Naval Facilities Engineering Systems Command

EXWC Engineering and Expeditionary Warfare Center

CONTRACT REPORT
CR-NAVFAC-EXWC-SH-22269
AUGUST 2022

FUEL TRANSFER SYSTEM INSPECTION REPORT

FUEL TRANSFER INFRASTRUCTURE ASSESSMENT

Red Hill Bulk Fuel Storage Facility, Hawaii (RHL)

Austin Brockenbrough and Associates, LLC

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Austin Brockenbrough & Associates, LLC (Brockenbrough) was retained by NAVFAC EXWC under Contract No. N3943020D2242, Delivery Order N3943022F4333 to perform an inspection of the fuel transfer system, supporting infrastructure, and appurtenances, including valves and any other corrosion prone equipment at the Red Hill Bulk Fuel Storage Facility (RHBFSF) at Joint Base Pearl Harbor Hickam (JBPHH). Included in this inspection is the [redacted] the 19-[redacted] diameter JP-5, and the 32-[redacted] diameter F-76 pipelines from harbor-side entrance to the underground pumphouse, including up to the Surge Tanks, to the Red Hill Bu k Tank Farm (BHTF). Also included is the supporting 4-[redacted] and 6-[redacted] Fuel Oil Reclaim pipelines that runs from RHTF to Tank S-311 located outside [redacted] 3.

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Naval Facilities Engineering Systems Command
EXWC Engineering & Expeditionary Warfare Center

FUEL TRANSFER SYSTEM INSPECTION REPORT

FUEL TRANSFER INFRASTRUCTURE ASSESSMENT
Red Hill Bulk Fuel Storage Facility, Hawaii (RHL)

Delivery Order No. N3943022F4333
A/E Contract No. N39430-20-D-2242

Submitted to:

Naval Facilities Engineering Command
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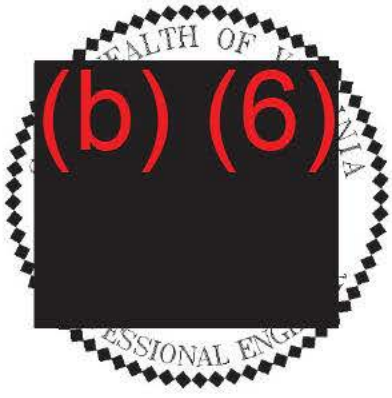

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ACRONYMS

API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
[redacted]	Barrels
BH	Bulk Head
CFR	Code of Federal Regulations
CML	Condition Monitoring Location
COR	Contracting Officer's Representative
DBB	Double Block and Bleed [Twin-Seal Valve]
DoD	Department of Defense
ECDA	External Corrosion Direct Assessment
FFS	Fitness For Service
FLC	Fleet Logistics Center
FOR	Fuel Oil Reclaim
FW	Flash Welded
GFI	Government Furnished Information
HPV	High Point Vent
ILI	In-Line Inspection
IMP	Integrity Management Plan
JBPHH	Joint Base Pearl Harbor-Hickam
LF-ERW	Low Frequency Electric Resistance Welded
LLC	Limited Liability Corporation
LPD	Low Point Drain
LRUT	Long-Range Ultrasonic Testing
MAOP	Maximum Allowable Operating Pressure
MAWP	Maximum Allowable Working Pressure
MOP	Maximum Operating Pressure
MOV	Motor Operated Valve
NAVFAC	Naval Facilities Engineering Systems Command
NAVFAC EXWC	NAVFAC Engineering and Expeditionary Warfare Center
NAVSUP	Naval Supply Systems Command
NDAA	National Defense Authorization Act
NDE	Non-Destructive Examination
NFPA	National Fire Protection Agency
NIWC	Naval Information Warfare Center
PAUT	Phased Array Ultrasonic Testing
POL	Petroleum, Oil, and Lubricants
[redacted]	Pounds per Square [redacted] Gauge
RHBFSF	Red Hill Bulk Fuels Storage Facility
RHTF	Red Hill Tank Farm
SOW	Scope of Work
SPCC	Spill Prevention Control and Countermeasures

[redacted]

UGPH	Underground Pumphouse
UFC	Unified Facilities Criteria
UT	Ultrasonic Testing
UTF	Upper Tank Farm
UTM	Ultrasonic Thickness Measurement

A. EXECUTIVE SUMMARY

Austin Brockenbrough & Associates, LLC (Brockenbrough) was retained by NAVFAC EXWC under Contract No. N3943020D2242, Delivery Order N3943022F4333 to perform an inspection of the fuel transfer system, supporting infrastructure, and appurtenances, including valves and any other corrosion prone equipment at the Red Hill Bulk Fuel Storage Facility (RHBFSF) at Joint Base Pearl Harbor Hickam (JBPHH). Included in this inspection is the (b) (3) (A) [redacted] pipelines from harbor-side entrance to the underground pumphouse, including up to the Surge Tanks, to the Red Hill Bulk Tank Farm (RHTF). Also included is the supporting (b) (3) (A) [redacted] pipelines that runs from the RHTF to Tank [redacted]311 located outside of [redacted] 3.

As required by this Delivery Order, Brockenbrough along with our subconsultants, InterSpec, LLC and E&I Hawaii, executed a pipeline inspection site visit to JBPHH. The inspection activities occurred during March 21, 2022, through May 23, 2022. This inspection was performed following the principles of API 570 and included external corrosion direct assessment (ECDA) of the pipelines, visual inspection of the pumps and other fuel system components, phased array ultrasonic testing (PAUT) of pipeline girth welds, and long-range ultrasonic testing (LRUT) of pipelines within concrete bulkheads. The following report was generated from the results of our field investigations, discussion with personnel, calculations, and analysis and represents the findings, assessments, recommendations, and conclusions developed during this project.

The current condition assessment is primarily based upon the inspection efforts made during our field investigation, and relevant supporting material provided in the government furnished information. We have assigned five easily understood levels of condition:

- Poor – The piping system is showing signs of significant integrity issues such as severe corrosion where significant pipe wall loss, greater than 50-percent, is present.
- Fair – The piping system is showing signs of moderate to severe integrity issues such as corrosion where pipe wall loss, greater than 40-percent but less than 50-percent, is present.
- Satisfactory – The piping system is showing signs of moderate integrity issues such as moderate corrosion where pipe wall loss, greater than 10-percent but less than 40-percent, is present.
- Good – The piping system shows signs of light to moderate corrosion where pipe wall loss, less than 10-percent, is present.
- Excellent – The piping system shows no signs of integrity issues or active corrosion.

The API 570 inspection and other advanced inspection methods performed on the fuel transfer systems at RHBFSF resulted in several findings and repair recommendations which have been prioritized into three categories:

- Mandatory/Urgent Repairs - Repairs identified as urgent are those that represent an immediate/major risk to personnel safety and/or the environment and have failed a fitness for

service evaluation. These are repairs that are critical to the hydraulic and structural integrity of the piping system and should be completed as soon as possible prior to defueling the RHTF.

- Long-Term Repairs - Repairs identified as long-term are those that do not pose an immediate risk to personnel safety and/or the environment. These repairs are not critical to the hydraulic and structural integrity of the piping system.
- Other Items of Note - Repairs or upgrades that could be addressed to upgrade the system piping to meet current military criteria or improve system operations but may not be warranted based on cost-benefit considerations and timeline of defueling the RHBFSF.

The decision has been made to close and defuel the Red Hill Bulk Fuel Storage Facility's fuel systems within the next five years. Therefore, the urgent recommendations included in this report are focused on system repairs needed to safely defuel the RHTF over the next 5 years. The only systems within the scope of this report that will remain in service after the fuel system closure of the RHBFSF is the UGPH. All the urgent and long-term deficiencies identified within the UGPH are recommended. These long-term deficiencies should be programmed for execution after defueling operations are complete.

In general, the piping systems at the RHBFSF are in fair to satisfactory condition and were found to be serviceable to support defueling operations. However, there were several identified mandatory/urgent deficiencies that should be corrected prior to performing defueling operations. Many of these urgent deficiencies are due to weeping fittings, severe external corrosion, and pitting, loose and/or missing fasteners on valves and other components, additional protective measures, and severe corrosion or damage on pipe supports and anchors. A complete list of repairs and deficiencies can be found in Section F of this report and are broken down between product and geographic locations.

The following is a summary of the major repairs recommended prior to defueling operations begin.

- Replacement of 22 steel pipe supports supporting the F-24 and JP-5 pipelines throughout the Harbor Tunnel.
- Replacement of 10 steel pipe supports supporting the FOR pipelines throughout [redacted] 3/Lower Access Tunnel.
- Repair of the two concrete pipe anchor bulkheads. (Deficiency Item Nos. [redacted] 44A and [redacted] 71A)
- Replacement of approximately 150 linear [redacted] of aboveground 6-[redacted] FOR pipe from Tanks [redacted] 311 isolation valve to aboveground/underground pipeline transition outside of [redacted] 3. (Deficiency Item No. FOR.059)
- Perform Borescope examination of underground FOR Pipeline at [redacted] 3. Note: This is not a repair but a requirement for further nondestructive examination of this pipe segment. This is currently under contract to be performed in the near future. (Deficiency Item No. FOR.055)
- Replacement of Tank 9 sample piping. (Deficiency Item No. FOR.031)
- Perform further NDE assessment of bell joint weld between [redacted] 572 and [redacted] 573 due to geometric anomaly/dent on the 18-[redacted] JP-5 pipeline. (Deficiency JP5.077)

Based on the LRUT investigation and results performed during this inspection, there were five (5) locations that have indications present that require follow-on verification to determine the extent and size of the indications. These locations should be inspected prior to performing defueling operations and they include:

- CML# [redacted] B8 (Between [redacted] 135 and [redacted] 136) – An indication (corrosion spot) was observed approximately 7 [redacted] past the concrete bulkhead, towards the tank gallery, underneath the pipe wrap. Location of indication is on the [redacted] pipeline. It is recommended that the pipe wrap be removed, and the pipeline be inspected at this location.
- CML# [redacted] B17 (Between [redacted] 239 and [redacted] 240) – An area of inactive pitting (approximately 0.050 [redacted] deep) with some large area scaling was identified. An additional two areas of possible corrosion of similar magnitude of pitting are suspected under the pipe wrap at this location. These areas are located on the (b) (3) (A) pipeline. It is recommended that the pipe wrap be removed, and the pipeline be further inspected at these locations.
- CML# [redacted] B21 (Between [redacted] 291 and [redacted] 292) – One confirmed indication was detected at approximately -402 to -411 [redacted] from setup on the (b) (3) (A) pipeline. There was also an indication identified at the pipeline to concrete saddle support [redacted] 195 on the (b) (3) (A) pipeline that will require additional investigation. This will require the pipe to be lifted off the concrete support or the pipe support removed and replaced to allow further inspection. It is recommended that follow-up inspection occur at both these locations.
- CML# [redacted] B26 (Between [redacted] 570 and [redacted] 571) – One indication was observed approximately -460 [redacted] from setup on the (b) (3) (A) pipeline. Indication is believed to be under the pipe wrap. It is recommended that the pipe wrap be removed at this location and further inspection of the pipe in this area be performed to confirm the extent of this indication.
- CML# [redacted] B26 (Between [redacted] 570 and [redacted] 571) – Two indications were noted approximately -976 [redacted] and -963 [redacted] from setup on the (b) (3) (A) pipeline. The indication is believed to be under pipe wrap. It is recommended that the pipe wrap be removed at this location and further inspection of the pipe be performed to confirm the extent of these indications.

The following is a summary of deficiencies for all four product pipelines within the RHBFSF.

	Quantity of Mandatory/Urgent Repairs	**Quantity of Long Term Repairs**	**Quantity of Other Items of Note**
F-24 Pipelines	19	31	16
JP-5 Pipelines	21	64	42
F-76 Pipeline	47	79	25
FOR Pipelines	22	43	1
Total	**109**	**217**	**84**

NOTE: Quantities include previous deficiencies identified in the 2016 and 2019 “Inspection and Repair of Red Hill Pipelines Report”.

The following is a summary of deficiencies for all pipe supports within the RHBFSF.

	Quantity of Mandatory/Urgent Repairs	Quantity of Long Term Repairs	Quantity of Other Items of Note
FOR Pipe Supports	12	199	34
Frame Pipe Supports (JP-5/F-24)	22	670	56
Concrete Sleepers (F-76)	2	61	553
UGPH Pipe Supports	-	26	96
Surge Tank Pipe Supports	-	9	9
Total	**36**	**965**	**748**

Disclaimer

Report is based on information known as of the date of the report and subject to revision should new information become available.

Photograph Release Statement

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B. INTRODUCTION

Austin Brockenbrough & Associates, LLC (Brockenbrough) was retained by NAVFAC EXWC under Contract No. N3943020D2242, Delivery Order N3943022F4333 to perform an inspection of the fuel transfer system, supporting infrastructure, and appurtenances, including valves and any other corrosion prone equipment at the Red Hill Bulk Fuel Storage Facility (RHBFSF) at Joint Base Pearl Harbor Hickam (JBPHH). Included in this inspection is the (b) (3) (A) the (b) (3) (A) and the (b) (3) (A) pipelines from the entrance to the underground pumphouse, including up to the Surge Tanks, to the RHBFSF. Also included is the supporting (b) (3) (A) pipelines that runs from the RHBFSF Tanks to Tank 311 located outside of 3.

As required by this Delivery Order, Brockenbrough along with our subconsultants, InterSpec, LLC and E&I Hawaii, executed a pipeline inspection site visit to JBPHH. Our inspection activities occurred during March 21, 2022, through May 23, 2022. This inspection was performed following the principles of API 570 and included External Corrosion Direct Assessment (ECDA) of the pipelines, visual inspection of the pumps and other fuel system components, phased array ultrasonic testing (PAUT) of pipeline girth welds, and long-range ultrasonic testing (LRUT) of pipelines within concrete bulkheads. The following report was generated from the results of our field investigations, discussion with personnel, and various calculations and analysis and represents the findings, assessments, recommendations, and conclusions developed during this project.

1. Infrastructure Assessment Objectives

The objective of this assessment is to conduct an inspection of the fuel transfer system, supporting infrastructure, and related POL appurtenances at the RHBFSF, report findings and provide recommendations, and provide an assessment of the overall condition of the POL piping systems.

The decision has been made to close and defuel the Red Hill Bulk Fuel Storage Facility's fuel systems within the next five years. Therefore, the urgent recommendations included in this report are focused on system repairs needed to safely defuel the RHTF over the next 5 years. The only systems, within the scope of this report, that will remain in service after the fuel system closure of the RHBFSF are the surge tanks and UGPH. All the urgent and long-term deficiencies identified within the UGPH are recommended. These long-term deficiencies should be programmed for execution after defueling operations are complete.

2. Project Scope

For the purposes of this assessment, the scope boundary and area of interest includes the JP-5, F-24, and F-76 pipelines from the Surge Tanks (Tanks 0221, 0222, 0223, and 0224), inside the Underground Pumphouse (UGPH), in the Harbor Tunnel, in the Lower Access Tunnel, and in the Red Hill Tank Gallery. The scope also includes the Fuel Oil Reclaim (FOR) pipelines from Tank 311,

outside of [redacted] 3, in the lower access tunnel, and in the Red Hill Tank Gallery. Our project scope of work includes the following pipeline inspection techniques and methodologies:

- Gathering of historical system data and review of Government Furnished Information (GFI).
- Performing a visual and hands-on pipeline inspection following the principles of API 570.
- Performing guided wave ultrasonic testing of piping portions passing through concrete bulkheads.
- Performing phased array ultrasonic testing (PAUT) of pipeline girth welds.
- Collecting ultrasonic thickness measurements on the pipelines to determine nominal pipeline wall thicknesses.

The systems included in this assessment are as follows:

- JP-5 – The JP-5 aviation kerosene grade fuel system includes the associated pipeline systems and support equipment.
- F-24 – The F-24 aviation kerosene grade fuel system includes the associated pipeline systems and support equipment.
- F-76 – The F-76 diesel grade fuel system includes the associated pipeline systems and support equipment.
- FOR – The FOR system contains untreated off-spec or contaminated product from the three main bulk fuel products (such as tank water bottoms) and includes the associated pipeline systems and support equipment that contain FOR.

The fuel systems are further broken down by sub-systems, or areas, as follows:

- UGPH – The UGPH which contains the primary distribution pumps, the Surge Tanks, and associated piping.
- Harbor Tunnel – The tunnel between the UGPH and RHTF containing the three primary bulk fuel pipelines.
- RHTF – The RHTF contains the 20 primary bulk fuel storage tanks and associated piping.
- [redacted] 3 Tunnel – FOR piping from Tank [redacted]311 to RHTF.

3. Use of this Report

This report identifies deficiencies within the RHBFSF and provides the urgency of when they should be performed to support defueling operations over the next five years. The engineering evaluation was performed by Brockenbrough and is supported by the supplemental API 570 Inspection Report performed by InterSpec, LLC and E&I Hawaii. The engineering evaluation includes all items identified within the API 570 report and any additional findings identified during our assessment. The full list of engineering evaluation findings and recommendations to support defueling can be found in Section F of this report. The API 570 report can be found in Appendix C. Note that the

urgency assigned to these findings within the engineering evaluation may be different than what is indicated within the API 570 report, as the engineering evaluation is tailored for the upcoming defuel timetable. When there is a discrepancy within this report, all findings and recommendations within Section F, including the urgency of the recommendations, shall govern. The API 570 report is to be used as a reference document to allow the reader access to additional information, photographs, and backup data. The Brockenbrough engineering team and their associated qualification are listed in Table 1 below.

4. Project Team

Table 1 below highlights the project team, roles, and contact information.

Table 1 - Project Team

NAME	PROJECT ROLE	CONTACT INFORMATION
NAVFAC EXWC		
(b) (6)	Contracting Officer	(b) (6)
	Contract Specialist	
	Project Manager	
	Design Manager	
BROCKENBROUGH PERSONNEL - PRIME		
(b) (6), PE Program Manager	Project Manager, API 570 Inspector, SSHO	(b) (6)
(b) (6), PE Director - Fuels Infrastructure	Project Engineer, API 570 Inspector, SSHO	
(b) (6), PE Principal	Field Team Supervisor, SSHO	
(b) (6), PE Sr. Project Manager	Mechanical Engineer, SSHO	
(b) (6), PE	Structural Engineer	
(b) (6)	CAD Technician	
INTERSPEC, LLC PERSONNEL (SUBCONSULTANT - API 570 INSPECTION)		
(b) (6)	PM, API 570 Inspector	(b) (6)
	API 570 Inspector, SSHO	
	Field Technician	

Table 1 - Project Team		
NAME	**PROJECT ROLE**	**CONTACT INFORMATION**
E&I HAWAII PERSONNEL (SUBCONSULTANT - PAUT NDE TECHNICIAN)		
(b) (6) [redacted]	NDE Technician/Specialist	Phone: (b) (6) [redacted]
(b) (6) [redacted]	NDE Technician/Specialist	Phone: (b) (6) [redacted]

C. FACILITY DESCRIPTION

1. Project Location

This pipeline assessment and inspection was performed at RHBFSF at JBPHH, Hawaii.

2. System Overview

Constructed around 1943, the RHBFSF consists of 20 underground storage tanks, an underground pumphouse, and a 3-mile tunnel containing product piping. The Red Hill storage tanks are bulk tanks that receive, store, and issue DLA-E capitalized JP-5, F-24, and F-76 to support NAVSUP Fleet Logistics Center (FLC) mission. The 20 tanks, which were mined inside Red Hill, are steel lined, concrete encased, and have an approximate storage capacity of 297,000 Tanks 1-4 are approximately 238 in and 100 in Tanks 5-20 are 250 in and are 100 in Fuel receipt into the Red Hill tanks is accomplished via transferring fuel from ships, pipeline receipt from the commercial refinery, or from the Upper Tank Farm (UTF) through aboveground pipelines within the Harbor Tunnel and Lower Access Tunnel uphill approximately three miles. Pumping operations uphill are accomplished by (b) fuel transfer pumps ranging from (b) (3) horsepower. The system also includes (b) underground Surge Tanks, with a capacity of (b) (3) (A) each, that act as an atmospheric buffer during fuel receipt operations. The pumphouse is configured such that the fuel transfer pumps can work in series or parallel as needed to match fuel receipt flowrates coming from ships and can provide enough head to successfully fill the farthest and highest tank. Fuel is issued, via gravity, from the Red Hill Storage Tanks to US Navy vessels, oilers, and barges at several piers and docks and to Hickam Field. The three main transfer pipelines that carry fuel to and from the Red Hill Tanks include a (b) (3) (A) pipeline. These pipelines are routed aboveground through the Harbor Tunnel and RHTF and are Service Class 3 per API 570.

There are two FOR systems at this facility: an upper and lower system. The system at RHTF, the upper system, is currently used to collect sump water from the Red Hill Tunnel Tank Gallery and water bottoms from the Red Hill Storage Tanks. FOR product is stored in one 1,000 AST, Tank 311, located adjacent to the 3 entrance. The FOR pipelines within the RHTF consist of a 4- pipeline header within a floor trench that is connected to each of the Red Hill Storage Tanks. Once the pipeline leaves the RHTF it transitions out of the trench adjacent to Sump Station 23 and increases in size to a 6- pipeline all the way through the lower access tunnel up to the flange on Tank 311. The FOR system at Pearl Harbor, the lower system, has two 14,000 aboveground storage tanks (ASTs), one 25,000 gal AST, and various associated piping for processing FOR. The reclaimed fuel can be issued to the truck fillstand or into the F-76 header. For the purposes of this assessment and inspection, we focused on the upper FOR system. The assessment and inspection of the lower FOR system at JBPHH is not in the scope of this contract.

Refer to Appendix A and B for detailed drawings showing the fuel system layout and schematics.

3. F-24 Pipelines

The following table summarizes the general pipeline information associated with the F-24 pipelines from the surge tanks, within the UGPH, through the tunnel system, and within the RHTF.

Table 2 - F-24 Pipeline Information	
Pipeline Identification:	(b) (3) (A) F-24 Pipeline
Current Service:	F-24 Aviation Turbine Fuel
Prior Services:	Unknown
Installation Date:	1942-1946
Location:	RHTF, Harbor Tunnel, UGPH
Pipeline Length:	(b) (3) (A) [redacted]
Pipe Material:	Carbon Steel, Similar Composition to API 5L and ASTM A53 (based on Pipe Pedigree Report)[1]
Flanges:	Class 300 in UGPH, Harbor Tunnel, and RHTF; Class 150 Flanges in RHTF; Types: Weld neck
Fittings:	Mitered joints; Fabricated Tees and Branch Connections; Factory Fabricated Tees, Elbows, and Components
Gasket Type:	Unknown
Fabrication Method(s):	(1) The seamed piping has both flash welded (FW) and low frequency electric resistance welded (LF-ERW) longitudinal seam welds.[1] (2) Girth welds: majority of piping is bell-bell-chill ring joints (possibly with backing rings). Remaining girth welds are standard butt welds.
Design Code:	ASME B31.3 (assumed)
Supporting Method:	Varies: (1) Supported on steel pipe supports with sacrificial pad welded to pipe at contact point with support approximately every 25 ft. (2) Cast directly into 26 concrete anchors/ bulkheads from UGPH up to RHTF. (3) Concrete Sleepers with Slides
Coating System	Varies: (1) Lead-Based Paint throughout system (original paint) (2) >50% of line has Pipe-Wrap (3) 1-Part System over Lead Primer
Nominal Pipe Diameters:	(b) (3) (A) [redacted]
Nominal Wall Thicknesses:	Primarily 0.25 in.
Maximum Allowable Operating Pressure (MAOP):	(b) (3) (A) [redacted]

4. JP-5 Pipelines

The following table summarizes the general pipeline information associated with the JP-5 Pipelines from the surge tanks, within the UGPH, through the tunnel system, and within the RHTF.

Table 3 - JP-5 Pipeline Information	
Pipeline Identification:	(b) (3) JP-5 Pipeline
Current Service:	JP-5 Aviation Turbine Fuel
Prior Services:	Unknown
Installation Date:	1942-1946
Location:	RHTF, Harbor Tunnel, UGPH
Pipeline Length:	(b) (3) (A) [redacted]
Pipe Material:	Carbon Steel, Similar Composition to API 5L and ASTM A53 (based on Pipe Pedigree Report)[1]
Flanges:	Class 300 in UGPH, Harbor Tunnel, and RHTF; Class 150 Flanges in RHTF; Types: Weldneck, slip-on
Fittings:	Mitered joints; Fabricated Tees and Branch Connections; Factory Fabricated Tees, Elbows, and Components
Gasket Type:	Unknown
Fabrication Method(s):	(1) The seamed piping has both flash welded (FW) and low frequency electric resistance welded (LF-ERW) longitudinal seam welds.[1] (2) Girth welds: majority of piping is bell-bell-chill ring joints (possibly with backing rings). Remaining girth welds are standard butt welds.
Design Code:	ASME B31.3 (assumed)
Supporting Method:	Varies: (1) Supported on steel pipe supports with sacrificial pad welded to pipe at contact point with support approximately every 25 ft. (2) Cast directly into 26 concrete anchors/ bulkheads from UGPH up to RHTF. (3) Concrete Sleepers with Slides
Coating System:	Varies: (1) Lead-Based Paint throughout system (original paint) (2) >50% of line has Pipe-Wrap (3) 1-Part System over Lead Primer
Nominal Pipe Diameters:	(b) (3) (A) [redacted]
Nominal Wall Thicknesses:	Primarily 0.25 in.
Maximum Allowable Operating Pressure (MAOP):	(b) (3) [redacted]

5. F-76 Pipelines

The following table summarizes the general pipeline information associated with the F-76 Pipelines from the surge tanks, within the UGPH, through the tunnel system, and within the RHTF.

Table 4 - F-76 Pipeline Information	
Pipeline Identification:	(b) (3) F-76 Pipeline
Current Service:	F-76 Marine Grade Diesel
Prior Services:	Heavy Fuel Oil (Unknown Time Period)
Installation Date:	1942-1946
Location:	RHTF, Harbor Tunnel, UGPH - Aboveground
Pipeline Length:	(b) (3) (A)
Pipe Material:	Carbon Steel, Unknown Specification (Assume ASTM A53)[1]
Flanges:	Class 300 in UGPH, Harbor Tunnel, and RHTF; Class 150 Flanges in RHTF; Types: Weld neck, slip-on
Fittings:	Mitered joints; Fabricated Tees and Branch Connections; Factory Fabricated Tees, Elbows, and Components
Gasket Type:	Unknown
Fabrication Method(s):	(1) The seamed piping has both flash welded (FW) and low frequency electric resistance welded (LF-ERW) longitudinal seam welds.[1] (2) Girth welds: majority of piping is bell-bell-chill ring joints (possibly with backing rings). Remaining girth welds are standard butt welds.
Design Code:	ASME B31.3 (assumed)
Supporting Method:	Varies: (1) Supported on concrete sleeper supports approximately every 25 ft. (2) Cast directly into concrete anchors/ bulkheads from UGPH up to RHTF. (3) Supported on steel pipe supports with sacrificial pad welded to pipe at contact point with support approximately every 25 ft.
Coating System:	Varies: (1) Lead-Based Paint throughout system (original paint) (2) >50% of line has Pipe-Wrap (3) 1-Part System over Lead Primer
Nominal Outer Diameters:	32 in. 20in. tank piping cross laterals 18 in. reduction for (4) Sectional DBB Isolation Valves
Nominal Wall Thicknesses:	Primarily 0.375 in.
Maximum Allowable Operating Pressure (MAOP):	(b) (3)

6. FOR Pipelines

The following table summarizes the general pipeline information associated with the FOR Pipelines from Tank S-311, through the tunnel system, and within the RHTF.

Table 5 - FOR Pipeline Information	
Pipeline Identification:	6" FOR Pipeline
Current Service:	Fuel Oil Reclaim (FOR)
Prior Services:	Unknown
Installation Date:	Unknown
Location:	RHTF, Lower Access Tunnel, [redacted] 3 to Tank S-311
Pipeline Length:	6,600 ft (approximately)
Pipe Material:	Carbon Steel, Unknown Specification (Assume ASTM A53)
Flanges:	Class 150 Flanges Types: Weld neck, slip-on
Fittings:	Mitered joints; LR elbows, STD tees and branch connections; Grooved Mechanical Fittings
Gasket Type:	Unknown
Fabrication Method(s):	Buttwelded pipe and Grooved Mechanical Fittings
Design Code:	ASME B31.3 (assumed)
Supporting Method:	Varies: (1) Fabricated Steel Supports (2) Stanchion Type Supports (3) Supported at approximately every 10-15 ft.
Coating System:	Unknown.
Nominal Outer Diameters:	6 in. Lower Access Tunnel to Tank S-311 4 in. (pipe trench within Red Hill Bulk Fuel Storage Facility)
Nominal Wall Thicknesses:	Primarily 0.275 in.
Maximum Allowable Operating Pressure (MAOP):	Unknown.

Tables 2-5 Footnotes:

1. In 2019, Enterprise Engineering Inc. (EEI) under contract to APTIM, completed a Pipe Pedigree Report on the pipelines within the RHBFSF. The results of the testing resolves that both the [redacted] are of an acceptable industry standard, equivalent to ASTM A53, Grade B piping. The chemistry, grade, and tensile strengths are of a high quality for the time of production. The FW piping seams were also metallurgically examined and tested to ensure that the weld quality factor was equal to one (1). In addition, extensive examinations were made in the tank gallery on the suspected LF-ERW piping utilizing ultrasonic phased array examinations of 100% of the LF-ERW piping. The results conclude that there is no LF-ERW piping within the Red Hill Facility which may be affected by seam weld cracks or other type of selective seam weld corrosion.

2. The F-24, JP-5, and F-76 piping systems are rated for an MAOP of 275 psig provided:

- All repairs and further investigations called for in 2010 EEI Surge Analysis report are completed.
- All repairs and further investigations called for in 2019 APTIM/EEI Inspection and Repair of Red Hill Pipelines are completed.
- Dresser Coupling investigations are completed, and they are found to be rated for 275 MAOP.
- Piping is braced off the tank at every location.
- Installed materials that will be subjected to full line pressure are rated for 275 [redacted]
- All urgent repairs and further investigations called for in this report are completed.

3. Per the DoD Defueling Plan of the Red Hill Bulk Fuels Storage Facility an evaluation to confirm all ratings of piping and hoses between the Red Hill and Pier Facilities is currently under contract.

D. INSPECTION METHODOLOGY

The pipeline inspections of the RHBFSF were performed by representatives from Brockenbrough, InterSpec, LLC, and E&I Hawaii. Pipeline inspection activities occurred over a 9-week period between March 21 through May 23, 2022. The pipeline inspection followed the principles of API 570. The following is a summary of inspection techniques that were implemented to perform the assessment of the piping systems within the RHBFSF. Refer to Appendix C – API 570 Inspection Report for more information.

1. References

The following references were used in the collection of data, inspection, and assessment of the piping systems at RHBFSF:

- API 570 Piping Inspection Code
- API 574 Inspection Practices for Piping System Components
- API 577 Welding Inspection and Metallurgy
- ASME B31.3 Process Piping
- ASME B31G Manual for Determining Remaining Strength of Corroded Pipelines
- 40 CFR 112 Oil Pollution Prevention
- NFPA 30 Flammable and Combustible Liquids Code
- UFC 3-460-01 Design: Petroleum Fuel Facilities
- UFC 3-460-03 O&M: Maintenance of Petroleum Systems

Additional references and criteria can be found in the API 570 Inspection Report in Appendix C.

2. External Visual and Hands-On API 570 Inspection

The purpose of the external visual and hands-on API 570 Inspection is to find and locate conditions or areas of concern that compromise the integrity of the piping. Areas of concern included but are not limited to metal-to-metal contact, corrosion, deteriorated coating systems, weeping joints or fittings, and damaged or deteriorated pipeline supporting mechanisms. The external visual and hands-on inspection was performed on the following pipeline segments and wetted system components under this project scope of work:

- (b) (3) (A) JP-5 Pipelines from the Surge Tanks to the RHTF including the (b) (3) (A) tank lateral piping.
- (b) (3) (A) F-24 Pipelines from the Surge Tanks to the RHTF including the (b) (3) (A) tank lateral piping.
- (b) (3) (A) F-76 Pipelines from the Surge Tanks to the RHTF including the (b) (3) (A) lateral piping.

- 6-[redacted] FOR pipelines from Tank [redacted]311 to the RHTF including the small ancillary piping within the trenches, etc.
- All fuel transfer pumps, valves, and other wetted components installed within the four product systems.
- All associated POL pipeline supports within the RHBFSF.

3. Long-Range Ultrasonic Testing (LRUT)

LRUT uses guided wave technology and excites low-frequency ultrasonic waves that travel the [redacted] of a piping system to detect wall thickness variations. It is an advanced non-destructive inspection technique. Our inspection team performed LRUT at locations where visual/hands-on inspection activities are not possible, such as where piping passes through concrete bulkheads or pipe anchors, etc. InterSpec, LLC performed LRUT at a total of 20 locations throughout the Red Hill Complex. Our team primarily focused on the concrete bulkhead penetrations associated with the JP-5, F-24, and F-76 pipelines.

4. Weld Examination and Inspection – Phase Array Ultrasonic Testing (PAUT)

To check welds for service-induced cracking/fatigue, PAUT was completed on 86 girth welds throughout the POL pipeline systems. PAUT is an advanced non-destructive inspection technique that uses a set of ultrasonic testing (UT) probes made up of small elements which are pulsed individually with computer-calculated timing or phasing. PAUT was performed by technicians from E&I Hawaii. The following is a breakdown of the pipeline girth welds that were examined by PAUT.

- Three within the Surge Tank Piping Gallery (one for each product: JP-5, F-24, and F-76)
- Nine within the UGPH (three per product: JP-5, F-24, and F-76)
- 56 within the Harbor Tunnel (19 per product: JP-5, F-24, and F-76)
- 18 within the tank gallery (six per product: JP-5, F-24, and F-76)

NOTE: PAUT was not performed on the FOR piping systems because the piping system is an ancillary piping system, is predominately constructed of grooved mechanical fittings, is not under constant pressure, and is not subject to higher system pressure as the main fuel piping associated with the F-24, JP-5, and F-76 pipelines.

5. Ultrasonic Thickness Measurements (UTMs)

Ultrasonic thickness measurements (UTMs) were taken at numerous locations throughout the piping systems. The primary purpose of collecting UTMs is to establish and identify the nominal pipe thickness of the piping. UTMs were also taken at areas on the piping systems that were subjected to severe corrosion and where pipe thickness/wall loss was present. These measurements were collected and will be used to further evaluate pipeline integrity and fitness-for-service, e.g. corrosion rates, remaining life calculations, minimum wall thickness, etc.

6. Pipe Support Observation

For each of the above referenced fuel lines, a visual condition observation of the pipe supports was performed. Supports were evaluated on several criteria, including general support type; support material deterioration; pipe support connection to ground, wall, or ceiling; and adequate pipe protection through the use of isolation pads and sleeves. Each support on each fuel line was numbered and catalogued, with support descriptions and deficiencies noted, described, and photographed.

7. Validation of 2016 and 2019 Piping Repair Recommendations

In 2016 and 2019, an "Inspection and Repair of Red Hill Pipelines Report" was completed by Enterprise Engineering, Inc. Our scope of work included validation and determination of which repairs have been completed and which repairs are still valid from this report. A table summary of the deficiencies, recommendations, and status is included in Section F, Table 14. Note, the deficiencies identified from the smart pigging/ILI operations could not be validated due to difficulty in determining the location of the anomalies with respect to the pipeline pig runs lengths/distances and start/ending points.

The following table provides a summary of the above-mentioned inspection methodologies:

Table 6 - Inspection Techniques

Pipe Segment	System	External Visual	Hands-On API 570	PAUT	LRUT	GFI Review and Historical Document Review
UGPH	(b) (3) (A)	X	X	X	X	X
		X	X	X	X	X
		X	X	X	X	X
Harbor Tunnel		X	X	X	X	X
		X	X	X	X	X
		X	X	X	X	X
[redacted] 3		X	X	-	-	X
Lower Access Tunnel		X	X	-	-	X
RHTF		X	X	X	X	X
		X	X	X	X	X
		X	X	X	X	X
		X	X	-	-	X

E. CONDITION ASSESSMENT

The current condition assessment is primarily based upon the inspection efforts made during our field investigation from March 21 through May 23, 2022, and relevant supporting material provided in the government furnished information. We have assigned five easily understood levels of condition:

- Poor – The piping system is showing signs of significant integrity issues such as severe corrosion where significant pipe wall loss, greater than 50-percent, is present.
- Fair – The piping system is showing signs of moderate to severe integrity issues such as corrosion where pipe wall loss, greater than 40-percent but less than 50-percent, is present.
- Satisfactory – The piping system is showing signs of moderate integrity issues such as moderate corrosion where pipe wall loss, greater than 10-percent but less than 40-percent, is present.
- Good – The piping system shows signs of light to moderate corrosion where pipe wall loss, less than 10-percent, is present.
- Excellent – The piping system shows no signs of integrity issues or active corrosion.

All pipe support deficiencies were noted during the condition observation, performed during the field investigation from March 21 through April 2, 2022, and are available in detail in Appendix F - Pipe Support Assessment. On many supports, there were multiple areas of deterioration, varying in severity. Only one condition assessment level was assigned to each pipe support, however, corresponding to the most severe deterioration observed on the support. The condition levels for pipe support assessment are similar to the pipe condition assessment levels above:

- Poor – One or more of the support components shows severe or complete deterioration and is either barely useable or not providing the intended load transfer and must be replaced within five years.
- Fair – One or more of the support components shows deterioration but should be able to remain in service for at least five years or longer with proper maintenance.
- Satisfactory – One or more of the support components shows minor deterioration but should be able to remain in service for the design lifespan with proper maintenance.
- Good – Few of the support components shows any deterioration. The support should be able to remain in service for the design lifespan with proper maintenance.
- Excellent – Support components are new and do not show any sign of deterioration. The support should be able to remain in service for the design lifespan with proper maintenance.

For a more detailed condition assessment of each individual valve and other system components, refer to 2022 “Lifecycle Sustainment Plan Report”.

1. F-24 System Assessment

The F-24 fueling system at the RHBFSF provides receipt, storage, and transfer of F-24 aviation fuel to support operations at JBPHH. (b) (3) (A) Fuel is then issued or transferred by gravity from the RHTF to other facilities on JBPHH.

a. **UGPH -** The facility was generally found to be in fair to good condition considering it has been operated continuously since 1943. The F-24 pipelines and system components within the UGPH can be fully serviceable to support the upcoming defuel operations with a few system upgrades and/or repairs.

1) Piping – The F-24 pipelines within the UGPH were found to be in good condition. The coating systems are relatively intact with only a few areas of coating failure observed throughout the facility. There was no notable corrosion on the piping systems within the UGPH. However, there were several flanges and threaded fittings throughout the facility with evidence of past and/or active weeping that require further maintenance. Many of these locations were at low point drains, high point vents, and pipeline instrumentation connections throughout the facility. Additionally, it was observed that the dresser couplings on the pump suction and discharge piping had loose nuts on the retaining rods and require further maintenance. It was also noted that the dresser coupling lugs on the pump suction side were installed backwards.

2) Fuel Transfer Pumps and – The fueling pumps are the original pumps that were installed back in 1943. The pumps are in fair condition but are showing signs of age and general wear. There is some coating failure on the pump casings, but no noticeable corrosion was present. At this advanced age, the fuel pumps have required maintenance of the pump bearings and have experienced shaft alignment issues.

3) Valves and Other Components – The valve types found in the UGPH include DBB valves, ball valves, gate valves, butterfly valves, pressure relief valves, and hydraulically operated control valves. The valves were found to be in good condition except for the gate valves and pressure relief valves. The gate valves are original equipment and are weeping and frequently require maintenance and service. The (b) (3) (A) relief valves (Cla-Val) have noticeable fuel weeps and require maintenance and repair.

4) Pipe Supports – The pipe supports in the UGPH include concrete sleepers and painted steel frame supports in several configurations to accommodate the tight piping spacing. In general, the supports in the UGPH are all in satisfactory, good, or excellent condition. No pipe support maintenance is required in the UGPH to facilitate safe defueling operations, though routine maintenance will be needed for the piping systems that are to remain in service after defueling operations are complete.

b. **Harbor Tunnel –** The Harbor Tunnel F-24 piping system features primarily a (b) (3) carbon steel bi-directional transfer line. This line is routed approximately 8 above the finished floor and is supported by regular spaced steel pipe supports. At various locations, the piping is anchored into concrete bulkheads. There are three DBB isolation valve stations located throughout the Harbor Tunnel.

1) Piping – The F-24 piping system within the Harbor Tunnel was found to be in generally satisfactory to good condition. The pipeline coating system within the Harbor Tunnel was found to be in generally poor to fair condition. There are many instances of coating failure and resultant light to moderate corrosion noted throughout. But no areas of severe corrosion or significant pitting was noted that would affect future operations. There were also many instances of pipe wrap system failure, exposing piping to accelerated corrosion at contact points.

2) Valves and Other Components – The isolation valves within the Harbor Tunnel are in satisfactory condition with only minor coating failure and loose or missing fasteners noted. There were minor fuel weeps observed throughout the Harbor Tunnel. These areas included threaded piping connections associated with the LPDs and HPVs.

3) Pipe Supports – The F-24 pipe supports in the Harbor Tunnel are primarily painted steel built-up frames made from plates and angles and bolted to both the floor and the tunnel wall. Both the F-24 and JP-5 pipes are supported on the same frame supports. Most of these frame supports are in satisfactory or fair condition and will not require repair before defueling, but some supports are in poor condition and will need to be replaced prior to defueling operations. Severe deterioration was noted, primarily at the column baseplates and wall anchorage locations. Concrete bulkhead anchors are also located periodically throughout the Harbor Tunnel, some of which show concrete deterioration, and which will also require repair prior to defueling.

c. **RHTF –** The F-24 system within the RHTF includes the (b) (3) (A) pipeline and the system tank issue and receipt cross laterals, which are (b) (3) in (b) (3) (A) storage tanks, with the capacity to cross connect into (b) (3) (A) if needed.

1) Piping – The piping system within the RHTF was found to be in generally satisfactory condition. Many instances of coating failure and resultant corrosion were noted, but most were not severe enough to affect operations in the near future. There were several locations where minor fuel weeps were evident, mainly observed at threaded pipe connections throughout the RHTF.

2) Pipe Supports – The pipe supports in the RHTF are primarily painted frame supports with two columns to the ground, or one column and a wall anchorage. In general, these

supports are in satisfactory to good condition, and will not require repair before defueling operations. Some supports showed local corrosion or member deformation, however, and will need to be repaired or replaced prior to defueling operations.

Several urgent deficiencies associated with the F-24 piping systems were noted throughout the facility and should be addressed prior to beginning any defueling operations. Refer to Tables 7 and 8 for a complete list of deficiencies identified.

2. JP-5 System Assessment

The JP-5 fueling system at the RHBFSF provides receipt, storage, and transfer of JP-5 aviation fuel to support operations at JBPHH. (b) (3) (A) [redacted] Fuel is then issued or transferred by gravity from the RHTF to other facilities on JBPHH.

a. **UGPH -** The facility was generally found to be in fair to good condition considering it has been operated continuously since 1943. The JP-5 pipelines and system components within the UGPH can be fully serviceable to support the upcoming defuel operations with a few system upgrades and/or repairs.

1) Piping – The JP-5 pipelines within the UGPH were found to be in good condition. The coating systems are relatively intact with only a few areas of coating failure observed throughout the facility. There was no notable corrosion on the piping systems within the UGPH. However, there were several flanges and threaded fittings throughout the facility with evidence of past and/or active weeping that require further maintenance. Many of these locations were at low point drains, high point vents, and pipeline instrumentation connections throughout the facility. Additionally, it was observed that the dresser couplings on the pump suction and discharge piping had loose nuts on the retaining rods and requires further maintenance. It was also noted that the dresser coupling lugs on the pump suction side were installed backwards.

2) Fuel Transfer Pumps [redacted] and [redacted] – The fueling pumps are the original pumps that were installed back in 1943. The pumps are in fair condition but are showing signs of age and general wear. There is some coating failure on the pump casings, but no noticeable corrosion was present. There were some minor hairline cracks observed on the concrete pump bases, but these do not appear to be of any concern. At this advanced age, the fuel pumps have required maintenance of the pump bearings and have experienced shaft alignment issues.

3) Valves and Other Components – The valve types found in the UGPH include DBB valves, ball valves, gate valves, butterfly valves, pressure relief valves, and hydraulically operated control valves. The valves were found to be in good condition except for the gate valves

and pressure relief valves. The gate valves are original equipment and are weeping and require frequent maintenance and service. The (b) (3) (A) [redacted] relief valves (Cla-Vals) have noticeable fuel weeps and require maintenance and repair.

4) Pipe Supports - The pipe supports for all lines in the UGPH include concrete sleepers and painted steel frame supports in several configurations to accommodate the tight pipe spacing. In general, the supports in the UGPH are all in satisfactory, good, or excellent condition. No pipe support maintenance is required in the UGPH to facilitate safe defueling operations, though routine maintenance will be needed for the piping systems that are to remain in service after defueling operations are complete.

b. **Harbor Tunnel -** The Harbor Tunnel JP-5 piping system features primarily an (b) (3) (A) [redacted] transfer line. This line is routed approximately 6 [redacted] above the finished floor and is supported by regular spaced steel pipe supports. At various locations, the piping is anchored into concrete bulkheads. There are three DBB isolation valve stations located throughout the Harbor Tunnel.

1) Piping – The piping system within the Harbor Tunnel was found to be in generally satisfactory to good condition. The pipeline coating system within the Harbor Tunnel was found to be in generally poor to fair condition. There were many instances of coating failure and resultant light to moderate corrosion noted throughout. The exception to this is seven areas of severe external corrosion and pitting were identified with pipe wall loss ranging from 38 percent to 60 percent. ASME B31G level 1 FFS evaluation was performed at these locations. Our analysis did not identify any locations in which the resultant remaining wall thickness of the pipe failed FFS evaluation. However, long term consideration should be given to replacing these sections of pipe. There were also many instances of pipe wrap system failure, exposing piping to accelerated corrosion at contact points.

2) Valves and Other Components – The isolation valves within the Harbor Tunnel are in satisfactory condition with only minor coating failure noted and issues with oil weeping from valve gear boxes. There were minor fuel weeps observed throughout the Harbor Tunnel. These areas included threaded piping connections associated with the LPDs and HPVs.

3) Pipe Supports - The JP-5 pipes in the Harbor Tunnel are supported on the same frames as the F-24 line; primarily painted steel built-up frames made from plates and angles and bolted to both the floor and the tunnel wall. As discussed in the F-24 pipe support description, most of these frame supports are in satisfactory or fair condition and will not require repair before defueling, but some supports were in poor condition and will need to be replaced prior to defueling operations. Severe deterioration was noted, primarily at the column baseplates and wall anchorage locations. Concrete bulkhead anchors were also

located periodically throughout the Harbor Tunnel, some of which exhibit concrete deterioration and will also require repair prior to defueling.

c. **RHTF -** The JP-5 system within the RHTF includes the (b) (3) (A) [redacted] pipeline and the system tank issue and receipt cross laterals, which are (b) (3) [redacted] in [redacted] (b) (3) (A) [redacted]

1) Piping – The piping system within the RHTF was found to be in generally satisfactory condition. Many instances of coating failure and resultant corrosion were noted, but most were not severe enough to affect operations in the near future. There were several locations where minor fuel weeps were evident, mainly observed at threaded pipe connections throughout the RHTF.

2) Pipe Supports - The JP-5 pipe supports in the RHTF are the same primarily painted frame supports with two columns to the ground, or one column and a wall anchorage as support both the F-24 and F-76 lines. In general, these supports are in satisfactory to good condition, and will not require repair before defueling operations. Some supports showed local corrosion or member deformation, however, and will need to be repaired or replaced prior to defueling operations.

Several urgent deficiencies associated with the JP-5 piping systems were noted throughout the facility and should be addressed prior to beginning any defueling operations. Refer to Table 9 for a complete list of deficiencies identified.

Note: The JP-5 pipeline was undergoing repairs during our inspection to correct the damage that occurred during the May 6th, 2021 pipeline event.

3. F-76 System Assessment

The F-76 fueling system at the RHBFSF provides receipt, storage, and transfer of F-76 diesel fuel to support operations at JBPHH. (b) (3) (A) [redacted] Fuel is then issued or transferred by gravity from the RHTF to other facilities on JBPHH.

a. **UGPH -** The facility was generally found to be in fair to good condition considering it has been operated continuously since 1943. The F-76 pipelines and system components within the UGPH can be fully serviceable to support the upcoming defuel operations with a few system upgrades and/or repairs.

1) Piping – The F-76 pipelines within the UGPH were found to be in good condition. The coating systems are relatively intact with only a few areas of coating failure observed throughout the facility. There was no notable corrosion on the piping systems within the

UGPH. However, there were several flanges and threaded fittings throughout the facility with evidence of past and/or active weeping that require further maintenance. Many of these locations were at low point drains, high point vents, and pipeline instrumentation connections throughout the facility. Additionally, it was observed that the dresser couplings on the pump suction and discharge piping had loose nuts on the retaining rods and require further maintenance. It was also noted that the dresser coupling lugs on the pump suction side were installed backwards.

2) Fuel Transfer Pumps [redacted] – The fueling pumps are the original pumps that were installed back in 1943. Pump [redacted] appeared to be out of service undergoing maintenance during our inspection. The pumps are in fair condition but are showing signs of age and general wear. There is some coating failure on the pump casings, but no noticeable corrosion was present. At this advanced age, the fuel pumps have required maintenance of the pump bearings and have experienced shaft alignment issues.

3) Valves and Other Components – The valve types found in the UGPH include DBB valves, ball valves, gate valves, butterfly valves, pressure relief valves, and hydraulically operated control valves. The valves were found to be in good condition except for the gate valves and pressure relief valves. The gate valves are original equipment and are weeping and require frequent maintenance and service. The 4-[redacted] pressure relief valves (Cla-Vals) have noticeable fuel weeps and require maintenance and repair.

4) Pipe Supports – The pipe supports for all lines in the UGPH include concrete sleepers and painted steel frame supports in several configurations to accommodate the tight piping spacing. In general, the supports in the UGPH are all in satisfactory, good, or excellent condition. No pipe support maintenance is required in the UGPH to facilitate safe defueling operations, though routine maintenance will be needed for the piping systems that are to remain in service after defueling operations are complete.

b. **Harbor Tunnel -** The Harbor Tunne[redacted] transfer line. This line is routed approximately 3[redacted] above the finished floor and is supported by regular spaced concrete pipe supports. At various locations, the piping is anchored into concrete bulkheads. There are three DBB isolation valve stations located throughout the Harbor Tunnel.

1) Piping – The piping system within the Harbor Tunnel was found to be in generally satisfactory to good condition. The pipeline coating system within the Harbor Tunnel was found to be in generally poor to fair condition. There were many instances of coating failure and resultant light to moderate corrosion noted throughout. But most were not severe enough to affect operations in the near future. The exception to this is five areas of severe external corrosion and pitting were identified with pipe wall loss ranging from 29 percent to 46 percent. ASME B31G level 1 FFS evaluation was performed at these

locations. Our analysis identified that these locations were acceptable for continued operations. There were also many instances of pipe wrap system failure, exposing piping to accelerated corrosion at contact points.

2) Valves and Other Components – The isolation valves within the Harbor Tunnel are in satisfactory condition with only minor coating failure noted and issues with oil weeping from valve gear boxes. There were minor fuel weeps observed throughout the Harbor Tunnel. These areas included threaded piping connections associated with the LPDs and HPVs.

3) Pipe Supports – The F-76 pipe supports in the Harbor Tunnel are concrete sleepers with embedded steel saddles. In general, these supports are in satisfactory to good condition, with minor concrete chipping and efflorescence where the concrete has been exposed to water. With few exceptions, which are noted in the following tables, these supports do not need repair before defueling operations begin.

c. **RHTF -** The F-76 system within the RHTF includes the [redacted] and the system tank issue and receipt cross laterals, which are [redacted]

1) Piping – The piping system within the RHTF was found to be in generally satisfactory condition. Many instances of coating failure and resultant corrosion were noted, but most were not severe enough to affect operations in the near future. There were several locations where minor fuel weeps were evident, mainly observed at threaded pipe connections throughout the RHTF.

2) Pipe Supports – The F-76 pipe shares the same painted steel frame supports as the F-24 and JP-5 pipes in the RHTF. In general, these supports are in satisfactory to good condition, and will not require repair before defueling operations. Some supports showed local corrosion or member deformation, however, and will need to be repaired or replaced prior to defueling operations.

Several urgent deficiencies associated with the F-76 piping systems were noted throughout the facility and should be addressed prior to beginning any defueling operations. Refer to Tables 10 and 11 for a complete list of deficiencies identified.

4. FOR System Assessment

The FOR collection and transfer system at the RHBFSF provides capture, transfer, and storage of FOR type waste from various operational systems at JBPHH. FOR is collected within the piping tunnel system through various sumps and drains and is then transferred to the FOR storage facility,

Tank [redacted]311, located outside at [redacted] 3. The FOR product is stored at this location until it can be issued to a truck for ultimate removal and disposal.

a. [redacted] **3 –** FOR product piping at [redacted] 3 consists of 6-[redacted] welded pipe. The piping is routed from the [redacted] 3 entrance to Tank [redacted]311.

1) Piping – In general, the FOR product piping system at [redacted] 3 was found to be in poor condition. The coating was in poor to fair condition and has failed, with resultant corrosion noted at several locations throughout. The corrosion was such that replacement of sections of the FOR product line are recommended as soon as possible. Refer to the following deficiency table in the "Findings and Recommendation" section of this report for locations and severity of corrosion. A borescope internal inspection of the underground piping segment at the entrance to [redacted] 3 has been recommended to confirm the condition where piping is not accessible.

2) Pipe Supports – At [redacted] 3, the FOR pipe supports are primarily painted steel saddles or stanchions bolted to concrete pads. They are generally in satisfactory to good condition and do not require repair before defueling operations.

b. **Lower Access Tunnel -** FOR product piping in the Lower Access Tunnel consists of 6-[redacted] grooved mechanical connected pipe. The piping is routed from Sump [redacted]23 at the RHTF to [redacted] 3 entrance.

1) Piping - FOR piping within the Lower Access Tunnel was found to be in generally satisfactory condition, with some instances of coating failure and resultant minor to moderate corrosion noted. A few joints were observed to be weeping and require further maintenance. There was a segment of 4-[redacted] piping within the pipe trench adjacent to Sump [redacted]23 where the pipeline was showing significant wall loss and had been previously repaired with three temporary pipe clamps. Note, the entire FOR pipeline within the Lower Access Tunnel from Sump [redacted]23 to [redacted] 3 entrance is being recoated as part of the "FLC POL Pipeline Repairs" project (E-Project Work Order No. 1615884). The temporary pipe clamps are also being removed and replaced with a pipe pup under this project as well.

2) Pipe Supports – There are primarily three types of FOR pipe supports in the Lower Access Tunnel. The first type is a wall mounted support consisting of a double cradle made of built-up bar stock painted and attached to the wall at two locations. The upper cradle supports the FOR pipe and the lower cradle is empty. The second type is a frame support consisting of painted frames made from built-up steel angle with a column attached to the floor and two arms attached to the wall. These frames support the FOR line on one arm and other piping on a second arm. The third type of frame is a galvanized Unistrut or angle frame with two columns to the ground and the FOR pipe strapped or u-bolted to a Unistrut or angle cross member. All three types of support are generally in satisfactory condition.

Several of the wall mounted supports show severe corrosion and loss of anchorage and must be replaced before defueling operations begin. Many of the frames are missing isolation pads or otherwise have metal-to-metal contact, which must be replaced if the line is to remain in service.

c. **RHTF -** FOR product piping within the RHTF consists primarily of a [redacted] header pipe and [redacted] laterals to each tank, mostly located in a shallow floor trench throughout the facility. FOR product is transferred from the storage tanks through the 4-[redacted] carbon steel piping to the aboveground storage facility outside of [redacted] 3.

1) Piping – FOR piping within the RHTF was found to be in generally satisfactory to good condition, with some instances of minor coating failure and other deficiencies.

2) Pipe Supports – In the RHTF, the FOR pipe is located in a trench in the floor and is supported by I-beam lengths, generally on their sides. These supports are frequently corroded or shimmed with wood pieces, but do not need to be replaced for defueling operations.

Several urgent deficiencies associated with the FOR piping systems were noted throughout the facility and should be addressed prior to beginning any defueling operations. Refer to Tables 12 and 13 for a complete list of deficiencies identified.

F. FINDINGS AND RECOMMENDATIONS

The API 570 inspection and other advanced inspection methods performed on the fuel transfer systems at RHBFSF resulted in several findings and repair recommendations which have been prioritized into three categories:

- Mandatory/Urgent Repairs - Repairs identified as urgent are those that represent an immediate/major risk to personnel safety and/or the environment and have failed a fitness for service evaluation. These are repairs are critical to the hydraulic and structural integrity of the piping system and should be completed as soon as possible prior to defueling the RHTF.
- Long-Term Repairs - Repairs identified as long-term are those that do not pose an immediate risk to personnel safety and/or the environment. These repairs are not critical to the hydraulic and structural integrity of the piping system.
- Other Items of Note - Repairs or upgrades that could be addressed to upgrade the system piping to meet current military criteria or improve system operations but may not be warranted based on cost-benefit considerations and timeline of defueling the RHBFSF over the next five years.

For additional information and photographs of the deficiencies refer Appendix C – API 570 Inspection Report. For pipe support deficiencies classifications, only Urgent repairs have been included in the following tables. For a list of all pipe support deficiencies, including long term repairs and other items of note, see Appendix F – Pipe Support Assessment. The pipe supports for the F-24 and JP-5 pipelines throughout the system share common pipe support frames and are included in Table 8 – F-24/JP-5 Pipe Support Findings and Recommendations. For approximate locations of the deficiencies refer to Appendix B – System Drawings. The list of deficiencies which have been sorted by urgency are included in Appendix G – Sorted Tables – Findings and Recommendations for quick reference.

1. LRUT Results

The primary purpose in performing LRUT was to investigate locations where access for inspection of the pipeline was not physically possible via traditional hands on and visual methods, e.g. concrete bulkhead and at concrete supports. The LRUT data that was collected were field analyzed for accuracy, signal amplitude, and range. Much of the data that was captured and analyzed indicated that the piping was in satisfactory condition with no indications within the detectible limits of the LRUT equipment. There were five (5) locations that have indications present that require follow-on verification to determine the extent and size of the indications. These locations include:

- CML# [redacted] B8 (Between [redacted] 135 and [redacted] 136) – An indication (corrosion spot) was observed approximately 7 [redacted] past the concrete bulkhead, towards the tank gallery, underneath the pipe wrap. Location of indication is on the (b) (3) (A) [redacted] It is recommended that the pipe wrap be removed, and the pipeline be inspected at this location.

- CML# [redacted] B17 (Between [redacted] 239 and [redacted] 240) – An area of inactive pitting (approximately 0.050 [redacted] deep) with some large area scaling was identified. An additional two areas of possible corrosion of similar magnitude of pitting are suspected under the pipe wrap at this location. These areas are located on the [redacted] It is recommended that the pipe wrap be removed, and the pipeline be further inspected at these locations.

- CML# [redacted] B21 (Between [redacted] 291 and [redacted] 292) – One confirmed indication was detected at approximately -402 to -411 [redacted] from setup on the [redacted] There was also an indication identified at the pipeline to concrete saddle support [redacted] 195 on the [redacted] that will require additional investigation. This will require the pipe to be lifted off the concrete support or the pipe support removed and replaced to allow further inspection. It is recommended that follow-up inspection occur at both these locations.

- CML# [redacted] B26 (Between [redacted] 570 and [redacted] 571) – One indication was observed approximately -460 [redacted] from setup on the [redacted] Indication is believed to be under the pipe wrap. It is recommended that the pipe wrap be removed at this location and further inspection of the pipe in this area be performed to confirm the extent of this indication.

- CML# [redacted] B26 (Between [redacted] 570 and [redacted] 571) – Two indications were noted approximately -976 [redacted] and -963 [redacted] from setup on the [redacted] The indication is believed to be under pipe wrap. It is recommended that the pipe wrap be removed at this location and further inspection of the pipe be performed to confirm the extent of these indications.

Refer to Appendix C – API 570 Inspection Report for additional information on the locations, techniques applied, and results related to the LRUT inspection.

2. PAUT Weld Examination Results

The primary purpose of the PAUT weld examination was to detect any service induced defects such as cracking or erosion/corrosion that may be present in the girth welds. The selection of the 86 welds is intended to be representative sample of the piping and were performed at areas that could see higher stresses due to pipe movement, anchorage/restraint, and cyclic stresses. The locations of PAUT on the selected welds was based on pipe movement and anticipated and/or potential exposure of shear and bending stress due to operating conditions. The PAUT data indicated that there are no service induced defects on any of the welds that were tested. For the exact locations PAUT was performed, techniques applied, and results refer to Appendix C – API 570 Inspection Report.

3. Hands-on and Visual Examination Results

The primary purpose of the hands-on visual examination was to detect areas of corrosion and pipeline integrity issues. The findings and recommendations are presented in the following tables separated by product.

4. Validation of 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report

Refer to Table 14 for these deficiencies and status and recommendations.

Table 7 - F-24 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F24.001		PM-19 PM-20 PM-21 PM-22	RHTF	(b) (3) (A)	Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
F24.002			RHTF		Tank sample piping downstream of the isolation valves are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
F24.003	A1		RHTF		Brass/bronze valve (low melting point) attached to the blind flange of the (b) (3) (A) Rating of valve is unknown.	Urgent	Replace valve with a Class 150 ball valve. Long-term consideration should be given into replacing threaded pipe and fittings with welded pipe.
F24.004	A4		RHTF		(b) (3) (A)	Urgent	Provide threaded plug on ball valve drain.
F24.005	A5		RHTF		Coating failure and corrosion on (b) (3) (A) at support.	Long	Remove surface corrosion and recoat affected area. Consider replacing support with a saddle that is welded to the structural support and providing a Teflon pad between pipe and saddle.
F24.006	A6		RHTF		(b) (3) (A) has a thick coating system preventing inspection of the pipe exterior. A dent was observed at the 7 o'clock position nea 38 which could not be analyzed due to coating system.	Long	Remove thick coating system, inspect exterior of pipe, and recoat.
F24.007	A9		RHTF		(b) (3) (A) is not adequately supported, approximately 47 between 46 and 47, with a saddle missing at 46.	Long	Install saddle support at 46 to properly support the pipeline.
F24.008	A10		RHTF		(b) (3) pipeline has a metal shim between pipe and saddle support.	Long	Remove support and shim, realign support saddle/base to properly support the pipe, and provide Teflon pad between saddle support and pipeline.
F24.009	A8	LAT-47	RHTF		(b) (3) pipeline is not adequately supported. Saddle is not engaged, wood shim is used, and saddle is not secured to I-beam support.	Long	Replace pipe support at this location with a suitable saddle of sufficient height to properly support the pipe and secure support to the I-beam structure. Provide Teflon pad between saddle support and pipeline.
F24.010	A11		RHTF		(b) (3) pipeline is unsupported between supports, approximately 58	Long	Shim the pipe or pipe supports to uniformly support the pipe.
F24.011	A11		RHTF		(b) (3) (A) is unsupported between supports. Support is partial engagement on one side of the pipeline.	Long	Shim the pipe or pipe supports to uniformly support the pipe.

Table 7 - F-24 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F24.012	A12		RHTF	(b) (3) (A)	Threaded 2[redacted] carbon steel low point drain valve is located on (b) (3) (A) [redacted] Valve classification is unknown.	Urgent	Replace valve with a Class 150 ball valve. Long term consideration should be given to replacing the threaded valve and piping with welded pipe and flanged ball valve.
F24.013	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
F24.014	A14		RHTF		Two loose joint harness fasteners were noted on the Dresser coupling on the (b) (3) [redacted] pipeline.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
F24.015	A15		RHTF		Metal-to-metal contact between the (b) (3) [redacted] pipeline and Unistrut support has caused coating failure and surface corrosion.	Long	Modify Unistrut support to eliminate metal-to-metal contact and spot repair coating system at the affected area.
F24.016	A16		RHTF		3[redacted] welded and flanged branch connection on top of the (b) [redacted] pipeline. Six of the flange fasteners are not fully engaged.	Urgent	Replace hardware to ensure fasteners are fully engaged (nuts are fully engaged with threaded bolts).
F24.017	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition. (3) (A)	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.
F24.018	B10 Table H	HT-1 HT-9 HT-16 HT-17 HT-23 HT-24 HT-37 HT-40	Harbor Tunnel		Several areas of coating failure with minor to moderate corrosion was observed on the (b) (3) (A) [redacted] See Table H in API 570 report for exact locations.	Long	Clean, prep and recoat affected areas.
F24.019	B1		Harbor Tunnel		Moderate coating failure and moderate corrosion on pipe, flanges, fasteners, and components on the (b) (3) (A) [redacted] due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.
F24.020	B7		Harbor Tunnel		There are two high point vents on the (b) (3) [redacted] pipeline between the UGPH concrete bulkhead and [redacted] 690 (within the vicinity of Valve 0151) that are constructed of threaded valves, nipples, and piping. Staining and weeping were noted around the threaded fittings. Valve classifications are unknown.	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Replace valves with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the high point vent piping and valves with welded pipe with flanged connections.
F24.021	B7 B8		Harbor Tunnel		There are two low point drains on the (b) (3) [redacted] pipeline between the UGPH concrete bulkhead and [redacted] 690 that are constructed of threaded valves, nipples, and piping. Notable corrosion was observed on the LPD just before the bulkhead to the UGPH. Valve classifications are unknown.	Urgent	Replace low point drains with Class 150 carbon steel ball valves, replace corroded piping, and recoat affected areas. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.
F24.022	B20		Harbor Tunnel		A non-standard repair at the bulkhead between [redacted] 651 and [redacted] 652 was noted. The repair includes a full encirclement welded split sleeve (clamshell) on [redacted] 652 side and a partial patch plate style repair on [redacted] 651 side of the bulkhead with square corners.	Other	This repair is scheduled for completion.

Table 7 - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F24.023	B9		Harbor Tunnel	(b) (3) (A)	The (b) (3) (A) was manufactured with four studs on the top and four studs on the bottom of the valve flanges where clearance to install a hexagonal bolt behind the flange is not possible. The threaded studs are not fully engaged at these locations. Engagement between 0.250 and 0.550 inches was observed with the valve flange.	Urgent	Replace fasteners that are not fully engaged per manufacturers recommendations.
F24.024	B15 Table F	HT-4 HT-18	Harbor Tunnel		Several dents were present on the (b) (3) (A) within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
F24.025	B18		Harbor Tunnel		Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. Locations include: - 1 threaded plug on top of pipe 650 and 651) - 1 threaded plugon top of pipe 597 and 598) - Two 2 high point vents 595 and 596) - 1.5 high point vent 583 and 584) - 2 high point vent 277 and 278) - 2 high point vent 276 and 277) - 1.5 high point vent 267 and 268) (weeping) - 1.5 high point vent 189 and 190) - 1.5 threaded plug on bottom of pipe 144 and 146) - 1.5 low point drain 106 and 107) - 1.5 high point vent 106 and 107)	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the high point vent between 267 and 268. Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.
F24.026	B50		Harbor Tunnel		There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.
F24.027			UGPH		The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
F24.028	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Long	Provide threaded plugs to prevent accidental discharge of fuel product.
F24.029	C14		UPGH		The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Long	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
F24.030	C15		UPGH		Minor bearing oil staining was noted on pump casings.	Long	Perform routine cleaning and removal of bearing oil staining from pump casings.
F24.031	C18		UPGH		Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.
F24.032	C26		UGPH		Moderate weeping/staining on front bearing shaft and casing of pump.	Long	Perform routine cleaning and removal of oil staining from pump casings.

Table 7 - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F24.033	C31		UGPH	(b) (3) (A) [redacted]	One loose joint harness fastener was noted on the Dresser coupling on the discharge side of Pump [redacted] 209.	Long	Tighten fasteners per manufacturers or designer of record specifications.
F24.034	C32		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of Pump [redacted] 210.	Long	Tighten fasteners per manufacturers or designer of record specifications.
F24.035	C33		UGPH		Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
F24.036	C37		UGPH		Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings. The following locations should addressed: - PIT-301 and adjacent Temperature Sensor - Valve GI58B - Valve GI18H - Valve GI38B - Valve GI38C - Valve GI48B - Valve GI48C - Valve GI48D	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
F24.037	C38		UGPH		Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections).	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.
F24.038	C40		UGPH		Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Long	Provide appropriate seal fittings and flexible conduit connections at transducers.
F24.039	C41		UGPH		It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices in the UGPH.
F24.040	C42		UGPH		There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Long	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
F24.041	C46		UGPH		There is a 3/4[redacted] high point vent located on the 16[redacted] F-24 pipeline downstream of MOV 216E3. The 3/4[redacted] piping terminates just before the UGPH sump and is lacking a threaded pipe plug.	Urgent	Provide threaded pipe plug to prevent accidental discharge of product from high point vent. Consideration should be given to modify the high point vent piping, so it terminates near the high point vent.
F24.042	C47		UGPH		There is a 3/4[redacted] threaded valve mounted on the side of the (b) [redacted] There is no pipe cap or plug at the end of the valve. Note: It is not clear as to the purpose of this connection Valve classification is unknown. (3) (A)	Urgent	Provide plug or cap to prevent accidental discharge of product. Replace valve with Class 150 ball valve. Long term consideration should be given to removing this connection if it serves no purpose.

Table 7 - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F24.043	C48 C54		UGPH	(b) (3) (A)	There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves. Perform routine pressure testing/calibration of pressure relieving devices.
F24.044	C49		UGPH		Mechanical dent was found on the [redacted] F-24 pipeline tie-in line to/from the surge tank. Dent depth is 0.505 inches with perpendicular orientation and length of 5 inches located 58 inches from the miter weld before the surge tank-to-UGPH bulkhead penetration. This results in a dent depth of 3 2%. Assessment indicates this dent is acceptable based on latest edition of API RP 1183; Assessment and Management of Pipeline Dents. Plain dents regardless of shape with depths up to 10 % of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). Dent is also acceptable per API 579 Section 12 Level 1 assessment (acceptable if it is ≤ 7% of the pipe diameter).	Long	Monitor at next API 570 Inspection.
F24.045	C51		UGPH		Valve flange for the 12[redacted] gate valves is missing a fastener.	Urgent	Install new fastener on valve flange.
F24.046	C52		UGPH		It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.
F24.047	C53		UGPH		All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Long	Remove coating and perform further weld inspection.
F24.048	C56		UGPH		The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
F24.049	D1		UGPH		Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
F24.050	D3		UGPH		The 1[redacted] ball valve associated with the sample/water drain line that ties into the 4[redacted] low suction line was observed as open and not secured. This could create a potential for a fuel spill. Valve was closed during our inspection.	Long	Consider a self-closing/spring loaded ball valve to prevent the valve from being inadvertently left open which could cause an accidental fuel spill.
F24.051	LRUT Results CML#[redacted] B17		Harbor Tunnel		An area of inactive pitting (approximately 0.050 inches deep) with some large area scaling was identified. An additional two areas of possible corrosion of similar magnitude of pitting are suspect under the pipe wrap at this location.	Urgent	Remove the pipe wrap and inspect these areas on the pipeline.

Table 8 - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] 685	B14 Table E2		Harbor Tunnel	(b) (3) (A)	Severely corroded base plate and bottom of column, loss of steel in column, delamination of base plate, no grout pad, F-24 connected to wall severely corroded.	Urgent	Replace support.
[redacted] 596	B14 Table E2		Harbor Tunnel		Severe corrosion and loss of support at baseplate and lower column connection.	Urgent	Replace support, support on minimum 6" raised concrete pier.
[redacted] 592			Harbor Tunnel		Extreme corrosion with no or very little material at any number of locations, active dripping.	Urgent	Replace support, support on minimum 6" raised concrete pier.
[redacted] 510	Table E2	HT-33	Harbor Tunnel		Corrosion to loss of support, wall anchors not visible.	Urgent	Replace support.
[redacted] 493		HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, complete deterioration through bottom front flange of both columns, extreme deterioration of anchor bolts over back flange of both columns.	Urgent	Replace support.
[redacted] 492	Table E2	HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, severe corrosion over entire support complete less of support at bottom of both columns and both flanges, delamination (severe) at baseplate, angles to wall severely deteriorated. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
[redacted] 475	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchor not visible, flanges at angle column not attached to baseplate, severe delamination at baseplate. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Urgent	Replace support.
[redacted] 473			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at baseplate and column flanges, appears unattached and detached when sounded.	Urgent	Replace support.
[redacted] 472	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme delamination at baseplate, columns not attached due to extreme deterioration, JP-5 bracket to the wall deteriorated and detached. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
[redacted] 469			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.
[redacted] 468			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.
[redacted] 467			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.
[redacted] 466			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.

Table 8 - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] 411			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations, grout pad broken, loss of bearing.	Urgent	Replace support.
[redacted] 399			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, JP-5 at wall.	Urgent	Replace support.
[redacted] 310	Table E2	HT-26 HT-28	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column flanges completely deteriorated at slab, baseplate is dust, JP-5 attachments to wall completed corroded - not attached at (1) side. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
[redacted] 306			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at bottom of column and significant loss of column flange section at baseplate interface.	Urgent	Replace support.
[redacted] 305	B32 Table E2	HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column moderately corroded, JP-5 anchor to wall complete section loss. API 570: Corrosion on pipe support at the tunnel wall attachment.	Urgent	Replace support.
[redacted] 304		HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, moderate column corrosion, complete loss of section at JP-5 and F-24 anchor to wall on [redacted] 1 side	Urgent	Replace support.
[redacted] 288			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, impacted and deformed column flanges.	Urgent	Replace support.
[redacted] 48	A7 A10 Table E1 Table E2	LAT-41 LAT-42	RHTF		Severe corrosion and loss of support at train-side column (photo), minor corrosion at center column baseplate, grout pad edges destroyed at center column baseplate (photo), severe corrosion and loss of material at beam near wall (photo) API 570: Metal to metal contact. No Teflon shims/insulation strip. Rail-ties wedged between pipe and saddle (F-24). Corrosion on base of pipe support and I-beam.	Urgent	Replace support. This repair is scheduled for completion.
[redacted] 47	A7 Table E1 Table E2	LAT-38 LAT-40	RHTF		Severe corrosion and loss of support at bottom of column, minor flange deformation at free end, corrosion at JP-5 saddle, corrosion and loss of angle at lower angle support, no saddle at F-24. API 570: Metal to metal contact. No Teflon shims/insulation strip. Missing steel saddle (floating pipe) (F-24). Corrosion on base of pipe support and I-beam.	Urgent	Replace support. This repair is scheduled for completion.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.001		PM-19 PM-20 PM-21 PM-22	RHTF	(b) (3) (A)	Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
JP5.002	A20		RHTF		The 2[redacted] high point vent piping on the (b) (3) (A) [redacted] is threaded and extends down below the pipe. Pipe extends into personnel movement space below and is at risk for possible damage from impact.	Long	Replumb high point vent piping such that it does not extend into personnel movement space and is constructed of welded pipe and flanged components. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.003			RHTF		Tank sample piping downstream of the isolation valve are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
JP5.004	A2		RHTF		Minor staining, indicative of a minor fuel weep, on the upstream body threaded plug associated with 12[redacted] DBB tank isolation valve.	Long	Tighten threaded plug and monitor as needed until it is repaired. Remove plug from the valve body and retape and reinstall to prevent future weeps. NOTE: Removal of plug cannot be performed without taking the tank out of service.
JP5.005	A3		RHTF		HPV on Tank 16 jet fuel piping downstream of the 12[redacted] tank isolation valve is missing a threaded plug. Some fuel was noted inside the valve body.	Urgent	Provide threaded plug on high point vent.
JP5.006	A4		RHTF		The DBB valves are equipped with a drain valve in lieu of a plug. The end of the valves is not secured with a pipe plug. - Tank 7 – 20 & 12[redacted] DBBs - Tank 8 – 12[redacted] DBB - Tank 9 – 20[redacted] DBB - Tank 10 – 20[redacted] DBB	Urgent	Provide threaded plug on ball valve drain.
JP5.007	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
JP5.008	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the (b) (3) (A) [redacted]	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.
JP5.009	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the (b) (3) (A) [redacted]	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.

Table 9 - JP-5 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.010	A19		RHTF	(b) (3) (A) [redacted]	Coating failure and corrosion between pipe and pipe support on the (b) (3) (A) [redacted]	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports. Note: This segment of piping (8ft pup) is currently being replaced as part of the FY21 Emergent Pipeline Repair Project.
JP5.011	A19		RHTF		Coating failure and (b) (3) (A) [redacted]	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.
JP5.012	A18	LAT-50	RHTF		Coating failure and corrosion due to mineral deposits on the (b) [redacted] No significant pitting was observed.	Long	Clean and recoat affected area of the pipeline.
JP5.013	A17		RHTF		High point vent with threaded fittings and a brass (low melting point) valve on top of the (b) (3) (A) [redacted] Valve classification is also unknown.	Urgent	Replace high point vent valve with Class 150 ball valve. Long term consideration should be given to replacing high point vent assembly with welded pipe and valve with flanged connections. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.014	LRUT Results CML# [redacted] B26		Harbor Tunnel		One indication was observed approximately -460 inches from setup on the (b) (3) (A) [redacted]	Urgent	Remove pipe wrap and inspect the pipeline at these locations.
JP5.015	B47		Harbor Tunnel		Out-of-round (flat spot) noted on the (b) (3) (A) [redacted] at the bell-weld between the 12 o'clock and 3 o'clock position.	Other	No action needed to perform defuel operations. Evaluate at the next API 570 inspection.
JP5.016	B44		Harbor Tunnel		The (b) (3) (A) [redacted] is unsupported and unreinforced. Branch line does not appear to be in use and blinded with a skillet and flange.	Long	Remove unused branch connection.
JP5.017	B40		Harbor Tunnel		Pitting corrosion on (b) (3) (A) [redacted] at the 2 o'clock position. Corrosion areas is 2 [redacted] by 2 [redacted] with a pit depth measurement of 0.113 inches. Remaining metal thickness of 0.120 to 0.125 inches. Metal thickness of unaffected area is 0.233 to 0 238 inches. Approximate wall loss of 48.5%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 [redacted] pup.
JP5.018	B33		Harbor Tunnel		Inactive pitting on the (b) (3) (A) [redacted] at the 10 o'clock position. Corrosion area is 8 [redacted] by 8 [redacted] with pit depth measurements of 0.050 to 0.135 inches. Remaining metal thickness of 0.091 to 0.099 inches. Metal thickness of unaffected area is 0.226 to 0 234 inches. Approximate wall loss of 59.7%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 [redacted] pup.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.019	B34		Harbor Tunnel	(b) (3) (A)	Inactive pitting on the (b) (3) (A) at the 5 o'clock position. Corrosion area is 6 by 6 with pit depth measurements of 0.050 to 0.089 inches. Remaining metal thickness of 0.152 to 0.156 inches. Metal thickness of unaffected areas is 0.234 to 0.241 inches. Approximate wall loss of 38%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
JP5.020	B31		Harbor Tunnel		Pitting corrosion was observed at the 6 o'clock position on the (b) Corrosion areas is 10 by 10 with pit depth measurements of 0.055 to 0.102 inches. Remaining metal thickness of 0.116 to 0.136 inches. Metal thickness of unaffected areas is 0 218 to 0.238 inches. Approximate wall loss of 46.8%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
JP5.021	B26		Harbor Tunnel		Heavy pitting was observed on the piping at the 9 o'clock position on the 18 JP-5 pipeline. Corrosion area is 9 by 9 with pit depth measurements of 0.050 to 0.140 inches. Metal thickness of unaffected area is 0.239 to 0 244 inches. Approximate wall loss of 58.6%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
JP5.022	B49		Harbor Tunnel		Heavy pitting was observed on the piping at the 2-6 o'clock positions on the 18 JP-5 pipeline at the interface where the piping penetrates the concrete bulkhead. Pit depth measurements of 0.0625 to 0.105 inches. Metal thickness of the unaffected area is 0.240 to 0.243 inches. Remaining metal thickness of 0.135 to 0.138 inches. Approximate wall loss of 43 8% wall loss.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup. Note, this will require removal of the pipeline within the concrete bulkhead.
JP5.023	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition.	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.
JP5.024	B10 Table H	HT-1 HT-16 HT-17 HT-23 HT-24 HT-41 HT-48 HT-50 HT-51	Harbor Tunnel		Several areas of coating failure with minor to moderate corrosion was observed on the 18 JP-5 pipeline. See Table H in API 570 report for exact locations.	Long	Clean, prep and recoat affected areas.
JP5.025	B1	HT-52	Harbor Tunnel		Moderate coating failure and moderate corrosion on pipe, flanges, fasteners, and components on the 18 JP-5 pipeline due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.

Table 9 - JP-5 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.026	B5 B6		Harbor Tunnel	(b) (3) (A) [redacted]	There are two low point drains on the (b) (3) (A) [redacted] between the UGPH concrete bulkhead and [redacted] 690 that are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Moderate corrosion was observed on low point drain piping adjacent to [redacted] 690. Notable corrosion was observed on LPD pipe adjacent to isolation valve #0156. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace low point drains with Class 150 carbon steel ball valves. Recoat affected areas to prevent further corrosion. Replace corroded piping with new. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.
JP5.027	B12		Harbor Tunnel		Non-standard flange construction at 12[redacted] branch connection on the (b) (3) (A) [redacted] Blind flange was constructed with 12-[redacted] weldneck flange with a flat plate welded to flange for blind.	Long	Replace non-standard blind with a 12[redacted] blind flange per ASME B16.5.
JP5.028	B13		Harbor Tunnel		Moderate oil staining noted on the 12[redacted] DBB valve gear box.	Long	Clean up gear box and ensure covers are secured to prevent future oil leaks. Verify sufficient lubricant is still present and if needed service actuator gear box.
JP5.029	B27		Harbor Tunnel		Tack weld fit up tab is located on the (b) (3) (A) [redacted] at the 12 o'clock position.	Long	Remove temporary attachment on the pipeline and perform NDE.
JP5.030	B29		Harbor Tunnel		Several active and inactive pitting locations and general corrosion was noted on the (b) (3) (A) [redacted] at the 12 o'clock position. Location is approximately 21-inches from [redacted] 475. Pit depth measurement of 0.095 inches. Remaining wall thickness of 0.130" to 0.147" is estimated at this location. Metal thickness of unaffected areas is 0.225 inches. Approximate wall loss of 42.2%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
JP5.031	B15 Table F	HT-4 HT-18	Harbor Tunnel		Several dents were present on the (b) (3) (A) [redacted] within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
JP5.032	B18		Harbor Tunnel		Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. - 1[redacted] high point vent [redacted] 650 and [redacted] 651) - Two 2[redacted] high point vents [redacted] 595 and [redacted] 596) (weeping) - 2[redacted] high point vent [redacted] 473 and [redacted] 474) - 0.5[redacted] threaded plug on top of pipe [redacted] 311 and [redacted] 312) - 0.5[redacted] threaded plug on top of pipe [redacted] 300 and [redacted] 301) - 1[redacted] threaded plug on top [redacted] 298 and [redacted] 299) (weeping) - 2[redacted] high point vent [redacted] 277 and [redacted] 278) - 2[redacted] high point vent [redacted] 276 and [redacted] 277) - Two 1.5[redacted] threaded plugs on top [redacted] 215 and [redacted] 216) - Two 1[redacted] high point vent [redacted] 206 and [redacted] 207) - 2[redacted] high point vent [redacted] 205 and [redacted] 206)	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the two high point vents between [redacted] 595 and [redacted] 596 and the threaded plug between [redacted] 298 and [redacted] 299. Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.033	B50		Harbor Tunnel	(b) (3) (A)	There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.
JP5.034			UGPH		The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance.	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
JP5.035	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Urgent	Provide threaded plugs to prevent accidental discharge of fuel product.
JP5.036	C14		UPGH		The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Urgent	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
JP5.037	C15		UPGH		Minor bearing oil staining was noted on pump casings.	Other	Perform routine cleaning and removal of bearing oil staining from pump casings.
JP5.038	C18		UPGH		Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.
JP5.039	C26		UGPH		Moderate weeping/staining on front bearing shaft and casing of pump.	Long	Perform routine cleaning and removal of oil staining from pump casings.
JP5.040	C28		UGPH		Inactive corrosion and bolt diameter reduction was noted on the follower bolts associated with the suction side dresser coupling.	Long	Replace dresser coupling follower bolts. Monitor for damage until repair is complete.
JP5.041	C29		UGPH		Housing on flow switch mounted on discharge side of pump is not secured and loose. Current configuration does not meet hazardous area rating.	Long	Secure housing and properly seal all conduit connections.
JP5.042	C30		UGPH		1/2[redacted] piping and pressure gauge assembly was observed to be weeping on the discharge side of[redacted] 208.	Long	Disassemble piping and gauge, retape threaded connections, and reassemble to prevent future weeps.
JP5.043	C33		UGPH		Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
JP5.044	C37		UGPH		Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings.	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
JP5.045	C38		UGPH		Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections). - PIT-284 and adjacent Temperature Sensor - Valve GI15D - Valve GI35E - Valve GI25B - Valve GI25C	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.046	C40		UGPH	[redacted]	Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Urgent	Provide appropriate seal fittings and flexible conduit connections at transducers.
JP5.047	C41		UGPH		It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices.
JP5.048	C42		UGPH		There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Urgent	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
JP5.049	C48 C54		UGPH		There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves.
JP5.050	C52		UGPH		The JP-5 header manifold has a 3/[redacted] gate valve (Valve GP98J) at the end of the header. The 3/4[redacted] valve is allowing product to weep by and drip into a catchment basin. It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.
JP5.051	C53		UGPH		All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Long	Remove coating and perform further weld inspection.
JP5.052	C55		UPGH		4[redacted] gate valve is weeping at bonnet.	Urgent	Service valve to prevent future weeps. If valve cannot be serviced, consider for replacement.
JP5.053	C56		UGPH		The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
JP5.054	D1		UGPH		Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
JP5.055	D4 D5 D6		UGPH		Some minor staining was noted on the bottom of the flanges for the (b) (3) (A) [redacted] near Surge Tank 1 and Surge Tank 2. No active weeping was noted. Liquid does not appear to be fuel as there was no presence of odor.	Long	Clean flange and monitor for future weeps. Repair as needed.
JP5.056	D7		UGPH		The 1[redacted] ball valve that is mounted on the 4[redacted] low suction line at Surge Tank 2 is missing a plug.	Urgent	Install a plug to prevent accidental fuel release.
JP5.057	F1		RHTF		Dresser coupling joints and associated joint harness at Tanks 18, 19, and 20 are damaged due to the May 6th event.	Other	The lateral piping associated with Tanks 18, 19, and 20 are currently under repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.058	F4		RHTF		Facility piping at the tank piping laterals tees have nonstandard rated flanged fittings and non-standard weld tie-ins. Noted at Tank 11/12, 13/14, 15/16.	Long	Replace fittings with ASME B16.5 fittings and flanges at these locations.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.059	F5		RHTF	(b) (3) (A)	Heavy corrosion with pitting was located at the rolled 45-degree elbows. Corrosion is due to active drips from the tunnel ceiling mineral deposits. Nominal thickness was likely 0 375". The general metal thickness at this area is now 0.300" with a pit depth of 0.100" resulting in a remaining thickness of 0.200".	Other	This segment of piping is currently under repair as part of the FY21 Emergent Pipeline Repair Project. No further action is recommended.
JP5.060	F6	LAT-12 LAT-14	RHTF		A section of (b) (3) (A) is not adequately supported at S 11 resulting in an unsupported pipe span of 44 between S 10 and 12. The maximum suggested pipe support spacing for NPS 18 pipe is 28	Long	Install saddle supports between the pipe and I-beam at 11. Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.061	F7		RHTF		A section of NPS 18 piping is not adequately supported at 13 resulting in an unsupported pipe span of 30 between 12 and concrete penetration at Door C. The maximum suggested pipe support spacing for 18 JP-5 pipeline is 28	Long	Install saddle supports between the pipe and I-beam at 13. Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.062	F9		RHTF		There is moderate coating failure and associated corrosion on the MOV-0163 DBB valve and associated hardware. Corrosion on fasteners, flanges, valve body, and relief pipe nipples was noted.	Long	Replace the coating on the DBB valve and associated hardware.
JP5.063	F10		RHTF		The MOV-0163 DBB body cavity relief nipple is in contact with the galvanized conduit. Potential for further corrosion due to dissimilar metal contact is present.	Long	Reroute conduit or DBB relief piping to eliminate metal-to-metal contact/interference.
JP5.064	F11		RHTF		There is heavy corrosion on the MOV-0163 DBB flanges promoting crevice corrosion on the fasteners.	Long	Replace fasteners.
JP5.065	F12		RHTF		There is heavy corrosion on the conduit and fittings associated with MOV-0163.	Long	Replace corroded conduit and associated fittings on MOV-0163.
JP5.066	F13		RHTF		There is a threaded nipple (high point vent) near Tanks 11 and 12 installed with a 3/4 ball valve. Note: There is staining/wetting on the lower threaded fitting. Location is between 38 and 39.	Urgent	Product staining was noted at threaded connections. Urgent repair should be to disassemble threaded joints, clean, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing high point vent assembly with welded pipe and valve with flanged connections. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.067	F14 Table F		RHTF		A dent has been identified with a depth of 0.950 and needs to be repaired prior to returning the JP5 pipeline above valve MOV-0163 back to service. An additional 10 dents were located from MOV-0163 to Tank 20. Refer to Table F in the API 570 report in Appendix C for exact dent locations of the other 10 dents.	Other	This segment of piping has been repaired by pup replacement as part of the FY21 Emergent Pipeline Repair Project. Recommendation for the other ten dents is to monitor at the next API 570 inspection.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.068	F15		RHTF	(b) (3) (A)	Facility piping girth (circumferential) welds include several non-typical bell and spigot style fillet welds. Some welds are direct bell-bell buttweld attachments. These welds appear to be part of the original construction. There has been ongoing replacement effort of these welds with several identified and replaced since the 2015 API 570 inspection. There are currently ten (10) welds with a bell and spigot/ bell-bell weld configuration in the segment inspected.	Long	Replace these joints to bring the piping into current standards. Note: Bell joints are being replaced between [redacted] 22 and [redacted] 23 and [redacted] 59 and [redacted] 60 as part of the FY21 Emergent Pipeline Repair Project.
JP5.069	F16		RHTF		A weld undercut was identified on the (b) (3) pipeline (located approximately 100 inches past [redacted] 40) at the 4 o'clock position. The measured depth was 1/32 [redacted] This is acceptable for normal and Category M fluid service.	Long	Recoat affected area where the coating was removed for weld measurement.
JP5.070	F20		RHTF		There is an 18 [redacted] dresser coupling joint and associated joint harness at [redacted] 25 just past the concrete penetration. Visual inspection did not reveal any deficiencies at this location. A slight tilt was noted and documented. Approximately a 0 9-degree tilt over a 36" span was recorded.	Long	Monitor at next API 570 inspection. Note: This is programmed for removal as part of the FY21 Emergent Pipeline Repair Project.
JP5.071	F21	PM-23	RHTF		The 18 [redacted] dresser coupling joint harness has four lugs that are welded backwards on the upstream side of the coupling.	Urgent	Correct positioning of the lugs in accordance with manufacturer's recommendation. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.072	F22	PM-25	RHTF		There was corrosion identified under insulation at the Tank 10 dresser coupling. Location is at the 8 o'clock to 10 o'clock position.	Long	Clean, prep, and recoat affected areas. Reinstall insulation after coating work is complete. Add [redacted] inspection to the next API 570 inspection for all dresser couplings.
JP5.073	F23		RHTF		Internal portions of the piping at Tanks 18 and 20 were visual inspected to get a condition assessment. The piping is in satisfactory condition with minor pitting. Minor pitting was noted at the bottom of the pipe (likely due to standing water). Pitting depth of 0.030" to 0.050" was noted.	Long	Exercise the tank valves periodically to move product and prevent standing water at low points of the piping system.
JP5.074	F24		RHTF		Minor pipe pitting was identified on Tank 18 laterally below a bubbled coating. Piping is 16 [redacted] schedule 40. Pitting depth of 0.030" to 0.070" was noted.	Long	Clean, prep, and recoat affected area.
JP5.075	F26	PM-10	RHTF		There is no hold down u-bolts or slide-guide to prevent lateral pipe movement at the end of the header pipe run (at [redacted] 1).	Long	Add guided slide support with hold down lugs at [redacted] 1. Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
JP5.076	F27		RHTF		There is coating damage at the pipe repair sleeve located approximately 2.5 [redacted] from [redacted] 16.	Long	Clean, prep, and recoat affected areas.

Table 9 - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
JP5.077	B52		Harbor Tunnel	(b) (3) (A)	A dent was observed at the bell joint. Due to location of anomaly's proximity to a weld this will not pass API 579 Section 12 Level 1 assessment. Measured depth of anomoly was 0.320 inches.	Urgent	Perform follow-on NDE examination of the weld at this location to validate if weld is acceptable for continued service.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.001		PM-19 PM-20 PM-21 PM-22	RHTF	(b) (3) (A) [redacted]	Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
F76.002	A22		RHTF		Dresser coupling on the 2 (b) (3) (A) [redacted] is missing the deflection ring. A small gap was noted between the washer and harness lug.	Urgent	Install appropriate deflection rings and tighten fasteners per manufacturers or designer of record specifications.
F76.003			RHTF		Tank sample piping downstream of the isolation valve are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
F76.004	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
F76.005	A21		RHTF		The high point vent on the (b) (3) (A) [redacted] is constructed with a non-standard threaded bronze/brass (low melting point) valve. Valve is located between riser tee to lateral piping and blind flange at the end of the pipe run. Valve classification is unknown.	Urgent	Replace high point vent valve with a Class 150 flanged carbon steel ball valve and welded pipe.
F76.006	A23		RHTF		Area of inactive corrosion observed on (b) (3) (A) [redacted] between supports, approximately 108 inches from [redacted] 40. Pit depth = 0.196" -0.200" and UTT of 0.430" on unaffected areas resulting in remaining thickness of 0 219" to 0.250". Approximate wall loss of 46.5%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 [redacted] pup.
F76.007	A33	PM-23 PM-24	RHTF		Dresser coupling on the (b) (3) (A) [redacted] was observed with backwards lugs. There are no deflection rings or adapters on the harness lugs.	Urgent	Correct positioning of the lugs and provide deflection rings and adapters on the harness lugs. Tighten hardware on rods per manufacturer or designer of record specifications.
F76.008	A24		RHTF		(b) (3) [redacted] pipeline is not fully supported at pipe support.	Long	Modify pipe support to adequately support pipe. Install Teflon pad between saddle support and pipeline to eliminate metal-to-metal contact.
F76.009	A24		RHTF		(b) (3) [redacted] pipeline is not fully supported at pipe support.	Long	Modify pipe support to adequately support pipe. Install Teflon pad between saddle support and pipeline to eliminate metal-to-metal contact.
F76.010	A25		RHTF		Second pipe support from Tank 9 is not supporting the (b) (3) [redacted] Approximately 39 [redacted] of unsupported pipe from the lateral tee to the tank.	Long	Modify pipe support to adequately support pipe.
F76.011	A26		RHTF		Several fasteners on flanges between lateral tee and (b) (3) [redacted] pipeline have moderate corrosion.	Urgent	Replace corroded fasteners and remove corrosion from spectacle blind. Recoat affected area.
F76.012	A27		RHTF		Two fasteners are not fully engaged on the blind flange associated with the branch piping on (b) (3) [redacted] pipeline.	Urgent	Tighten fasteners or replace fasteners with longer bolts to ensure nuts are fully engaged.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.013	A29		RHTF	(b) (3) (A)	Branch connection on (b) (3) (A) has a 1 threaded fitting and valve. Fuel staining was evident on pipeline but no active weeping noted.	Long	Clean the staining from the flange joint, branch pipe, and header pipe. Monitor the location for future weeps. Replace threaded fittings and valves with welded pipe and Class 150 flanged ball valve.
F76.014	A28		RHTF		Coating failure and corrosion due to mineral deposits on (b) (3) (A) No significant pitting or thickness loss noted.	Long	Clean and recoat affected area of the pipeline.
F76.015	A30		RHTF		Staining noted on (b) (3) (A) between tanks. No active weeping was noted. Oily substance does not appear to be F-76 fuel.	Long	Thoroughly clean tie-in connections and flanges to remove oily substance. Monitor location for potential weeps and drips.
F76.016	A31		RHTF		Wood support extending from (b) (3) (A) to tunnel ceiling. Use and function of the support is unknown and not associated with pipeline support or restraint. The wood beams do not appear to be bearing any load on the pipe based on gaps between wood and top of steel saddle as well as gaps at bolting hardware.	Long	Further investigation of the use and purpose of the wood support. Perform alternative design to remove support from pipeline and for the intended function.
F76.017	A32		RHTF		Dresser coupling on the (b) (3) (A) was observed with rod restraint that did not appear to be fully engaged/tightened. There are no deflection rings or adapters on the harness lugs. The lugs are installed backwards. Dresser coupling is located on main pipeline within the RHTF.	Urgent	Correct positioning of the lugs and provide deflection rings and adapters on the harness lugs. Tighten hardware on rods per manufacturer or designer of record specifications.
F76.018	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition.	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.
F76.019	B10 Table H	HT-1 HT-7 HT-16 HT-17 HT-34 HT-35 HT-42 HT-43 HT-45 HT-47 HT-48 HT-49	Harbor Tunnel		Several areas of coating failure with minor to moderate corrosion was observed on the (b) (3) (A) See Table H in API 570 report for exact locations.	Long	Clean, prep, and recoat affected areas.
F76.020	B1		Harbor Tunnel		Moderate coating failure and with moderate corrosion on pipe flanges, fasteners, and components on the (b) (3) (A) due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.021	B2		Harbor Tunnel	(b) (3) (A)	The two high point vents on the (b) (3) (A) adjacent to valve 0151 and the UGPH bulkhead are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace high point vent valves with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the high point vent piping and valves with welded pipe with flanged connections.
F76.022	B3 B4 B5		Harbor Tunnel		There are three low point drains on the (b) (3) (A) between the UGPH concrete bulkhead and [redacted] 690 that are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace low point drains with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.
F76.023	B11		Harbor Tunnel		Four arc strikes/weld lines between the 7 o'clock and 10 o'clock positions were identified on the (b) (3) (A) Each arc strike is approximately 3 inches long and are located adjacent to the pipeline miter circumferential weld. Gouge depths range from 0.03125 to 0.09375 inches.	Long	Remove coating and conduct close visual inspection along with liquid penetrant testing or magnetic particle testing of the arc strikes and weld lines.
F76.024	B19		Harbor Tunnel		DBB isolation valve on the (b) (3) (A) is missing a nut and bolt on the top plate.	Urgent	Install new nut and bolt on the top plate of the valve.
F76.025	B51		Harbor Tunnel		There appears to be a pipe alignment tab weld that was not ground flush.	Long	Grind weld attachment flush and conduct further NDE.
F76.026	B30		Harbor Tunnel		Inactive pitting and general corrosion were observed on the (b) [redacted] was observed between [redacted] 314 and [redacted] 315 at the 10 o'clock position. Corrosion area is approximately 24 inches by 16 inches with the deepest pit corrosion area covering 9 inches by 9 inches with pit depths range from 0.080 to 0.140 inches. Remaining wall thickness of 0.218 to 0.221 inches is estimated at this location. Metal thickness of unaffected area is 0 358 to 0.361 inches. Approximate wall loss of 39.1%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
F76.027	B28		Harbor Tunnel		Concrete saddle support (number 337) has several 1/8[redacted] rods between the pipe and concrete saddle.	Long	Remove 1/8[redacted] rods between pipe and concrete saddle, inspect interface, and provide Teflon pad between pipe and support.
F76.028	B21		Harbor Tunnel		"Clock Spring" repair sleeve on the (b) (3) (A)	Long	Review previous documentation to determine reason for repairs. Consideration should be given into removing the clock spring repairs and replacing the section of piping with new. Note: Replacement of the clock springs was previously mentioned as a long-term repair in EEI's 2016 "Inspection and Repair of Redhill Pipelines Report" but does not appear to be performed as part of the 2019 fuel system repairs.
F76.029	B21		Harbor Tunnel		"Clock Spring" repair sleeve on the (b) (3) (A)	Long	Review previous documentation to determine reason for repairs. Consideration should be given into removing the clock spring repairs and replacing the section of piping with new. Note: Replacement of the clock springs was previously mentioned as a long-term repair in EEI's 2016 "Inspection and Repair of Redhill Pipelines Report" but does not appear to be performed as part of the 2019 fuel system repairs.

Table 10 - F-76 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.030	B38		Harbor Tunnel	(b) (3) (A)	Concrete pipe support, PSC-501, is not engaged with pipe and the pipe is floating. Loose concrete aggregate was noted between support and pipe.	Long	Remove the loose concrete aggregate between the pipe and the support and shim with Teflon pad.
F76.031	B22		Harbor Tunnel		The concrete saddle type support is cracked.	Long	Repair concrete saddle support.
F76.032	B23		Harbor Tunnel		2[redacted] threaded HPV is located on the (b) (3) (A) [redacted] The ball valve does not have a lock and the reducing bushing is not fully engaged in the threaded connection. Valve classification is unknown.	Urgent	Lock 2[redacted] ball valve out. Remove the reducing bushing and install a 2-[redacted] pipe plug. Replace valve with a Class 150 carbon steel ball valve. Long term consideration should be given to replacing the threaded piping and valve with welded pipe and flanged connections.
F76.033	B24		Harbor Tunnel		Coating failure and corrosion on the welded 8[redacted] branch on the (b) (3) (A) [redacted]	Long	Clean, prep, and recoat affected area.
F76.034	B37		Harbor Tunnel		Wood shim installed between (b) (3) (A) [redacted] and concrete saddle support number 193.	Long	Remove wood shim and provide steel plate shim and Teflon pad.
F76.035	B35		Harbor Tunnel		Inactive pitting on (b) (3) (A) [redacted] at the 6 o'clock position. Corrosion area is 3[redacted] by 2[redacted] with a pit depth measurement of 0.114 inches. Remaining metal thickness of 0.269 to 0.273 inches. Metal thickness of unaffected areas is 0.383 to 0.387 inches. Approximate wall loss of 29.8%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
F76.036	B36		Harbor Tunnel		Inactive pitting on the (b) (3) (A) [redacted] at the 6 o'clock position. Corrosion area is 15[redacted] by 24[redacted] with pit depth measurements of 0.050 to 0.114 inches. Remaining metal thickness of 0.186 to 0.193 inches. Metal thickness of unaffected areas is 0.386 to 0 393 inches. Approximate wall loss of 29.5%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
F76.037	B41		Harbor Tunnel		Pitting on the (b) (3) (A) [redacted] at the 11 o'clock position. Corrosion area is 18[redacted] by 24[redacted] with pit depth measurements of 0.050 to 0.120 inches. Remaining metal thickness of 0.178 to 0.201 inches. Metal thickness of unaffected areas is 0.298 to 0.321 inches. Approximate wall loss of 40.3%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
F76.038	B43		Harbor Tunnel		Longitudinal weld on the (b) (3) (A) [redacted] has a 5[redacted] long area of weld porosity.	Urgent	Conduct additional NDE to evaluate the extent of the porosity in this weld.
F76.039	B42		Harbor Tunnel		One bolt is missing a nut on the flange (b) (3) (A) [redacted]	Urgent	Replace fastener that has a missing nut.
F76.040	B45		Harbor Tunnel		The flanged 6[redacted] branch connection on the 32[redacted] F-76 pipeline lacks proper thread engagement on a fastener and is missing a nut on another bolt. The blind flange installed does not appear to be ASME B16.5 rated.	Urgent	Install new fasteners to ensure proper thread engagement, install new nut, and install new ASME B16.5 blind.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.041	B15 Table F	HT-4 HT-18 HT-21 HT-24	Harbor Tunnel	(b) (3) (A)	Several dents were present on the (b) (3) (A) within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
F76.042	B18		Harbor Tunnel		Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. - 1[redacted] threaded plug on top [redacted] 595 and [redacted] 596) - 1[redacted] threaded plug on bottom [redacted] 595 and [redacted] 596) - 2[redacted] high point vent [redacted] 544 and [redacted] 545) - 2[redacted] high point vent [redacted] 277 and [redacted] 278) - 2[redacted] high point vent [redacted] 276 and [redacted] 277) - 2[redacted] high point vent [redacted] 205 and [redacted] 206) (weeping)	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the 2[redacted] high point vent located between [redacted] 205 and [redacted] 206. Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.
F76.043	B50		Harbor Tunnel		There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.
F76.044			UGPH		The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance.	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
F76.045	C1 C2 C7		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 201. Four loose joint harness fasteners were noted on the Dresser coupling on the suction side of pump [redacted] 201. Some minor coating cracks were noted on the discharge dresser coupling around the middle ring-to-follower joint area indicating potential movement.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
F76.046	C3		UGPH		Pump shaft guard post not secured to concrete pad.	Long	Secure shaft guard post.
F76.047	C4		UGPH		Several open conduits and sensor enclosures were noted on [redacted] 201 as this pump appears to be undergoing maintenance and/or repair.	Long	Secure all conduits and sensor enclosures prior to returning pump to service.
F76.048	C5		UGPH		Several loose fasteners noted on the upper half casing of [redacted] 201 as this pump appears to be undergoing maintenance and/or repair.	Long	Secure all fasteners to the casing prior to returning the pump back to service.
F76.049	C8		UGPH		Hairline crack was noted in pump pad associated with Pump [redacted] 201. Hairline crack does not appear to be of significant concern.	Other	Monitor hairline cracks in pump pad/foundations.
F76.050	C6		UGPH		Skillet is installed on the discharge pump nozzle on [redacted] 201 and [redacted] 205. The assembled joints have only one gasket installed.	Other	Consider installing another gasket to protect flange faces from contact surface damage.
F76.051	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Urgent	Provide threaded plugs to prevent accidental discharge of fuel product.
F76.052	C10		UPGH		A small fuel weep was observed on the suction side pressure gauge assembly at the threaded connection associated with Pump [redacted] 201.	Urgent	Remove gauge, retape threaded connection, and reassemble to prevent future weeps.
F76.053	C11		UGPH		Hairline crack was noted in pump pad associated with Pump [redacted] 202. Hairline crack does not appear to be of significant concern.	Other	Monitor hairline cracks in pump pad/foundations.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.054	C12		UGPH	[redacted]	Coating failure on pump casing associated with Pump [redacted] 202	Long	Clean, prep, and recoat affected areas.
F76.055	C13		UGPH	[redacted]	1/2[redacted] ball valve (Valve GP26H) is missing a plug.	Urgent	Provide threaded plug to prevent accidental discharge of fuel product.
F76.056	C14		UPGH	[redacted]	The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Urgent	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
F76.057	C15		UPGH	[redacted]	Minor bearing oil staining was noted on pump casings.	Long	Perform routine cleaning and removal of bearing oil staining from pump casings.
F76.058	C16		UGPH	[redacted]	The control valve tubing on the pump discharge control valve is in contact with the grating/I-beam.	Long	Modify control valve tubing or grating to prevent metal-to-metal contact.
F76.059	C17		UGPH	[redacted]	Heavy discoloration and staining observed on the pump discharge control valve. Similar discoloration was noted on [redacted] 203, [redacted] 204, [redacted] 205.	Urgent	Clean, disassemble, and replace valve cover gasketing to prevent future weeps and drips.
F76.060	C18		UPGH	[redacted]	Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.
F76.061	C19		UPGH	[redacted]	A small fuel weep was observed on the suction side pressure gauge assembly at the threaded connection associated with Pump [redacted] 203.	Urgent	Remove gauge, retape threaded connection and reassemble to prevent future weeps.
F76.062	C20		UGPH	[redacted]	One loose joint harness fastener was noted on the Dresser coupling on the discharge side of pump [redacted] 203.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
F76.063	C21		UGPH	[redacted]	Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 204.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
F76.064	C22		UGPH	[redacted]	The fasteners on the pump discharge control valve are not fully engaged.	Urgent	Tighten fasteners or replace fasteners with longer bolts to ensure nuts are fully engaged.
F76.065	C23		UGPH	[redacted]	Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 205.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
F76.066	C24		UGPH	[redacted]	The isolation ball valve on the pump discharge control valve tubing was in the closed position at the time of inspection. The control valve function may be limited when the piloting is isolated and not subject to system pressures.	Urgent	Verify correct position of isolation valve on the control tubing and consider providing a lock or car-seal to prevent accidental misalignment of the valve position.
F76.067	C25 C27		UGPH	[redacted]	The suction side Dresser coupling is missing a nut on the restraining rod. Also, there was one loose joint harness fastener present.	Urgent	Provide nut and tighten fasteners per manufacturers or design of record specifications.
F76.068	C33		UGPH	[redacted]	Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
F76.069	C34		UGPH	[redacted]	There are several open conduits, junction boxes, and unsealed electrical fittings throughout the UGPH that will not meet hazardous area ratings.	Urgent	Seal all electrical fittings per NFPA requirements to meet hazardous area classifications.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.070	C35		UGPH	Various	There are several locations throughout the UGPH where abandoned/open conduit penetrates the UGPH floor, potentially negating the secondary containment.	Long	Cap, seal, or remove all abandoned conduits within the UGPH.
F76.071	C36		UGPH	Various	There are several bronze/brass valves installed on the small ancillary piping systems within the UGPH. A few examples are Gate Valve GI58I, GI58G, and GI58H. Valve classification is unknown.	Urgent	Replace low melting point valves with Class 150 carbon steel ball valves.
F76.072	C37		UGPH	Various	Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings. - PIT-0285 and adjacent Temperature Sensor - Valve GI36C - Valve GI26G - Valve GI16E	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
F76.073	C38		UGPH	Various	Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections).	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.
F76.074	C39		UGPH	[redacted]	Lack of thread engagement was observed on 12 fasteners on the bypass loop flanges associated with the [redacted] pipeline.	Urgent	Install proper flange bolts and hardware to insure proper thread engagement at all flanged connections.
F76.075	C40		UGPH	Various	Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Urgent	Provide appropriate seal fittings and flexible conduit connections at transducers.
F76.076	C41		UGPH	Various	It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices.
F76.077	C42		UGPH	[redacted]	There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Urgent	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
F76.078	C43		UGPH	[redacted]	Localized coating failure and corrosion observed on [redacted] pipeline at Valve 232E4. Small pitting was observed with pit depths ranging from 0.05 to 0.07 inches.	Long	Clean, prep, and recoat affected areas.
F76.079	C44		UGPH	[redacted]	Gate valve GR68B is missing wheel nut on valve stem.	Urgent	Install new wheel nut.
F76.080	C45		UGPH	[redacted]	The [redacted] DBB valve on the F-76 pipeline has six fasteners/studs that are not fully engaged.	Urgent	Remove existing hardware and reinstall studs to ensure proper thread engagement with valve body flange.
F76.081	C48 C54		UGPH	Various	There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.082	C50		UGPH	[redacted]	The flange connection on the [redacted] pipeline at the bulkhead penetration does not appear to be an ASME rated flange.	Long	Replace flanged connection with ASME B16 5 rated flange.
F76.083	C52		UGPH	[redacted]	It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.
F76.084	C53		UGPH	[redacted]	All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Urgent	Remove coating and perform further weld inspection.
F76.085	C56		UGPH	[redacted]	The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
F76.086	D1		UGPH	[redacted]	Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
F76.087	D8		UGPH	[redacted]	Lack of thread engagement on nuts and bolts associated with the 4[redacted] low suction pipe flange for Surge Tank 3 at the pipe branch tie-in connection.	Urgent	Tighten fasteners or install new flange bolting hardware to ensure proper thread engagement is achieved at the flanged joint.
F76.088	D9 D15		UGPH	[redacted]	The [redacted] valves that are mounted on the 4[redacted] low suction line at Surge Tanks 3 and 4 are missing plugs. A brass/bronze valve was noted at Surge Tank 3 location. Valve classification is unknown.	Urgent	Install a plug to prevent accidental fuel release. Replace bronze/brass valve with Class 150 carbon steel ball valve.
F76.089	D10		UGPH	[redacted]	Some minor staining was noted on the bottom of the 32[redacted] Dresser coupling on Surge Tank 4. No active weeping was observed. Liquid does not appear to be fuel.	Long	Clean flange and monitor for future weeps.
F76.090	D11		UGPH	[redacted]	The thermal relief flange at Surge Tank 4 appears to be equipped with a 1/16[redacted] gaskets instead of 1/8[redacted] gaskets.	Long	Disassemble the connection and provide dimensionally correct gaskets.
F76.091	D12 D13		UGPH	[redacted]	Some minor staining was noted on the bottom of the flanges for the [redacted] pipeline just before support F76-8 and F76-9. No active weeping was observed. Liquid does not appear to be fuel.	Long	Clean flanges and monitor for future weeps.
F76.092	D14		UGPH	[redacted]	Some minor staining was noted on the bottom of the 4[redacted] low suction DBB valve flange at Surge Tank 4.	Urgent	Clean flanges and monitor for future weeps.
F76.093	LRUT Results CML#[redacted] B8		Harbor Tunnel	[redacted]	LRUT Results - An indication (corrosion spot) was observed approximately 7 inches past the concrete bulkhead, towards the tank gallery, underneath the pipe wrap.	Urgent	Remove pipe wrap and inspect the pipeline at this location.

Table 10 - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
F76.094	LRUT Results CML# [redacted] B21		Harbor Tunnel	[redacted]	LRUT Results - One confirmed indication was detected at approximately -402 to -411 inches from setup on the [redacted] pipeline. There was also an indication identified at the pipeline to concrete saddle support, PSC-195 on the [redacted] pipeline that will require additional investigation.	Urgent	Perform further investigation of the indications at both locations. Note: This will require the pipe to be lifted off the concrete support or the pipe support removed and replaced to allow further inspection.
F76.095	LRUT Results CML# [redacted] B26		Harbor Tunnel	[redacted]	Two indications noted approximately -976 inches and -963 inches from setup on the [redacted] pipeline.	Urgent	Remove pipe wrap and inspect the pipeline at these locations.

Table 11 - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
PSC.44A			Harbor Tunnel	[redacted]	Concrete has been chipped out and removed on tank side around flange for the F-24 and JP-5 lines; concrete around F-24 line has broken out (but not fallen) on opposite side.	Urgent	Remove and replace concrete at anchor bulkhead.
PSC.71A			Harbor Tunnel	[redacted]	Concrete at F-24 line has been broken out on tanks side, no flange visible.	Urgent	Remove and replace concrete at anchor bulkhead.

Table 12 - FOR Findings and Recommendations

Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
FOR.001	E1		RHTF		Threaded pipe nipple was noted on the Tank 20 FOR sample pipeline.	Long	Replace threaded connection with a welded connection.
FOR.002	E2		RHTF		Metal-to-metal contact was observed between the FOR pipeline and pipe support within the pipe trench, just downstream of the tank sampling manifold.	Long	Provide Teflon pad to prevent metal-to-metal contact.
FOR.003	E3		RHTF		Moderate corrosion was noted on the 2 blind flange and fasteners on the abandoned branch to the sampling lines at Tank 19.	Long	Clean, prep, and recoat branch connection, blind flange, and replace fasteners.
FOR.004	E7		RHTF		1 ball valve located on the blind flange on Tank 18's FOR pipeline is not plugged off. This valve is susceptible to being accidentally opened if something were to impact the ball valve handle causing it to open.	Urgent	Provide plug or cap on ball valve to prevent accidental fuel release.
FOR.005	E5		RHTF		Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
FOR.006	E6		RHTF		Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
FOR.007	E4		RHTF		General coating failure and corrosion on I-beam type pipe supports for the FOR pipeline within the trench. Moderate corrosion was observed on supports between Tanks 16 through 20.	Long	Clean, prep, and recoat pipe supports.
FOR.008	E8		RHTF		Spray foam material in contact with FOR pipeline.	Long	Remove spray foam as required to prevent contact with FOR piping.
FOR.009	E9		RHTF		FOR pipeline flange is covered with concrete within the sump.	Long	Remove concrete from pipe flange and fasteners. Clean, prep, and recoat affected flange and fasteners.
FOR.010	E10		RHTF		Moderate sump floor-to-wall deterioration observed in the concrete FOR sump.	Long	Consider installing a SS tank or lining the concrete pit and testing it annually.
FOR.011	E11		RHTF		The pressure gauge on the FOR line on the discharge side of the sump pump is out of calibration and the glass gauge is cracked.	Urgent	Replace damaged pressure gauge.
FOR.012	E12		RHTF		The 2 FOR pipeline between the tee and gate valve at Door C is covered with a stained plastic wrap and c-clamps. This is indicating a weep at the threaded joint.	Urgent	Remove wrap and repair piping connections to prevent future weeps and drips.
FOR.013	E13		RHTF		The wall mounted pipe support associated with the 2 FOR pipeline has a wood shim between the pipe and the support and the pipe is not secured.	Long	Repair/modify pipe support so the pipeline is secured, and the use of a wood shim is eliminated.
FOR.014	E14		RHTF		pipeline is constructed out of threaded pipe and joints from Sump 7 to Tank 15/16.	Long	Replace pipe segment with welded pipe
FOR.015	E15		RHTF		The section of pipeline from 17 to 20 is threaded and not supported adequately. The pipeline spans that are unsupported measure	Long	Provide additional pipe supports at 9-ft on center per industry standard.
FOR.016	E16		RHTF		Metal-to-metal contact was observed on the FOR pipeline within the electrical room between the pipe and pipe support.	Long	Provide Teflon pad or polymeric half rounds to eliminate metal-to-metal contact between the pipe and the support.

Table 12 - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
FOR.017	E17		RHTF	[redacted]	There are four brass/bronze (low melting point) valves where the piping ties into the FOR-trench piping.	Long	Replace valves with Class 150 carbon steel ball valves.
FOR.018	E18		RHTF	[redacted]	Three pipe support on the FOR pipeline within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
FOR.019	E19		RHTF	[redacted]	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.020	E20		RHTF	[redacted]	Threaded pipe nipple was noted on the Tank 16 FOR sample pipeline.	Long	Replace threaded connection with a welded connections and Class 150 carbon steel ball valve with flanged ends.
FOR.021	E21		RHTF	[redacted]	Tank isolation valve on the [redacted] pipeline has one fastener that is not fully engaged.	Urgent	Replace bolt on flange with a longer bolt to ensure nut has adequate thread engagement.
FOR.022	E22		RHTF	[redacted]	Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping. Support is also shimmed by a piece of wood.	Long	Provide a new pipe support that fully supports the piping.
FOR.023	E23		RHTF	[redacted]	The FOR-gate valve flange has three fasteners that are not fully engaged.	Urgent	Replace bolts on flange with a longer bolt to ensure nuts have adequate thread engagement.
FOR.024	E24		RHTF	[redacted]	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.025	E25		RHTF	[redacted]	The [redacted] tank isolation valve on the [redacted] pipeline has product staining on the valve body. This is indicative of a prolonged slow weep possibly from valve plugs in the body.	Urgent	Clean valve body and monitor for drips and weeps. Service the DBB valve as required.
FOR.026			RHTF	[redacted]	The FOR connection from the product lines is constructed out of a combination of hard pipe and hoses.	Urgent	Replace connections and hoses with hard pipe.
FOR.027	E27		RHTF	[redacted]	The tank sampling system at Tank 13 has three 1[redacted] flanged joints with cracked gaskets.	Urgent	Remove damaged gaskets and install new gaskets ensure proper torque sequence and specifications are met.
FOR.028	E28		RHTF	[redacted]	The [redacted] pipeline within the pipe trench is being supported with a piece of wood.	Long	Provide new metal pipe support with Teflon pads to eliminate metal-to-metal contact.
FOR.029	E29		RHTF	[redacted]	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.030	E30		RHTF	[redacted]	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.031	E32		RHTF	[redacted]	The tank sampling piping associated with Tanks is showing signs of minor to moderate corrosion at areas where the piping has not been upgraded. Tank 9 sample piping is severely corroded and requires replacement.	Urgent	Repair by replacement the small-bore tank sample piping up to the sampling stations associated with Tank 9. Long term - Clean, prep, and recoat other sampling lines associated with the storage tanks.
FOR.032	E31		RHTF	[redacted]	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.033	E33		RHTF	[redacted]	Metal-to-metal contact is present at three locations between the [redacted] pipeline and pipe supports.	Long	Provide coated U-bolts and Teflon pads between the pipeline and supports at all three locations.

Table 12 - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
FOR.034	E34		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle. The tank isolation valves are located approximately 30 ft from tank shell/nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.035	E35		RHTF		The R pipeline is covered with plastic within the AFFF Sump #4.	Long	Remove plastic covering and inspect the pipeline for corrosion or damage.
FOR.036	E38		RHTF		The tank sampling line associated with the 135 ft sample piping has product staining on valve and joints. Does not appear to be an active weep. Weep appears to be the result of residual fuel taken during sampling operations.	Urgent	Clean valve body and monitor for drips and weeps.
FOR.037	E39		RHTF		The pipeline is not supported for a span of approximately 31 ft.	Long	Provide additional pipe supports at no greater than 14-ft on center per industry standard.
FOR.038	E36		RHTF		The pipeline is not supported for a span of approximately 28 ft.	Long	Provide additional pipe support at 14-ft on center per industry standard.
FOR.039	E37		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
FOR.040	E40		RHTF		Metal-to-metal contact between the pipeline and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
FOR.041	E41		RHTF		Metal-to-metal contact between the pipeline and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
FOR.042	E42		RHTF		Metal-to-metal contact between the pipeline and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
FOR.043	E48		RHTF		Unsecured flange and pipe nozzle at 6 ball valve. The flange is missing several fasteners and the pipe is not capped.	Urgent	Provide fasteners to secure flange connection to 6 ball valve and provide cap to secure pipe end.
FOR.044	E44 E45 E46		RHTF		Three temporary pipe clamps on pipeline within trench adjacent to S-23. Pipe clamp lengths are 6 16 8 Also, UTT indicates pipe wall loss in this area over 55% metal loss is present.	Other	This piping repair is being performed as part of the "FLC POL Pipeline Repairs" project (E-Project Work Order No. 1615884). The temporary pipe clamps are being removed and pipeline segment is being replaced with a pipe pup.
FOR.045	E43		RHTF		A loose fastener was observed on a e flange within the pipe trench adjacent to S-23.	Urgent	Tighten fastener on pipe flange.
FOR.046	E47		RHTF		The on the sump pump discharge piping within Sump S-23 is missing a body cavity relief handle and does not have a plug.	Urgent	Provide handle and threaded plug on cavity relief valve.
FOR.047	E49		RHTF		Metal-to-metal contact between pipeline and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
FOR.048	E50		3		pipeline is constructed with grooved mechanical fittings. Product staining was noted at FOR 100, -31, -32, -30, and -29	Long	The grooved mechanical fittings do not meet current military criteria. Replace the piping system with welded pipe. Urgent maintenance is required at grooved fittings where fuel weeps are evident.
FOR.049	E51		3		Pipe support 238 supporting the 6 FOR Pipeline is damaged and the frame is bent.	Long	Replace damaged pipe support.

Table 12 - FOR Findings and Recommendations

Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
FOR.050	E52		[redacted] 3	[redacted]	Metal-to-metal contact between [redacted] pipeline and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
FOR.051	E52		[redacted] 3	[redacted]	Metal-to-metal contact between [redacted] pipeline and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
FOR.052	E53 Table H	HT-2 HT-3	[redacted] 3	Various	Coating failure and heavy corrosion on [redacted] ch pipeline. See Table H in API 570 report for exact locations.	Long	Clean, prep, and recoat pipeline in affected area.
FOR.053	E54		[redacted] 3	[redacted]	2[redacted] Low Point Drain – No cap on cam-lock fitting. Two fasteners are not fully engaged on the 2[redacted] low point drain flange.	Urgent	Provide cam-lock cap on fitting and provide longer bolts to ensure nuts are fully engaged.
FOR.054	E55		[redacted] 3	[redacted]	2[redacted] Low Point Drain – No cap on cam-lock fitting. Two fasteners are not fully engaged on the 2[redacted] low point drain flange.	Urgent	Provide cam-lock cap on fitting and provide longer bolts to ensure nuts are fully engaged.
FOR.055			[redacted] 3	[redacted]	Condition of underground segment of the FOR pipeline is unknown. Per the 2021 CP Report, this section of buried pipe had ineffective magnesium anodes.	Urgent	Perform borescope examination of the underground pipeline segment to assess internal condition of the pipeline. This is currently under contract and will be performed in the near future.
FOR.056	E56		[redacted] 3	[redacted]	1 ½[redacted] low point drain valve is missing a plug.	Urgent	Provide plug on valve. NOTE: Facility Personnel corrected this finding during our inspection.
FOR.057	E57		[redacted] 3	[redacted]	1 ½[redacted] low point drain valve is missing a plug under the [redacted] 3 staircase.	Urgent	Provide plug on valve. NOTE: Facility Personnel corrected this finding during our inspection.
FOR.058	E58		[redacted] 3	[redacted]	Moderate coating failure and minor corrosion was noted on the 8-[redacted] FOR penetration sleeve just below the [redacted] 3 staircase. Some minor corrosion was noted on 6[redacted] FOR pipeline at this location as well. Water infiltration at pipe sleeve was observed.	Long	Clean, prep, and recoat affected areas on the pipeline and penetration sleeve. Provide fuel resistant caulking around sleeve penetration to prevent water infiltration through concrete wall.
FOR.059	E60		TK S-311 – [redacted] 3 Entrance	[redacted]	Severe corrosion and pitting at several locations between [redacted] 3 and S-311. Wall Loss observed between 60%-79%. Severe corrosion also observed at pipe support cradle interfaces.	Urgent	Replace approximately 150 linear [redacted] of [redacted] pipe on the aboveground portion of the FOR line outside of [redacted] 3. Limits are from [redacted] pipe outside [redacted] 3 to the DBB isolation valve outside of the secondary containment area of Tank S-311.
FOR.060	E59		[redacted] 3	[redacted]	Moderate coating failure and corrosion was observed on the FOR-riser pipe just outside [redacted] 3 door.	Long	Clean, prep, and recoat affected areas on the flanges.
FOR.061	E61		[redacted] 3 to TK S-311	[redacted]	Excessive vegetation was observed around the [redacted] pipeline from Tank S-311 to the underground pipeline transition at [redacted] 3 entrance.	Long	Perform routine trimming/cutting of vegetation away from pipeline.
FOR.062	E62		TK S-311	[redacted]	Wooden pipe crossover staircase is in contact with the 6[redacted] FOR pipeline.	Long	Modify wooden stairway to eliminate contact with pipeline.
FOR.063	E63		TK S-311	[redacted]	The body cavity relief valve on the 8[redacted] DBB located on the FOR-receipt pipeline is discharging to isolated segment of piping downstream and should be discharging to the atmospheric, tank side of the valve.	Urgent	Replumb the body cavity relief to relieve towards Tank S-311.
FOR.064	E64		TK S-311	[redacted]	The 8[redacted] DBB valve, located outside of the secondary containment, has a loose fastener.	Urgent	Tighten loose fastener on valve flange.

Table 12 - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
FOR.065	E67		TK S-311	[redacted]	The body cavity relief valve on the [redacted] located on the FOR-issue pipeline is discharging to isolated segment of piping downstream and should be discharging to the atmospheric, tank side of the valve.	Urgent	Replumb the body cavity relief to relieve towards Tank S-311.
FOR.066	E65 and E66		TK S-311	[redacted]	[redacted] valve outside of the secondary containment and thermal relief valve flanges are not equipped with proper insulating flange kits.	Long	Provide insulating flange kits on flanges.

Table 13 - FOR Pipe Support Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
PSF.13			[redacted] 3	[redacted]	Actively dripping, medium-high corrosion, metal to metal contact, corroded at pipe support interface	Urgent	Replace support.
PSF.14			[redacted] 3	[redacted]	Highly corroded and deformed, no contact w/ pipe	Urgent	Replace support.
PSF.15			[redacted] 3	[redacted]	Corroded, in contact w/ pipe	Urgent	Replace support.
PSF.16			[redacted] 3	[redacted]	Corroded, intact, metal to metal contact, only top anchor to wall present, lower part of bracket not in contact w/ wall	Urgent	Replace support.
PSF.42	Table E2		[redacted] 3	[redacted]	Not supporting pipe, no anchorage to wall at top, metal to metal contact	Urgent	Replace support.
PSF.60, PSF.61	Table E2		[redacted] 3	[redacted]	No guide, support broken so pipe is at end of arm	Urgent	Replace Support.
PSF.87, PSF.89			[redacted] 3	[redacted]	No contact w/ pipe	Urgent	Replace Support or modify to properly support pipe.
PSF.169			[redacted] 3	[redacted]	No sleeve on U-bolt, U-bolt corroded to delamination, significant corrosion at base plate and anchors	Urgent	Replace Support.
PSF 234	Table E2		[redacted] 3	[redacted]	Front support flange bent from apparent impact, U-bolt displaced on pipe, not U-shaped.	Urgent	Replace Support.
PSF 238	E51 Table E2		[redacted] 3	[redacted]	Support completely deformed, removed from base plate	Urgent	Replace Support.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	16-TG-1	RHTF	[redacted]	Patch Plate	Remove, provide, and install 4 ft [redacted] pup piece to eliminate the patch plate.	Other	Repair has been completed. No further action required.
	16-TG-2	RHTF	[redacted]	Threaded Small Bore Valve	Remove 2" threaded bronze gate valve. Provide 2" carbon steel Class 150 ball valve.	Urgent	Same deficiency observed. Concur with 2016 recommendation.
[redacted] 44	16-TG-3	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same deficiency observed. Concur with 2016 recommendation.
[redacted] 46 47	16-TG-4	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same deficiency observed. Concur with 2016 recommendation.
[redacted] 47 48	16-TG-5	RHTF	[redacted]	Corroding Pipe Support	Remove, provide, and install the bottom 1 ft column of pipe supports 47 and 48. Provide temporary support before repairs.	Urgent	Same deficiency observed. Concur with 2016 recommendation.
	16-TG-6	RHTF	[redacted]	Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Lifting lug has been removed and is presumed NDE was also conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-7	RHTF	[redacted] 7	Pitting at Lifting Lug Weld	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Lifting lug has been removed and is presumed NDE was also conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-9	RHTF	[redacted]	Arc Strike	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. It is presumed that NDE was conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-11	RHTF	[redacted]	Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
F24.009 [redacted] 73	16-TG-12	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
[redacted] 74	16-TG-13	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	16-TG-15	RHTF	[redacted]	2" Diameter Patch Plate	Remove, provide, and instal [redacted] tee. The repair will require piping rework to fit a new tee. Engineering will be required for the repair design.	Other	Same finding observed. Visual inspection did not indicate area of concern during this inspection. Concur with 2016 recommendation.
[redacted] 79 through [redacted] 84	16-TG-16	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. [redacted] 83 and [redacted] 84 were also observed to be floating during this inspection. Concur with 2016 recommendation.
	16-TG-17	RHTF	[redacted]	Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
F24.012	16-TG-19	RHTF	[redacted]	Threaded Small Bore Valve	Remove 2" threaded bronze gate valve. Provide 2" carbon steel Class 150 ball valve.	Urgent	Same finding was observed. Concur with 2016 recommendation.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
F24.016	16-TG-20	RHTF	[redacted]	Failing Gasket	Remove the failing gasket on the 3" blind flange. Provide and install new gasket.	Urgent	Did not observe failing gasket during this inspection. However, observed lack of engagement on fasteners at this flange during inspection. This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	16-TG-21	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating has not been removed yet by coating removal contractor.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	16-TG-23	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating was not adequately removed by coating removal contractor.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
F24.022	16-UGPH-1	Harbor Tunnel	[redacted]	Non-Standard Repair at Bulkhead	Remove, provide, and install 10 ft 16" pup piece to eliminate the non-standard repair in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be reanchored as part of the repair.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
F24.018	16-UGPH-2	Harbor Tunnel	N/A	Coating Repair	Recoat 400 ft of failing coating on the [redacted] between the UGPH and [redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation. Note that the corrosion in this area is approximately 500 linear[redacted]
F24.020 F24.021	16-UGPH-3	Harbor Tunnel	N/A	Threaded Small Bore Pipe/Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Urgent	Same finding observed. Concur with 2016 recommendation. In addition, refer to F24.020 and F24.021 for more information.
	16-LRUT-1	Harbor Tunnel	[redacted]	Coating Removal/Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	Assumed to be completed based on coating at this location appearing relatively new. Current inspection did not identify this as an area of concern. No further action needed.
	16-LRUT-2	Harbor Tunnel	[redacted]	Coating Removal/Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	Assumed to be completed based on coating at this location appearing relatively new. Current inspection did not identify this as an area of concern. No further action required.
[redacted] 2	18-TG-1	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendation.
	18-TG-2	RHTF	[redacted]	Gouge/Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair has been completed. No further action required.
	18-TG-3	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket weld.	Other	There is a 4[redacted] pup installed between [redacted] 3 and [redacted] 4 and no socket weld. Repair is completed. No further action needed.
[redacted] 6	18-TG-5	RHTF	[redacted]	Missing Guide at Pipe Support	Provide guide for pipe support.	Long	Same finding observed. Guide is missing at the 7 o'clock position. Concur with 2016 recommendation.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	18-TG-6	RHTF	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] piece to eliminate the dent.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
	18-TG-11	RHTF	[redacted]	Dent/Crease	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
[redacted] 11	18-TG-12	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-14	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] ce to eliminate the socket welds.	Other	This repair has been completed. No further action required.
	18-TG-15	RHTF	[redacted]	Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Lifting lugs not identified during inspection. Most likely removed during previous repairs. No further action is recommended.
[redacted] 12	18-TG-16	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-18	RHTF	[redacted]	Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Long	Same finding was observed. Concur with 2016 recommendation.
[redacted] 16	18-TG-21	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-22	RHTF	[redacted]	Corrosion on Sleeve	Install drip shield above pipe.	Long	Moderate coating failure is now present. Concur with 2016 recommendation. In addition, remove corrosion and recoat piping.
	18-TG-23	RHTF	[redacted]	Weld Overlay Repair	Remove weld overlay, remove coating, and perform magnetic particle testing. Recoat after testing.	Other	This was not identified during this inspection. No further action is recommended.
	18-TG-25	RHTF	[redacted] 1	Corrosion	Remove the corroded area of piping between the flange sets 20" downstream and 67" upstream of Pipe Support 20. Provide spool piece. Spool piece includes two rolled 45° elbows, elevation difference of 29", lateral difference of 31", and flange face to face distance of 87".	Other	This repair was being performed during our inspection. No further action required.
	18-TG-27	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-28	RHTF	[redacted]	Socket Weld	Remove, provide, and install 5 ft 18" pup piece to eliminate the socket welds.	Other	Same finding was observed. Concur with 2016 recommendation. NOTE: This segment of pipe was marked for repair during our inspection.
	18-TG-29	RHTF	[redacted]	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	18-TG-30	RHTF	[redacted]	Dent	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.

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Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	18-TG-31	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted] Pup piece shall extend 2 ft upstream and 2 ft downstream of Pipe Support 30.	Other	This repair has been completed. No further action required.
	18-TG-32	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket weld.	Other	This was repaired with a 2 [redacted] pipe pup. No further action required.
	18-TG-33	RHTF	[redacted] 6	Dent	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
JP5.066	18-TG-34	RHTF	[redacted]	Threaded Small Bore Pipe/Valve	Remove 1 ft of [redacted] and [redacted] valve. Provide 3/4" welded/flanged schedule 80 carbon steel pipe and 3/4" flanged carbon steel Class 150 ball valve.	Urgent	A shorter pipe nipple is now installed with ¾ [redacted] ball valve but still contains threaded fittings. Product staining was noted at threaded connections. Urgent repair should be to disassemble threaded joints, clean, retape, and reassemble to prevent future weeps. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-35	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket welds.	Other	Repair has been completed. No further action is required.
	18-TG-37	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] ece to eliminate the socket welds.	Other	Repair has been completed. No further action is required.
JP5.002	18-TG-40	RHTF	[redacted]	Non-Standard Components	Replace 1 1/2" plastic ball valve with Class 150 carbon steel ball valve. Replace 7 ft of small bore threaded pipe and fittings with welded carbon steel pipe and fittings.	Long	Valve has been replaced but threaded piping still exists. Concur with replacing threaded pipe with welded and reroute out of the way of walking path, golf car or rail path. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-41	RHTF	[redacted]	Socket Weld	Remove, provide, and install 6 ft [redacted] ece to eliminate the socket welds.	Long	Same finding was observed. At the time of our inspection coating was removed at this location presumably for repair. Concur with 2016 recommendation.
	18-TG-42	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 f [redacted] to eliminate the socket weld.	Other	Repair has been completed. No further action is required.
	18-TG-44	RHTF	[redacted]	Corrosion	Remove, provide, and install 18" tee. The repair will require piping rework to fit a new tee. Engineering will be required for the repair design.	Long	Same finding observed. Concur with 2016 recommendations. Coating was removed during inspection presumably for repairs.
[redacted] 67	18-TG-45	RHTF	[redacted]	Corrosion	Replace pipe support. Recoat bottom of pipe at Pipe Support 67 during Tank Gallery recoat.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-46	RHTF	[redacted]	Socket Weld	Remove, provide, and install 6 ft 18" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendations. Coating was removed at the time of our inspection presumably for repair.
	18-TG-48	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted]. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action is required.

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	18-TG-49	RHTF		Welded Saddle Pipe Support	Remove, provide, and install 4 ft ce to eliminate the saddle pipe support. Provide new pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-50	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-51	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-52	RHTF		Corrosion	Remove, provide, and install 4 ft . Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action is required.
	18-TG-53 and 18-TG-54	RHTF		Corrosion	Remove, provide, and install 6 ft . Pup piece shall extend 6 ft upstream and 2 ft downstream of Pipe Support 75. *Note: 18-TG-53 and 18-TG-54 have been combined into one repair recommendation.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-56	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-58	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
JP5.013	18-TG-59	RHTF		Threaded Small Bore Pipe/Valve	Remove 1" threaded pipe and gate valve. Provide 1" welded/flanged schedule 80 carbon steel pipe and 1" flanged carbon steel Class 150 ball valve.	Urgent	Same finding observed. Concur with 2016 recommendations. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-60	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
	18-UGPH-1	Harbor Tunnel		Threaded Pipe	Remove threaded 4" blind flange. Provide 4" weld neck flange.	Long	Did not observe 4 threaded blind flange. There is a 1-iinch threaded fittings with a ball valve between 650 and 651. Replace 1 ball valve with welded/flanged fittings and pipe.
	18-UGPH-2	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-UGPH-5	Harbor Tunnel		Dent	Term Remove, provide, and install 4 ft to eliminate the dent.	Other	Repair has been completed. No further action required.
	18-UGPH-6	Harbor Tunnel		Dent	Remove, provide, and install 4 ft e to eliminate the dent.	Other	Repair has been completed. No further action required.
	18-UGPH-7	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft ce to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-UGPH-9	Harbor Tunnel		Dent	Remove, provide, and install 4 ft to eliminate the dent.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.

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JP5.026	18-UGPH-10	Harbor Tunnel	N/A	Threaded Small Bore Pipe/Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Urgent	Same finding observed. Concur with 2016 recommendation. In addition, refer to JP5.026 for more information.
JP5.024	18-UGPH-11	Harbor Tunnel	N/A	Coating Repair	Recoat 400 ft of failing coating on the [redacted] between the UGPH and [redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation.
	18-LRUT-1	RHTF	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Long	Same finding observed. Concur with 2016 recommendation.
JP5.024	18-LRUT-2	Harbor Tunnel	[redacted]	Coating Repair	Recoat 5 ft of [redacted]	Long	Same finding observed. Concur with 2016 recommendation.
	18-LRUT-3	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] iece to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
JP5.024	18-LRUT-4	Harbor Tunnel	[redacted]	Coating Repair	Recoat 5 ft of [redacted] .	Long	Same finding observed. Concur with 2016 recommendation.
	18-LRUT-5	Harbor Tunnel	[redacted]	Dent/Gouge	Remove, provide, and install 4 ft [redacted] to eliminate the dent/gouge.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-LRUT-6	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	32-TG-1	RHTF	[redacted]	Non-Standard Flange	Remove non-standard flange. Provide and install standard weld neck flange.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-3	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] ce to eliminate the socket welds.	Long	Deficiency was not identified. Confirmation on repair is needed. If repair has not been performed, recommend repair per 2016 recommendation.
	32-TG-4	RHTF	[redacted]	Dresser Coupling	Remove deteriorating gasket on the Dresser coupling. Provide and install new gasket? Stress analysis?	Long	Deteriorated gasket was not observed during this inspection. Eight lugs on the upstream side of the dresser coupling are installed backwards and are not per manufacturer's detail. Rotate lugs for correct installation.
	32-TG-5	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted] Pup piece shall extend upstream and downstream of the corroded area.	Other	This repair has been completed. No further action required.
	32-TG-6	RHTF	[redacted]	Corrosion	Recoat bottom of pipe at Pipe Support 28 during Tank Gallery recoat. Section of pipe support may need to be removed to recoat.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-7	RHTF	[redacted]	Non-Standard Flanges	Remove, provide, and install 4 ft [redacted] . Pup piece shall extend upstream downstream of the flange set.	Long	Same finding observed. Concur with 2016 recommendation.

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	32-TG-8	RHTF	[redacted]	Patch plate	Remove, provide, and install 4 ft [redacted] Pup piece shall extend upstream downstream of the [redacted] diameter patch plate.	Long	Same finding observed. Visual inspection did not indicate area of concern during this inspection. Concur with 2016 recommendation.
	32-TG-9	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-10	RHTF	[redacted]	Patch plate	Remove, provide, and install 4 ft [redacted]. Pup piece shall extend upstream downstream of the [redacted] diameter patch plate.	Long	Same finding observed. Visual inspection did not indicate are of concern during this inspection. Concur with 2016 recommendation.
	32-TG-11	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-13	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Area has been recoated. Inactive pitting observed between 0.050 and 0.100 inches deep. Continue coating maintenance to deter further corrosion.
[redacted] 46	32-TG-14	RHTF	[redacted]	Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-15	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Area has been recoated. Inactive pitting observed between 0.050 and 0.100 inches deep. Continue coating maintenance to deter further corrosion.
	32-TG-16	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted] Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.
	32-TG-17	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-19	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted]. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.
	32-TG-20	RHTF	[redacted]	Non-Standard Flange	Remove, provide, and install 4 ft [redacted] Pup piece shall extend upstream downstream of the flange set.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-21	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-24a 32-TG- 24b 32-TG-24c	RHTF	[redacted]	Corrosion Dent/Gouge Corrosion	Remove, provide, and install 4 ft [redacted] Pup piece shall extend upstream and downstream of the corroded/dent area. *Note: 32-TG-24a, 32-TG-24b, and 32-TG-24c have been combined into one repair recommendation.	Long	Same finding observed. Concur with 2016 recommendation. Coating has been applied to arrest corrosion.
	32-TG-25	RHTF	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted]. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.

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	32-TG-27	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-28	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	No issues noted during inspection. Coating system appears to be relatively new in this area. No further action is required.
	32-TG-29 32-TG-30 32-TG-31 32-TG-32 32-TG-33 32-TG-34	RHTF	[redacted]	Corrosion, Non-Standard Repair, Coating Removal	Remove, provide, and install 30 ft [redacted] Pup piece shall extend approximately 4 ft upstream of Pipe Support 70 and approximately 4 ft downstream of Pipe Support 69. *Note: 32-TG-29 through 32-TG-34 have been combined into one repair recommendation.	Long	Same finding observed. Concur with 2016 recommendation. Coating has been applied to arrest corrosion.
	32-TG-35	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	No issues noted during inspection. Coating system appears to be relatively new in this area. No further action is required.
	32-TG-36	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
F76.016	32-TG-37	RHTF	[redacted]	Tunnel Support	Investigate if supports are load bearing on the piping?	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-38	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-39	RHTF	[redacted]	Socket Weld	Remove, provide, and install 4 ft [redacted] to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-40	RHTF	[redacted]	Deadleg	Remove, provide, and install 4 ft [redacted] to eliminate the deadleg.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-41	RHTF	[redacted] 1	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
F76.006	32-TG-42	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Long	Area of inactive corrosion was observed. Pit depth of 0.196 – 0.200 inches was found. FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	32-TG-43	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-44	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. There was a repair sleeve and some inactive pitting (0.05 – 0.180 inches) at this location. No further action is required.

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	32-TG-45	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. Inactive corrosion/pits identified halfway between [redacted] 69 and [redacted] 70 with max pit of 0.120 inches. No further action is required.
	32-TG-46	RHTF	[redacted]	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. Inactive corrosion/pits identified nea [redacted] 70 with max pit of 0.150 inches. No further action is required.
	32-A2A3-1	Harbor Tunnel	[redacted]	Threaded Small Bore Pipe/Valve	Remove 2" threaded high point vent (HPV) assembly. Provide welded/flanged HPV assembly with schedule 80 carbon steel pipe and Class 150 ball valve.	Long	Same finding observed. Some product staining was noted but active weeping was not observed. Concur with 2016 recommendation. Recommend high point vent be monitored in until repair can be performed.
	32-A2A3-2	Harbor Tunnel	[redacted]	Dent/Gouge	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-3	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Minor pitting was observed at this location ranging from 0 50-0.080 inches. Repair coating to arrest further corrosion.
F76.019	32-A2A3-4	Harbor Tunnel	[redacted]	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-5	Harbor Tunnel	[redacted]	Corrosion	4' Pup Repair. Greater than 50% corrosion on Weld.	Other	Repair has been completed. No further action required.
F76.019	32-A2A3-6	Harbor Tunnel	[redacted]	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-7	Harbor Tunnel	[redacted]	Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-8	Harbor Tunnel	[redacted]	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-9	Harbor Tunnel	[redacted]	Coating Repair	Recoat 1 ft of failing coating at the weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-10	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 8 ft of coating and inspect.	Long	Pitting was observed at this location approximate pit depth of 0.120 inches. Repair coating at this location to arrest corrosion.
	32-A2A3-11	Harbor Tunnel	[redacted]	Coating Repair	Recoat 4 ft of failing coating.	Other	Repair has been completed. No further action required.
F76.019	32-A2A3-12	Harbor Tunnel	[redacted]	Coating Repair	Recoat 16 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-13	Harbor Tunnel	[redacted]	Coating Repair	Remove 24 ft of wrap coating and recoat.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-14	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 3 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-A2A3-15	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 12 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-16	Harbor Tunnel	[redacted]	Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-17	Harbor Tunnel	[redacted]	Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-18	Harbor Tunnel	[redacted]	Coating Repair	Recoat 15 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-19	Harbor Tunnel	[redacted]	Dent/Gouge	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-20	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] ece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-21	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-22	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating at weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-23	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
F76.019	32-A2A3-24	Harbor Tunnel	[redacted]	Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-25	Harbor Tunnel	[redacted]	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-26	Harbor Tunnel	[redacted] 6	Dent	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-27	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft [redacted] to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-28	Harbor Tunnel	[redacted]	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-29	Harbor Tunnel	[redacted]	Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-30	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-31	Harbor Tunnel	[redacted]	Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-32	Harbor Tunnel	[redacted]	Corrosion	Remove, provide, and install 4 ft [redacted] to eliminate the corroded area.	Other	Repair has been completed. No further action required.
F76.028	32-A2A3-33	Harbor Tunnel	[redacted]	Clockspring	Remove, provide, and instal [redacted] to eliminate the Clockspring repair.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
F76.019	32-A2A3-34	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-35	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-36	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-37	Harbor Tunnel	[redacted]	Coating Repair	Recoat 12 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-38	Harbor Tunnel	[redacted]	Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-39	Harbor Tunnel	[redacted]	Coating Repair	Recoat 8 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-40	Harbor Tunnel	[redacted]	Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.018	32-A2A3-41	Harbor Tunnel	[redacted]0	Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-42	Harbor Tunnel	[redacted]	Coating Repair	Recoat 20 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-43	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Clean, inspect, and recoat approximately 75 ft of piping between Pipe Support 595 and the bulkhead.	Long	Same finding observed. Concur with 2016 recommendation.
F76.029	32-A2A3-44	Harbor Tunnel	[redacted]	Clockspring	Remove, provide, and instal[redacted] to eliminate the Clockspring repair.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-45	Harbor Tunnel	[redacted]	Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Inspection observed minimum corrosion and pitting at this area (pit depths[redacted]). Concur with 2016 recommendation.
	32-A2A3-46	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 15 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-47	Harbor Tunnel	[redacted]	Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-A2A3-48	Harbor Tunnel	[redacted]	Coating Repair	Recoat 20 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
F76.018	32-A2A3-49	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 30 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-UGPH-2	Harbor Tunnel	[redacted]	Dent	Remove, provide, and install 4 ft[redacted] ce to eliminate the dent.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-UGPH-6	Harbor Tunnel	N/A	Threaded Small Bore Pipe/Valve	Remove three threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Long	Same finding observed. Concur with 2016 recommendation.
F76.019	32-UGPH-7	Harbor Tunnel	N/A	Coating Repair	Recoat 400 ft of failing coating on the [redacted] between the UGPH and [redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation.
	32-LRUT-1 32-LRUT-2	Harbor Tunnel	[redacted]	Corrosion at Bulkhead	Remove, provide, and install 10 ft [redacted] to eliminate the corroded areas in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be reanchored as part of the repair.	Urgent	Not able to verify without performing LRUT at this location. It is unknown whether this has been repaired. If repair has not been performed, concur with 2016 recommendation.
	32-LRUT-3	Harbor Tunnel	[redacted]	Coating Removal / Unknown Repair Scope	Remove 8 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	TK2-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK4-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK6-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK6-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".

Table 14 - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	TK8-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK10-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK10-TG-2	RHTF	N/A	Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK10-TG-3	RHTF	N/A	Corrosion	Remove jacketing at Dresser Coupling and inspect.	Other	Insulation was removed at Tank 10 during July 2021 inspection and the area was inspected and documented. Add[redacted] inspection to the API 570 inspection program until dresser couplings are replaced or RHBFSF is defuel and decommissioned.
	TK12-TG-1	RHTF	N/A	Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK13-TG-1	RHTF	N/A	Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK14-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK16-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK16-TG-2	RHTF	N/A	Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
[redacted] T19A	TK19-TG-1	RHTF	N/A	Pipe Support	Repair pipe support corroding steel and spalling concrete.	Long	Same conditioned identified in July 2021 inspection. Concur with 2016 recommendation.
[redacted] T20B	TK20-TG-1	RHTF	N/A	Pipe Support	Replace pipe support corroding steel.	Long	Same conditioned identified in July 2021 inspection. Concur with 2016 recommendation.

APPENDIX 'A' – FLOW SCHEMATIC

APPENDIX 'B' - SYSTEM DRAWINGS

(b) (3) (A)

(b) (3) (A)

(b)(3)(A)

FILE NAME: G:\22 Jobs\22-022 Fuel Infrastructure Assessment-Red Hill\CAD\Model\22-022 Mech Layout_Report SWDs.dwg LAYOUT NAME: SKETCH 2 PLOTTED: Monday, August 29, 2022 – 3:45pm USER: rhopkins

MATCH LINE SEE SHEET SK-3

[redacted]

GRAPHIC SCALE(S):
1"=10' 0' 10' 20' 30'

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING SYS. EMD COMMAND
NAVFAC EXWC
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 2
SK-2

NOT FOR CONSTRUCTION

[redacted]

CUI

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

MATCH LINE SEE SHEET SK=4

DEPART MENT OF THE NAVY	NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND		
	NAVFAC EXWC		
	HNWR II	HONOLULU, HAWAII	
NAVSUP FLCPH	RED HILL TANK FACILITY, JBPHH, HAWAII		
FUEL TRANSFER SYSTEM INSPECTION REPORT			
SKETCH 3			

DESIGNED	DRAWN	CHECKED	APPROVED
[redacted]	[redacted]	[redacted]	[redacted]

CON - JAK	Date 8/31/22	DRAWING NO.	REV NO.
CHK - SHS		SK3	-

CONT NO.	AS NOTED		
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DWG ACCESSIBILITY			
SHEET	5	0	42
	SK3		

NOT FOR CONSTRUCTION

REVISIONS		
NO.	DESCRIPTION	DATE
[redacted]		

DWG 1 OF [redacted]	SK #	REV #

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FILE NAME G:\22 AAA\22-022 Fuel Infrastructure Assessment-Fnl INA\Cad\Aaa\22-022 Main Layout_Sheet Drawing LAYOUT NAME SKETCH 3 PLOTTED Monday, August 29, 2022 – 3:40pm USER Hayden

[redacted]

GRAPHIC SCALE(S):

1"=10'

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DEPART MENT OF THE NAVY — NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND

NAVFAC EXWC

NAVSUP FLCPH — RED HILL TANK FACILITY, JBPHH, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 4

SK4

NOT FOR CONSTRUCTION

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FILE NAME: G:\22 AAA\22-022 Fuel Infrastructure Assessment-Fed HI\Civil\work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 4 PLOTTED: Monday, August 29, 2022 – 3:45pm USER: Hayden

GRAPHIC SCALE(S):
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NAVFAC EXWC
NAVAL FACILITIES ENGINEERING SYS CMD COMMAND
DEPART MENT OF THE NAVY
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 5
SK5
AS NOTED
NOT FOR CONSTRUCTION
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GRAPHIC SCALE(S):
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NAVFAC EXWC
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 6
SK6
NOT FOR CONSTRUCTION
CUI
CUI

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

NAVFAC EXWC

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND

NAVSUP FLCPH

RED HILL TANK FACILITY, JBPHH, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 7

SK-7

AS NOTED

NOT FOR CONSTRUCTION

CUI

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FILE NAME: G:\22 Jobs\22-022 Red Hill Inspections Assessment-Fed HI\Civil\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 7 PLOTTED: Monday, August 29, 2022 - 3:46pm USER: Hayden

GRAPHIC SCALE(S):
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MATCH LINE SEE SHEET SK-8
NAVFAC EXWC
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 8
SK-8
NOT FOR CONSTRUCTION
CUI
CUI

[redacted]

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

NOT FOR CONSTRUCTION

[redacted]

DRAWN BY	JMK	CHECKED BY	SMS
DESIGNED BY		APPROVED BY	
DATE		DATE	

CONTRACT NO.		SCALE	AS NOTED
E.R.D.C. NO.		CODE IDENT NO.	
SHT. NO.		SIZE	11 x 17
DWG NO.	SK-9	REV	0

NAVFAC EXWC

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND

NAVSUP FLCPH

RED HILL TANK FACILITY, JBPHH, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 9

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FILE NAME: G:\22 AAA\22-022 Fuel Infrastructure Assessment-Fed HA\Civil\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 9 PLOTTED: Monday, August 29, 2022 - 3:46pm USER: hhalva

[redacted]

[redacted]

GRAPHIC SCALE(S):

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0' 10' 20' 30'

CUI

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DEPART MENT OF THE NAVY	NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND		
NAVFAC EXWC			
HNWR II	HONOLULU, HAWAII		
NAVSUP FLCPH	RED HILL TANK FACILITY, JBPHH, HAWAII		
FUEL TRANSFER SYSTEM INSPECTION REPORT			
SKETCH 10			
DRAWN BY: JMK	CHECKED BY: RTH	APPROVED BY: SMS	
SCALE: AS NOTED			
DRAWING NO.			
SK-10			
SHEET 12 OF 42			

NOT FOR CONSTRUCTION

FILE NAME: G:\22 AAA\22-022 Red Hill\Drawings\Sketches\22-022 Red Hill Sketch 10.dwg LAYOUT NAME: SKETCH 10 PLOTTED: Monday, August 29, 2022 - 2:46pm USER: Stephen

[redacted]

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

[redacted]

NOT FOR CONSTRUCTION

[redacted]

NO.	DATE	BY	DESCRIPTION
1			
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DRAWN BY: MJK CHECKED BY: SMS

DESIGNED BY:

DRAWN BY:

CHECKED BY:

NO. 22 022 NO.

NO. 22 022 NO.

DEPARTMENT OF THE NAVY NAVAL FACILITY ENGINEERING SYSTEMS COMMAND

NAVFAC EXWC

HONOLULU, HAWAII

NAVSUP FLCPH RED HILL TANK FACILITY, JBPHH, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 11

CODE 1 ID NO. AS NOTED

CODE 2 ID NO.

SHEET 13 OF 42

SK-11

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FILE NAME: G:\22 Jobs\22-022 Red Hill Inspections Assessment-Final Report\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 11 PLOTTED: Monday, August 29, 2022 - 2:46pm USER: Hughes

[redacted]

[redacted]

GRAPHIC SCALE(S):

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DEPART MENT OF THE NAVY	NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND		
HAWAII	NAVFAC EXWC		
NAVSUP FLCPH	RED HILL TANK FACILITY, JBPHH, HAWAII		
	FUEL TRANSFER SYSTEM INSPECTION REPORT		
	SKETCH 12		
DRAWN BY JMK	CHK'D BY RTH	APP'D BY SMS	
SCALE AS NOTED			
DWG NO. SK-12	REV 0	SHT 14 OF 42	

NOT FOR CONSTRUCTION

CUI

FILE NAME: G:\22 Jobs\22-022 Final Investigation Assessment-Fuel Rel\Civil\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 12 PLOTTED: Monday, August 29, 2022 – 2:46pm USER: Hopkins

[redacted]

[redacted]

GRAPHIC SCALE(S):

1"=10'

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[redacted]

NOT FOR CONSTRUCTION

[redacted]

NO.	DATE	DESCRIPTION	BY
1			
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DESIGNED BY: [redacted]
DRAWN BY: [redacted]
CHECKED BY: [redacted]
QA/QC BY: [redacted]

NO.	DATE	REVISION BRIEF DESCRIPTION	BY
1			
2			
3			

CON: JMK Date: 8/31/22 CHK: SMS

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
NAVFAC EXWC
PORT HUENEME, CALIFORNIA

NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
HONOLULU, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 13

DRAWING NO. SK-13
SHEET 15 OF 42
SCALE: AS NOTED

CUI

FILE NAME: G:\22 Jobs\22-022 Final Investigation Assessment-Rel 1\PDO\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 13 PLOTTED: Monday, August 29, 2022 – 2:46pm USER: Hughes

GRAPHIC SCALE(S):
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NOT FOR CONSTRUCTION
SKETCH 14
FUEL TRANSFER SYSTEM INSPECTION REPORT
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
NAVFAC EXWC
NAVAL FACILITIES ENGINEERING SYS. CMD. COMMAND
DEPART. MENT OF THE NAVY
HONOLULU, HAWAII
AS NOTED
SK-14

GRAPHIC SCALE(S):
1"=10'
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NAVFAC EXWC
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 15
SK-15
NOT FOR CONSTRUCTION
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FILE NAME: G:\22 Jobs\22-022 Fuel Infrastructure Assessment-Red Hill,OAU\Models\22-022 Mech Layout_Report SWDs.dwg LAYOUT NAME: SKETCH 16 PLOTTED: Monday, August 29, 2022 - 3:46pm USER: rhopkins

MATCH LINE SEE SHEET SK-17

MATCH LINE SEE SHEET SK-16

GRAPHIC SCALE(S):
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DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING SYS. EMS COMMAND
NAVFAC EXWC
NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII
FUEL TRANSFER SYSTEM INSPECTION REPORT
SKETCH 16
SK-16

NOT FOR CONSTRUCTION

CUI

[redacted]

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

DEPART MENT OF THE NAVY	NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND		
	NAVFAC EXWC		
	HAWAII	HONOLULU, HAWAII	
NAVSUP FLCPH	RED HILL TANK FACILITY, JBPHH, HAWAII		
	FUEL TRANSFER SYSTEM INSPECTION REPORT		
	SKETCH 17		
DRAWN BY	JMK	CHECKED BY	SMS
DATE	AS NOTED		
DRAWING NO.	SK-17		
SHEET	19	OF	42

NOT FOR CONSTRUCTION

FILE NAME: G:\22 AAA\22-022 Fuel Infrastructure Assessment-Bid Ph\Civil\Sketch\22-022 Sketch Layout_Sheet Drawing LAYOUT NAME: SKETCH 17 PLOTTED: Monday, August 29, 2022 – 2:46pm USER: Stephen

[redacted]

[redacted]

GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

CUI

CUI

DEPART MENT OF THE NAVY	NAVAL FACILITIES ENGINEERING SYS TEMS COMMAND	NAVSUP FLCPH	SK-18
NAVY 8	NAVFAC EXWC	RED HILL TANK FACILITY, JBPHH, HAWAII	
HONOLULU NAVY 8	HONOLULU	FUEL TRANSFER SYSTEM INSPECTION REPORT	
		SKETCH 18	

NOT FOR CONSTRUCTION

FILE NAME: G:\22 AAA\22-022 Red Hill Tank Inspection Assessment-Fall Report\Work\22-022 Work Layout_Sheet Drawing LAYOUT NAME: SKETCH 18 PLOTTED: Monday, August 29, 2022 - 2:46pm USER: Hughes

GRAPHIC SCALE(S):
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NAVFAC EXWC
NAVAL FACILITIES ENGINEERING SYS CMD COMMAND
NAVSUP FLCPH
FUEL TRANSFER SYSTEM INSPECTION REPORT
RED HILL TANK FACILITY, JBPHH, HAWAII
SKETCH 19
SK-19
NOT FOR CONSTRUCTION
CUI

[redacted]

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GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
NAVFAC EXWC
NAVY 8
HONOLULU, HAWAII 96860-3134

NAVSUP FLCPH
RED HILL TANK FACILITY, JBPHH, HAWAII

FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 20

SK-20

AS NOTED

NOT FOR CONSTRUCTION

CUI

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FILE NAME: G:\22 Jobs\22-022 Fuel Infrastructure Assessment-Red Hill\Civil\Sheets\22-022 Sheets Layout_Sheet Drawing LAYOUT NAME: SKETCH 20 PLOTTED: Monday, August 29, 2022 - 2:46pm USER: Hughes

[redacted]

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GRAPHIC SCALE(S):

1"=10'

0' 10' 20' 30'

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GRAPHIC SCALE(S):

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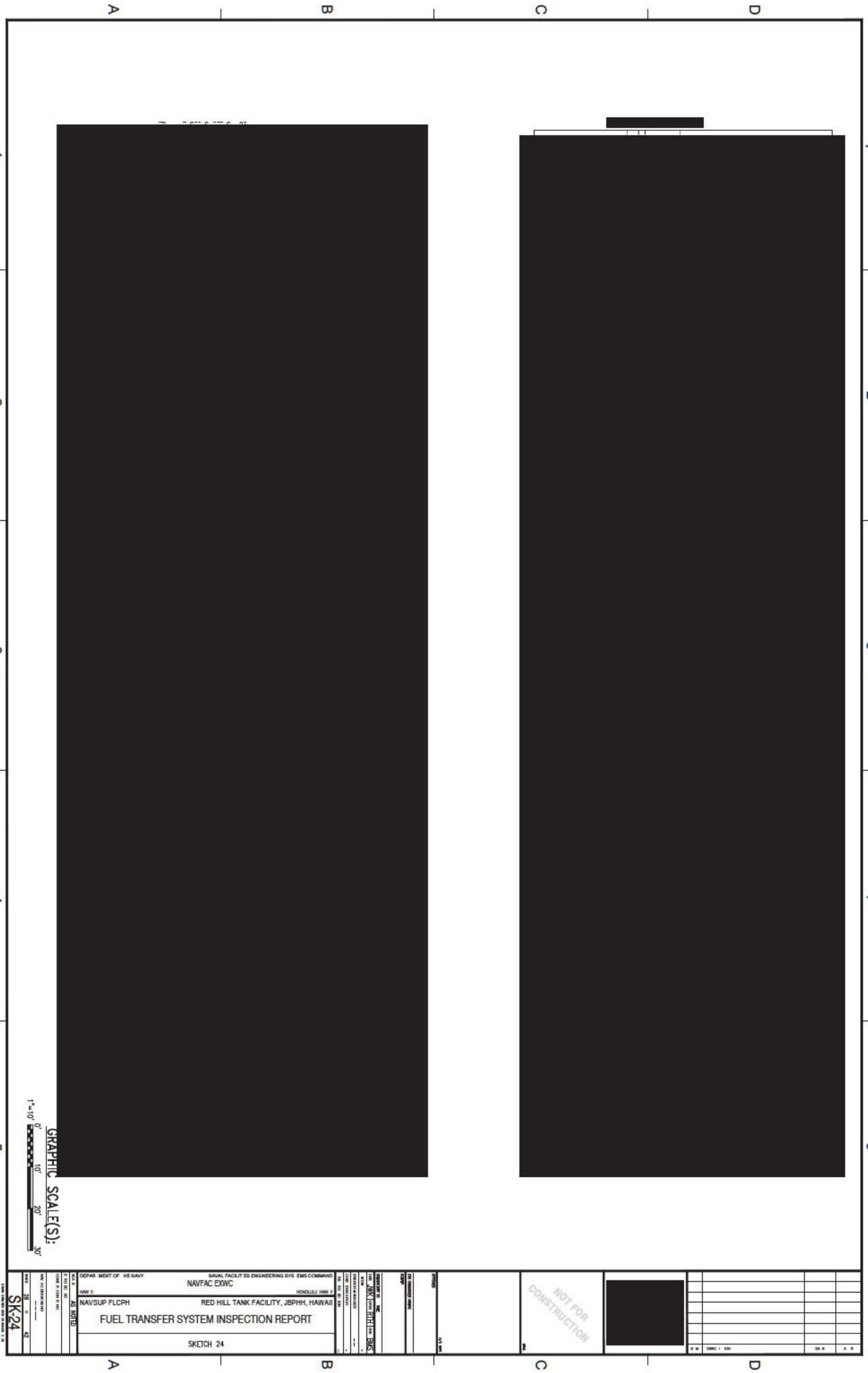

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FUEL TRANSFER SYSTEM INSPECTION REPORT

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FUEL TRANSFER SYSTEM INSPECTION REPORT

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FUEL TRANSFER SYSTEM INSPECTION REPORT

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FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 32

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FILE NAME: G:\22 Jobs\22-022 Red Hill Tank Inspections-Fuel Transfer System\Drawing\22-022 Red Hill Tank Inspections-Fuel Transfer System.dwg LAYOUT NAME: SKETCH 32 PLOTTED: Monday, August 29, 2022 – 2:46pm USER: Hopkins

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FUEL TRANSFER SYSTEM INSPECTION REPORT

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FUEL TRANSFER SYSTEM INSPECTION REPORT

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FUEL TRANSFER SYSTEM INSPECTION REPORT
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FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 38

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RED HILL TANK FACILITY, JBPHH, HAWAII
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SKETCH 39
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SURGE TANK AREA	DEFICIENCIES AT VARIOUS LOCATIONS WITHIN UGPH
	F24.043 F76.075
	F24.045 F76.077
	JP5.044 F76.078
	JP5.045 F76.079
	JP5.046 F76.080
	JP5.047 F76.081
	JP5.048
	JP5.049
	JP5.050
	JP5.051
	JP5.052

UGPH PIPING PLAN

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FUEL TRANSFER SYSTEM INSPECTION REPORT

SKETCH 40

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APPENDIX 'C' - API 570 INSPECTION REPORT

[redacted]

Inter Spec LLC
Environmental Inspection Services
464 S Independence Blvd, C-104, Virginia Beach, VA 23452
www.interspecllc.net

Office: 757-622-6299
Fax: 757-622-9103
Toll Free: 800-546-7853

API-570 Inspection Report Facility POL Piping
Red Hill Fuel Complex Piping

(Tank Gallery, Harbor Tunnel, UGPH, Surge Tank and FOR Piping)
Joint Base Pearl Harbor Hickam; HI

Prepared for

Austin Brockenbrough & Associates, LLC

1011 Boulder Springs Drive, Suite 200
Richmond, Virginia 23225

March 22 - May 24, 2022

API Standard 570 recommends this document containing valuable historical information be retained for the life of the piping.

Signature(s):

[redacted]

[redacted]

General Conditions

The information referenced in this engineering report is based solely upon the area(s) agreed upon and contracted for inspection on the date of the inspection and under those present, known, same, and current conditions. This report was prepared using retrievable data from those areas that were properly cleaned, prepared, and made accessible during the inspection. Areas not contracted for inspection, not cleaned, and not made accessible are not included in this report.

The methods, standards, and regulations used by InterSpec, LLC during the inspection and preparation of this engineering report comply with the most current and widely accepted standards and regulations in the industry, in which these standards and regulations make no representation, warranty, or guarantee. The professional opinions and recommendations stated in this report, including predictability of life, maximum [redacted] of time for re-inspection, suitability for product storage, and safe fill [redacted] are conclusive approximations and are intended to serve mainly as guidelines for obtaining the utmost in spill prevention and environmental protection. The listed recommendations may not necessarily be mandatory actions but corrective actions InterSpec, LLC suggests would better preserve the owners'/operators' facility components and may contribute to safer and more convenient operations. Failure to comply with these could result in, but may not be limited to, reduction of service life, piping mishap, legal consequences, and/or fines for owners/operators. It is best advised the recommended repairs, corrective actions, and procedures be fully and accurately complied with in order to meet the required and applicable federal, state, and local regulations and to have the necessary repairs and upgrades performed prior to making any change in service, product, and/or current conditions. Some recommendations and requirements are necessary to bring the component(s) into compliance with federal, state, and local regulations. InterSpec, LLC recommends re-inspection after any corrective action, repair, or change in usage when the change is to a more severe service. Any change in facility conditions that are applicable to this inspection report such as, but not limited to, a change in service or usage could result in outdating this report. The predictability of any component in this report is a result of following the procedures in the applicable industry standard. InterSpec, LLC accepts absolutely no responsibility or liability for any mishap or failure, including any subsequent clean-up costs or legal ramifications, resulting from owners'/operators' failure to perform the required repairs, inspections, and re-inspections as they apply.

[redacted]

Executive Summary

This report contains an engineering analysis of the data collected during the inspection of the Red Hill fuel complex piping for Joint Base Pearl Harbor Hickam, Pearl Harbor located in Hawaii. The inspection is limited to sections specified in the SOW and included the primary piping, header piping, and associated valves and equipment for the (b) (3) (A) the (b) (3) (A) , and the pipelines. Piping associated with Surge Tanks and the FOR lines from the Tank Gallery to Tank 311 was also inspected. The UGPH piping, pumps, and pressure reliving devices/piping were also closely inspected, and the findings were documented.

The inspection was conducted on a mix of primarily (b) (3) (A) carbon steel piping, spanning an approximately 3.5-mile stretch. The project completed was a hands-on API-570 visual inspection, visual weld inspection, ultrasonic thickness (UT) testing, Phased Array Ultrasonic Testing (PAUT) of welds, and ultrasonic guided wave (inspection of concrete penetrations, pipe and saddle contact points. Results of the UT, PAUT and assessment is included in Annex A and Annex B. The inspection has identified five (5) locations that have indication requiring a follow-on verification to determine the extent and size of indication

The evaluation of the inspected POL piping shows the remaining life of the majority of the facility piping, if continued in the same product service, to be in accordance with API-570. There are, however, several segments of piping that are or approaching the minimum operating thickness or life with some that have moderate external corrosion and pitting. The location with localized pitting/corrosion that do not meet API Std. 570, API RP 574 and ASME B31.3 calculations are summarized in Table A2. A section of the FOR line outside of 3 is also not structurally sound due to pitting corrosion and requires replacement before continued use of the system.

The inspection, finding and data at this facility: is subgroup in six categories:

A. Tank Gallery Piping
B. Harbor Tunnel Piping
C. UGPH Piping
D. Surge Tank Piping
E. FOR Piping
F. JP-5 Piping from Tank 20 to (July 2021 Observations)

The Maximum Allowable Operating Pressure (MAOP) was calculated for the remaining aboveground piping using the minimum measured thicknesses and was determined to be greater than (b) (3) (A) herefore, the piping is structurally certified to meet the requirements of API Standard 570 (unless listed in Table A2). Other areas of compliance are contingent on accomplishing the requirements noted in Table D. Areas with localized pitting/corrosion identified during the inspection that do not meet the inspection standard and industry guidance are specifically identified in Table D along with the recommended repair (See summary in Table A2).

Design and the inspection data is summarized in Table A1 below based on TML data collected throughout that segment of piping):

[redacted]

TABLE A1 - Summary Design and Inspection Data

MAOP* = 275 [redacted]

	Pipe Size (Assumed) [redacted]	Nominal Wall Thickness [redacted]	Minimum Required Wall Thickness [redacted]	Previous Measured Wall Thickness [redacted]	Minimum Measured Wall Thickness [redacted]	Corrosion Rates [redacted] Year)	Calculated Remaining Life (years)	Maximum Allowable Working Pressure at Next UT Inspection [redacted]
Tank Gallery Piping F-76 line by Tank 5 (Lateral) (TML G15)	(b) (3) (A)	0.375	0.171	0.375	0.318	0.00072	[redacted]	498
Tank Gallery Piping JP-5 line by Tank 4 (Lateral) (TML G14)	(b) (3) (A)	0.375	0.110	0.375	0.320	0.00070	302	786
Tank Gallery Piping F-24 line b/w [redacted] & [redacted] (TML G52)	(b) (3) (A)	0.250	0.137	0.250	0.240	0.00013	811	478
Tank Gallery Piping JP-5 line b/w [redacted] & [redacted] (TML G4)	(b) (3) (A)	0.250	0.154	0.250	0.231	0.00024	320	407
Tank Gallery Piping F-76 line b/w [redacted] & [redacted] (TML G26)	(b) (3) (A)	0.375	0.274	0.375	0.342	0.00042	163	338
Harbor Tunnel Piping (b) (3) F-24 (TML H124)	(b) (3) (A)	0.250	0.137	0.250	0.193	0.00072	78	372
Harbor Tunnel Piping (b) (3) JP-5 (TML H164)	(b) (3) (A)	0.250	0.154	0.250	0.192	0.00073	52	329
Harbor Tunnel Piping (b) (3) F-76 (TML H180)	(b) (3) (A)	0.375	0.274	0.375	0.344	0.00039	179	340
UGPH Piping (TML P2)	(b) (3) (A)	0.250	0.154	0.250	0.224	0.00033	213	393
UGPH Piping F-76 header manifold (TML P146)	(b) (3) (A)	0.375	0.206	0.375	0.341	0.00043	314	449
UGPH Piping (TML P57)	(b) (3) (A)	0.375	0.137	0.375	0.360	0.00019	1174	716
Surge Tank Piping NPS 16 (TML S1)	(b) (3) (A)	0.250	0.137	0.250	0.241	0.00011	912	480
Surge Tank Piping NPS 18 (TML S10)	(b) (3) (A)	0.250	0.137	0.250	0.231	0.00024	390	458
Surge Tank Piping NPS 32 (TML S22)	(b) (3) (A)	0.375	0.274	0.375	0.336	0.00049	126	331
FOR Piping NPS 4 (TML F41)	(b) (3)	0.237	0.090	0.237	0.211	0.00033	368	1479
FOR Piping NPS 6 (TML F54)	(b) (3)	0.280	0.110	0.280	0.219	0.00077	141	1019
FOR Piping NPS 6 (TML X2) Exterior pipe outside of [redacted] 3 (Due to Pitting)	(b) (3)	0.280	0.110	0.280	0.090	0.00241	-8	0

Notes:

Table is based on thickness data collected at CMLs. Localized areas of pitting and corrosion are detailed in Table D (Piping Deficiency. Exterior section of the FOR pitting and corrosion is extensive and is added to the table.

** When the design pressure or MAOP was not available, the pump dead head pressure or TRV set points are used in the working pressure calculation. The calculation was computed for the lowest CML in the NPS group. The maximum anticipated working pressure is used in the calculation (275 [redacted] NOTE: TRV at UGPH is set to 260 [redacted] based on the tag. MAOP of 275 [redacted] (based on pedigree, specimen tests and study performed by APTIM/EEI)*

*** The [redacted] pipe appears to be a [redacted] rolled and welded plate. STD schedule (0.375") is used for calculation purpose.*

**** Use nominal when there is no documented TML data from previous inspection record*

[redacted]

[redacted]

TABLE A2 – Localized Pitting and Corrosion Summary (Area Not Per API STD. 570/API RP 574)					
Piping Line/System	Location (b) (3) (A)	Minimum Measured Thickness (in.)	Pitting Depth (in.)	Remaining metal Thickness (in.)	See Item #
(b) (3) (JP-5 line)	[redacted]	0.239 - 0.244	0.239 - 0.244	0.099	B26
(b) (3) (JP-5 line)		0.225 - 0.242	0.060 – 0.095	0.130	B29
(b) (3) (JP-5 line)		0.218 - 0.238	0.218 - 0.238	0.116	B31
(b) (3) (JP-5 line)		0.226 - 0.234	0.050 - 0.135	0.099	B33
(b) (3) (JP-5 line)		0.233 - 0238	0.113	0.120	B40
(b) (3) (JP-5 line)		0.240 – 0.243	0.063 - 0.105	0.135	B49
(b) (3) (F-76 line)		0.358 - 0.361	0.080 - 0.140	0.218	B30
(b) (3) (F-76 line)		0.383 - 0.387	0.140	0.269	B35
(b) (3) (F-76 line)		0.383 - 0.387	0.140	0.269	B36
(b) (3) (F-76 line)		0.298 - 0.321	0.050 - 0.120	0.178	B41
(b) (3) (F-76 line)		0.219 - 0.250	0.196 - 0.200	0.219	A23
NPS 6 (FOR)		0.235 - 0.260	0.050 - 0.190	0.090	E60

Note:

- *Remaining metal thickness values were calculated in accordance with Equation (3a) from Paragraph 304.1.2, "Straight Pipe under Internal Pressure," of ASME B31.3, "Process Piping" Code.*
- *The piping line segment fails to meet the required minimum thickness calculated per ASME B31.3. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.*
- *Required minimum thickness per ASME B31.3 for* [redacted] *and* [redacted] *(seamed pipe under operating pressure of 275 PSIG)*

[redacted]

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- 1.2 API-570 Pipeline Inspection Procedures

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2. Appendix B (Thickness Data/CMLs)
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4. Appendix D (API 570 Checklist and Site Assessment Findings/Discussion Form)
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M3. API STD 570 Pitting Data & TML (Exterior Section of FOR Piping)

1.0 Introduction

1.1 Purpose

1.1.1 This report presents an analysis of data collected during an inspection conducted between March 22 through May 24, 2022 of the tunnel aboveground piping systems designated for inspection at the Red Hill fuel complex in Hawaii. The inspection was performed by a certified API-570 inspector from InterSpec, LLC. All data was collected in accordance with the guidelines set forth in API Standard 570, the appropriate ASME Codes, 40 CFR 112, and other supporting documents.

The project included mobilization of equipment and personnel to support the activities outlined in the SOW. The following inspections and tasks were completed:

i. Guided wave (or long-range ultrasonic testing (LRUT) of the selected concrete bulkhead penetrations and concrete support contact points. A representative sample of bulkhead penetrations and concrete support contact points were examined at the Tank Gallery, Harbor Tunnel, and Surge Tank. A total of 32 LRUT data acquisition setups were completed (note some locations yielded poor data due to pipe geometry or low amplitude signals).

ii. Conducted manual and semi-automated Phased Array Ultrasonic Testing (PAUT) examinations of 86 welds. A representative sample of welds was examined at the Tank Gallery, Harbor Tunnel, Surge Tank, and Underground Pump House (UGPH).

iii. A hands-on API-570 visual inspection of the primary piping, header piping, and associated valves and equipment for the (b) (3) (A) the (b) (3) (A) , and the (b) (3) (A) pipelines. Piping associated with Surge Tanks and the FOR lines from the Tank Gallery to Tank 311 were inspected. The UGPH piping, pumps, and pressure reliving devices/piping were also closely inspected and findings documented. The inspection consisted of close visual examination of the piping to include coating inspection, pit measurements/sizing, corrosion evaluation, dent measurements/sizing, support inspection, soil-to-air/concrete-to-air interface inspections, crevice inspection at saddle and supports, along with other piping system integrity consideration. The section of JP-5 Piping from Tank 20 to was not evaluated during this trip (An API-570 inspection along with various NDE was completed on this section of piping in July 2021). The inspection observations from the 2021 report is incorporated in this current inspection report to consolidating the inspections. An appendix is also provided highlighting the status of this segment of piping and work completed at the time of demobilization.

iv. Sections of piping inspected were also evaluated with ultrasonic thickness at selected locations to evaluate for internal and external corrosion and to establish Condition Monitoring Locations (CMLs) in accordance with API-570 and per the project scope. Dry Film thickness (DFT) readings were also conducted throughout the facility piping.

v. Project also included removal of lead-based paint at 86 locations to support the PAUT weld examinations. All activity related to coating removal, collection, and disposal was managed by trained personnel per industry standard and Facility/OSHA regulations

vi. All PAUT weld examination locations required surface preparation (weld spatter filling) to ensure adequate coupling to aid the transmission of ultrasonic energy.

vii. At the completion of the project, all areas where coating was removed was coated with a Kem Kromik Universal Metal Primer.

1.2 API-570 Pipeline Inspection Procedures

1.2.1 **Overview**: Piping can deteriorate by several means such as internal or external corrosion and internal erosion. All POL piping evaluated by InterSpec during an API-570 inspection is classified as to risk and prioritized per API-570. Factors that are considered include: location, contents, pressure, temperature, injection points, external conditions, and areas of low flow or no flow.

InterSpec initially conducted a visual inspection of the site and planned an integrity inspection that best fulfilled the needs of the customer. For example, the customer's piping might all be the same class, or there may be portions that are more critical. In each situation, the testing procedures will be the same, but re-inspection requirements will be different.

1.2.2 **General**: Visual, ultrasonic, magnetic particle, and dye penetrant examinations are used in InterSpec's evaluation.

a. Careful visual inspection to identify deficiencies in the material condition of the piping and insulation where it exists.
b. For underground or encased piping, conduct an above grade surveillance; looking for discoloration of the soil, softening of paving asphalt, or noticeable odor.
c. Deterioration may be in the form of electrochemical, chemical, mechanical, or a combination of these and may be accelerated by temperature, stress, fatigue, impingement, high velocity, or irregularity of flow rates. When any of these conditions are present, they will be evaluated by the appropriate NDE method.

Corrosion is the prime cause of deterioration in a piping system. InterSpec evaluates the following conditions when they exist**:**

a. Caustics, inorganic acids, organic acids, and low pH water – are all leading causes of corrosion within piping systems.
b. Hydrogen sulfides attack metals and can cause hydrogen blistering and hydrogen embrittlement.
c. Atmospheric corrosion - Corrosion where humidity is above 60% allowing water to absorb oxygen at a high rate and increase rates of corrosion.
d. Corrosion under insulation (CUI) – Sources of moisture include rain, condensation, snow etc. (CUI is common).
e. Check for caustic embrittlement – Commonly found on systems carrying caustic products; check fitting connections, flanges, next to weld seams, and areas of high stress.

Mechanical Forces

a. Check for cracks, bulges, and distortions.
b. Check for fatigue failures.
c. Check where thermal expansion is causing fatigue from heating and rapid cooling.
d. Check fabrication defects.

On-Stream Inspections

a. Determine pipe sections that may be approaching minimum life and have to be replaced at a scheduled shutdown.
b. Inspect pipe supports and pipe anchors.
c. Inspect for external corrosion - piping, supports, slide shoes, and spring hangers.

[redacted]

Visual Inspection

a. Check for leaks, safety, and fire hazards.
b. Inspect flanged joints, packing glands, valve bonnets, and expansion joints.
c. Check misalignment: pipe support out of plumb, shifting of base-plates, or foundation breaking supports, hangers, and braces.
d. Check deterioration of protective coatings for evidence of corrosion, distortion, movement of concrete footings, failure or loose foundation bolts, restricted operation of pipe rollers, or slide plates.
e. Check branch connections that are against pipe supports as a result of thermal movement.
f. Check for damage due to hydraulic shock; check DUMMY LEGS (a weld support welded to an elbow, usually a piece of pipe or structural beam).
g. Inspect for cracks where vibration or swaying has been observed (problems at small connections with heavy valves and small lines that are tied down to a larger line).
h. Check external corrosion from sweating lines, moisture getting through insulation, or protective coatings.
i. Check for accumulations of corrosion liquids (from spills and old leaks).
j. Check for hot spots.

Condition Monitoring Location (CML)

a. Ultrasonic thickness measurements.
b. Tees, deadlegs, elbows, and reducers.
c. Monitor each piping system by taking CMLs, where areas are subject to higher corrosion rates, areas are subject to localized corrosion, locate minimum thickness at CML, outside and inside radius of elbows taken (use lowest reading in calculations) establish minimum for areas of CUI.

MT/PT Inspection

a. Evaluate welds, cuts, and gouges.

Hammer Testing

a. Do not use on lines under pressure, stress-relieved lines in caustic service, or where stress corrosion cracking can occur.

[redacted]

Determine Retirement Thickness; Calculate Thickness According To:

a. ASME B31.3 using Barlow Equation if thickness is less than D/6 and SE is not greater than 0.385. t = PD/2SE, where
   t = pressure design thickness,
   = internal design pressure,
   D = outside of pipe,
   S = allowable unit stress, and
   E = longitudinal joint efficiency.
   For valves and flanges use t =1.5PD/2SE + corrosion allowance.

Sketches

a. Develop layout or isometric drawings providing a means of recording the size of piping, piping location, process flow, thickness measurements, and areas of serious corrosion.

Inspection for Specific Types of Corrosion and Cracking (as applicable)

a. Injection points – 12" or 3 pipe diameters downstream.
b. Deadlegs –high points in hot piping.
c. CUI – integrity of insulation, sources of moisture, localized corrosion, chloride stress corrosion, or cracking of SS piping – areas susceptible to CUI, areas exposed to mist over spray, steam vents, process spills, piping in intermittent service, vibrating piping, steam traced, and systems with deteriorated wrappings.
d. Erosion – occurs in areas of turbulent flow, downstream of control valves, downstream of pump discharges, and downstream of orifices.
e. Environmental cracking – causes are upset conditions, CUI, unanticipated condensation, and exposure to wet hydrogen sulfide or carbonates (usually on SS piping).
f. Fatigue cracking – from excess cyclic stresses caused by pressure, mechanical, or thermal changes. Low-cycle fatigue from heat up and cool down, and high-cycle from excessive piping vibration (preferred method of detection is PT or MT).
g. Creep cracking – depends on time, temperature, and stress; check high stress areas, mechanical changes from temperature – most often in systems operating above 900 degrees.

Classify Piping for Next Inspection Requirement

a. Class 1 next UT/VT in 5 years.
b. Class 2 next VT in 5 years.
c. Class 2/3 next UT in 10 years.
d. 75% of Class 1, 50% of Class 2, and 25% of Class 3 piping that have areas of damaged insulation need to be inspected.

Evaluation

a. Calculate the remaining life of piping system.
b. Calculate long-term corrosion rate.
c. Calculate short-term corrosion rate (if previous data is available and submitted).
d. Evaluate locally thinned areas.
e. Conduct piping stress analysis (as applicable).

Prepare an Inspection and Engineering Report

a. Listing all references.
b. Listing name and certification number of the API-570 inspector.
c. Showing location of all thickness measurements.
d. Showing all engineering calculations.
e. Including a narrative of the aforementioned inspection, examination, and testing items.
f. Including a statement of fitness for service.
g. Including a corrosion rate and remaining life statement.
h. Including a listing of recommended repairs and/or alterations.
i. Including a statement of compliance with the API Standard 570.

2.0 References and Acronyms

2.1 American Petroleum Institute:

2.1.1 API Standard 570, Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems
2.1.2 API RP 574, Inspection of Piping System Components
2.1.3 API RP 576, Inspection of Pressure-relieving Devices
2.1.4 API RP 577, Welding Inspection and Metallurgy
2.1.5 API RP 578, Material Verification Program for New and Existing Piping Systems
2.1.6 API Standard 579-1/ASME FFS-1, Fitness-For –Service
2.1.7 API RP 580, Risk-based Inspection
2.1.8 API RP 1110, Pressure Testing of Liquid Petroleum Pipelines

2.2 American Society of Mechanical Engineers Codes:

2.2.1 Code for Pressure Piping, Chemical Plant and Petroleum Refinery Piping, ASME B31.3.
2.2.2 Standard for Pipe Flanges and Flanged Fittings; ASME B16.5
2.2.3 ASME Boiler and Pressure Vessel Code; Section V, Non-Destructive Examination
2.2.4 ASME Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

2.3 National Fire Protection Association:

2.3.1 NFPA-30, Flammable and Combustible Liquids Code
2.3.2 NFPA-70, National Electrical Code
2.3.3 NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response

2.4 American Society of Nondestructive Testing:

2.4.1 ASNT-SNT-TC-1A

2.5 Code of Federal Regulations:

2.5.1 CFR, Title 29, Part 1910, Process Safety Management
2.5.2 CFR, Title 40, Volume 21, Chapter I, Subchapter D, Part 112, Oil Pollution Prevention

2.6 Military and Host Nation References or Standards:

2.6.1 UFC 3-460-01, Petroleum Fuel Facilities
2.6.2 UFC 3-460-03 O&M Maintenance of Petroleum Systems
2.6.3 UFGS 33 52 43.13 Aviation Fuel Piping
2.6.4 UFGS-0l 35 29, Safety and Occupational Health Requirements
2.6.5 UFGS-0l 35 30, Safety, Health, and Emergency Response (HTRW/UST)

[redacted]

Acronyms and Abbreviations

ACRONYM	DEFINITION
ACVG	Alternating Current Voltage Gradient
AG	Aboveground
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
CIS	Close Interval Survey
CFR	Code of Federal Regulations
CML	Condition Monitoring Locations
CP	Cathodic Protection
CR	Corrosion Rates
CS	Carbon Steel
DBB	Double Block and Bleed Isolation Valve
DC	Direct Current
DCVG	Direct Current Voltage Gradient
ULSD-2	Ultra-Low Sulfur Diesel #2
EPA	Environmental Protection Agency
F	Fahrenheit
FS	Filter Separator
GAL	Gallon
GPM	Gallons per Minute
HPV	High Point Vent
ICCP	Impressed Current Cathodic Protection
ILI	In-Line Inspection
LPD	Low Point Drain
LRUT	Long Range Ultrasonic Testing
LT	Long Term
MAWP	Maximum Allowable Working Pressure
MAOP	Maximum Allowable Operating Pressure
MOGAS	Motor Gasoline
MSS	Manufacturers' Standardization Society of the Valve and Fittings Industry
NFPA	National Fire Protection Association
NWGLDE	National Work Group on Leak Detection Evaluations
PAUT	Phased Array Ultrasonic Testing
PH	Pumphouse
POL	Petroleum, Oil, and Lubricants
PRT	Product Recovery Tank
[redacted]S	Pipe Support
[redacted]	Pounds Per Square [redacted] Gauge
PSV	Pressure Safety Valve
SCFM	Standard Cubic [redacted] per Minute
SPCC	Spill Prevention Control and Countermeasures
SS	Stainless Steel
TRV	Thermal Relief Valves
UG	Underground
USDOT	United States Department of Transportation
UST	Underground Storage Tank
UT	Ultrasonic Testing
UV	Ultraviolet
VOC	Volatile Organic Compounds
VP	Valve Pit

[redacted]

3.0 Description

3.1 Job Description:

Contracted by:	Austin Brockenbrough & Associates, LLC
Job Number:	22-0114

3.2 Pipe/Location Description:

Owner/Operator:	US Navy
Location:	Joint Base Pearl Harbor Hickam; HI (Red Hill)
Pipe Identification:	(b) (3) Header Piping
Service	JP-5, F-24, F-76 and Fuel Contact Water

3.3 Part Description:

Construction Code:	ASME B31.3 (Assumed)
Manufacturer:	Unknown
Year Installed:	Varies (Primarily 1940s with upgrades/modifications)
Material:	Carbon steel (*ASTM A53; Grade B specification) ASTM A53 Grade B (TS = 60,000 PSI; YS = 35,000 PSI) *Based on the 2017 Pipe Pedigree Testing performed by EEI

3.4 Inspection Description:

Inspection Type:	API-570, Guided Wave and Phased Array Ultrasonic Testing
Equipment Used:	Ultrasonic Thickness Unit, PAUT & Guided Wave Unit
Inspector(s):	Benyam Berhane

3.5 Piping Design Parameters:

Max Pressure:	(b) (3)
Last Pressure Test Date:	NA
Max Temp:	200°F
Construction:	Welded/Threaded/Flanged/Clamped (Victaulic) Joints

3.6 Equipment Description:

Ultrasonic Thickness Meter

Manufacturer:	General Electric
Model:	DMS-GO+
Calibration Methods Used:	Zeroing Procedure, Copper Coating Calibration Procedure, and Two Point Calibration Procedure

[redacted]

Ultrasonic Flaw Detector

Manufacturer:	General Electric
Model:	USM-GO
Wedge:	GE Benchmark 70 degree/5 Mhz/0.500 (S/N # 024F2P)
Calibration Methods Used:	Distance amplitude correction, sensitivity levels and flaw depth Verified on standard test block containing side dried holes

PAUT

Manufacturer:	Olympus
Model:	OmniScan X3
Probe/Wedge:	5L32-A11 5MHz linear array probe using 32 active elements (45° to 70° focused) 5L16-A10 5MHz linear array probe using 16 active elements (43° to 70° focused)
Calibration Methods Used:	NAVSHIPS calibration standard (S/N: 03-8269) with 3/64” side drilled holes

LRUT

Manufacturer:	Southwest Research Institute (SwRI®)
Model:	MsS Data Acquisition and Reporting Software for Pipeline Inspection
Calibration Methods Used:	Determined by geometrical feature. Unit maintenance/calibration performed by manufacture (SwRI®)

[redacted]

4.0 Inspection

4.1 Results:

4.1.1 Site Description

POL piping inspected at the Red Hill fuel complex consists of a mix of primarily (b) (3) (A) [redacted], carbon steel piping, spanning an approximately 3.5-mile stretch. The fuel piping system at the tank gallery and harbor tunnel is a dual directional tank receipt and issue piping for Tanks 1 through 20. At the time of the inspection, several of the tanks were permanently out of service or removed for inspection/maintenance activity.

The F-24 ([redacted] and JP-5 ([redacted] piping is constructed from carbon steel with mostly schedule 10 (0.250-in thick) and some standard thickness piping at the tank gallery laterals and sections of replaced spool pieces in the harbor tunnel are used. The F-76 line ([redacted]) is also carbon steel with majority STD (0.375-in thick) pipe. The fuel piping is primarily electric fusion welded (EFW) longitudinal seamed of unknown weld joint efficiency or quality factor and some that appear to be electric resistance welded (ERW) seams. The FOR is welded 4-[redacted] schedule 40 at the tank gallery and clamped (Victaulic) 6-[redacted] schedule 40 starting at the FOR-Sump (S-23) with an isolated section of 6-[redacted] welded pipe in the tunnel. FOR piping from the [redacted] 3 access door to Tank 311 is welded pipe. The piping in the UGPH and Surge Tank tunnel is similar in design and construction to the harbor tunnel piping.

The piping and associated equipment facilitate the receipt, transfer, and distribution of the fuel within the POL facility. Product is received from an underground pumphouse and pumped to various tanks using the same piping headers.

The inspection is limited to sections specified in the SOW and included the primary piping, header piping, and associated valves and equipment for the F-24, the (b) (3) (A) [redacted] jet propellant grade 5 (JP-5), and the (b) (3) (A) [redacted] diesel fuel marine (F-76) pipelines. Piping associated with Surge Tanks and the FOR lines from the Tank Gallery to Tank 311 was also inspected. The UGPH piping, pumps, and pressure reliving devices/piping were also closely inspected and findings documented.

A list of deficiencies identified are outlined in Table D.

4.1.2 Inspection Code

The inspection was conducted in accordance with API-570. Unless otherwise stated, API-570 refers to the Fourth Edition, dated February 2016, "Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems."

4.1.3 Integrity Testing

Ultrasonic wall thickness measurements of the piping were taken in accordance with API-570 and per the project scope. The ultrasonic testing was conducted at each pipe support location as well as sampling for internal corrosion at change in product direction locations per the guidelines of API-570. Condition monitoring locations (CMLs) were selected by taking into account corrosion or erosion that might occur in piping transporting refined products. API-570 recognizes that, theoretically, a piping "circuit" subject to perfectly uniform corrosion could be adequately monitored with a single CML. Since corrosion is seldom uniform, each piping circuit in this report had multiple CMLs (if not restricted by access).

CMLs were often selected to be at a circumferential weld joining a straight section of pipe with an elbow. The selected CML was typically on the downstream side of the elbow. Thus, if erosion were to occur its effects would be detected by a reduction in the wall thickness along the outer arc of the elbow when

compared to the inner arc. The erosion would also be detected on the adjacent downstream pipe section where turbulence would preferentially thin the portion of the pipe wall.

The wall thickness was measured at the 12:00, 3:00, 6:00, and 9:00 o'clock positions at each CML unless an obstruction prevented recording the thickness. A circular area approximately 0.25" in [redacted] centered 1" off the toe of the circumferential weld or coupling was ultrasonically scanned. The minimum thickness value detected was recorded. The clock positions are determined by looking downstream and in the direction of product flow. To assist in documenting the thickness values and reduce the potential for error during future thickness examinations, the location of each CML for each piping section was noted. The ultrasonic wall thickness measurements are contained in Appendix B, Piping Thickness Measurements.

4.1.4 Findings

An external visual inspection of the piping systems at this facility was performed to determine the condition of the piping, associated hardware, and coating systems. In addition to any coatings, the following were visually inspected:

- Valves were inspected to determine evidence of leakage, deterioration, and proper support.
- Flanged connections were inspected to ensure proper engagement between bolts and nuts, evidence of leakage, proper class rating, and sufficient weld deposition for slip-on flanges, and distortion. Additional flanged joints were inspected for evidence of leakage, stains, or drips.
- Piping supports were inspected for evidence of distortion, pipe-to-support contact, corrosion, general spacing, and deterioration.
- Other ancillary equipment associated with the piping system were also inspected for overall integrity.

All the POL piping at the facility is constructed of coated carbon steel piping. An external inspection was performed on the valves, supports, gauges, and other ancillary equipment to assess the integrity of the system. Pumps and pressure reliving devices were not inspected. Deficiencies for this facility is listed in Table D.

4.1.5 Piping Construction

Documentation was not available as to whether these piping systems were designed in accordance with a national code or standard. As a basis of this report, it was assumed they were designed and installed in accordance with a previous edition of ASME B31.3, "Process Piping" Code. The intent of this inspection was not to determine compliance of the piping to ASME B31.3; rather it was to determine the current condition of the piping system and to evaluate its integrity for continued operation under normal operating conditions. However, where it was necessary to refer to a design code, B31.3 was selected.

Industrial piping can be fabricated by either rolling plate material to form a cylinder or by extruding it from a single billet of steel. In the case of the former, welding will seal the longitudinal seam created by rolling the plate. The ASTM piping specification will determine the actual welding process used. When piping is extruded, however, it has no longitudinal seam. Although the exact piping specification and nominal wall thickness used to erect the piping is unknown, the piping most likely conforms to ASTM Specification A53, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless." This specification addresses seamless piping and two types of seam-welded piping. See Note below.

NOTE: The May 2000 and August 2018 metallurgical lab and destructive testing reports that were conducted on tunnel pipe samples to determine yield and tensile stress of existing pipes were

reviewed. The [redacted] pipe reported 43.5 – 48.2 [redacted] yield and 65.7 – 71.6 [redacted] tensile on the August 2018 test. The samples on the May 2000 test report produced 49.7 – 53 [redacted] yield and 70.6 – 76.8 [redacted] tensile. These results produced exceed ASTM A53 Grade B material with 35 [redacted] yield and 60 [redacted] tensile per current edition of ASME B31.3 Table A-1. The computations in this report will use ASTM A53 Grade B based on Pipe Pedigree Report.

The piping in this facility has mostly electric fusion welded (EFW) longitudinal seams of unknown weld joint efficiency or quality factor and some that appear to be electric resistance welded (ERW) seams. Table 302.3.4 of ASME B31.3 provides longitudinal weld joint quality factors. Based on this table, ERW pipes are listed as 0.85 weld joint quality factors, and single butt-welded pipes are listed as 0.80. The computations in this report will use the lower of the two longitudinal weld joint quality factors.

Wall thickness values were calculated in accordance with Equation (3a) from Paragraph 304.1.2, "Straight Pipe under Internal Pressure," of ASME B31.3, "Process Piping" Code. This formula calculates the internal pressure design thickness for straight pipe and elbows. The minimum required wall thickness of piping may be greater due to additional pipe wall stresses introduced by support spacing, concentrated loads, or other structural factors. In low pressure and temperature applications, the required thickness is calculated in accordance with Equation (3a) from Paragraph 304.1.2. This calculation may be very low, indicating that the pipe would have insufficient structural strength to support its weight. For this reason, an absolute minimum thickness (AMT) value is calculated by *InterSpec, LLC* to set the lower limits to prevent sagging, buckling, and collapse at supports. The owner may elect a more stringent lower limit. AMT value is also known as Minimum Alert Thickness (MAT). AMT or MAT are usually not intended to mean that pipe components must be retired when one CML reaches the default limit but rather to flag locations were additional engineering evaluation should be completed to assure overall piping integrity.

4.1.6 Piping Classification

The piping in this report is not considered process piping as defined in API-570; however, applying the prescribed classification will mitigate leaks, fire, hazards to personnel, and system failures. API 570 classifies piping systems into four different classes (1, 2, 3, and 4); see table B. Such a classification system allows extra inspection effort to be focused on piping systems that may have the highest potential consequence if failure or loss of containment occurs. In general, the lower classified systems require more extensive inspection at shorter intervals in order to affirm their integrity for continued safe operation. InterSpec, however, recommends the use of Class (1) since API classification is based on the consequence, not likelihood, of failure. Class (1) is proposed because any piping failure would significantly affect operation of the facility as well as have a greater potential of safety risk to environment and personnel.

Table B – API classification and recommended interval

Class	Thickness Measurement (UT)	Visual Inspection (VT)
1	Lesser of 5 Years or half the remaining Life	Lesser of 5 Years or half the remaining Life
2	Lesser of 10 Years or half the remaining Life	Lesser of 5 Years or half the remaining Life
3	Lesser of 10 Years or half the remaining Life	Lesser of 10 Years or half the remaining Life
4*	Optional	Optional

** Piping service that is essentially nonflammable and nontoxic.*

[redacted]

Table C – Deficiency Color Code		
	Mandatory	Repairs must be done as soon as practical or before piping is placed back in service
	Short-Term	May fail within 2 to 3 years if corrective actions are not implemented or the component replaced
	Long-term Repairs	No near-term adverse effect

Note: the time line in this deficiency color code is not intended to predict when a component or equipment will fail. It is rather a tool to prioritize action or repair items to maintain a level of integrity, prevent equipment failure, and prolong the working life of the systems inspected.

Note:

The findings listed in Table D are grouped by location at this facility and categorized A through E with JP-5 observation consolidated in paragraph F:

A. Tank Gallery Piping
B. Harbor Tunnel Piping
C. UGPH Piping
D. Surge Tank Piping
E. FOR Piping
F. [redacted] JP-5 Piping from Tank 20 to [redacted] (July 2021 Observations)

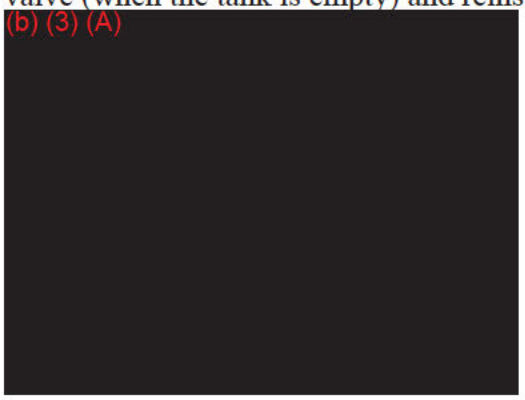
[redacted]

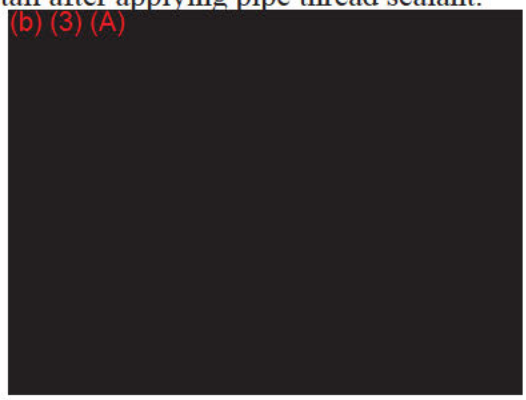
Table D [redacted] Piping Deficiency

A. Tank Gallery Piping

A1) **Finding:** Brass/bronze (low melting point) valve attached to the end blind flange of the (b) (3) (A) (F24) line near Tank 15/16 ((b) (3) (A)).
Reference: M, Short-Term
Recommendation: Remove the brass/bronze valve and install carbon steel Class 150 ball valve with flanged ends.

A2) **Finding:** Minor staining on the upstream throat plug of the DBB skin valve for Tank 16. Monitor as needed; note: plug cannot be removed without draining the tank.
Reference: A/I/J, Mandatory
Recommendation: Monitor the plug on the DBB valve until repaired. Remove plug from the valve (when the tank is empty) and reinstall after applying pipe thread sealant.



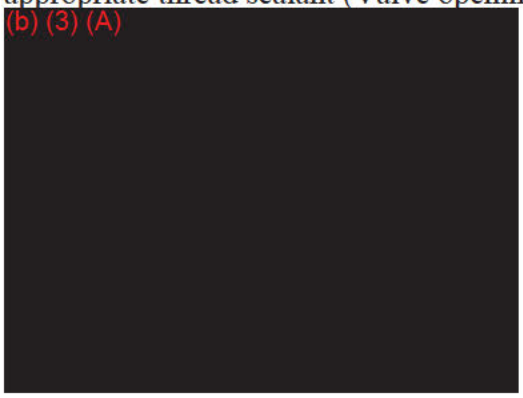


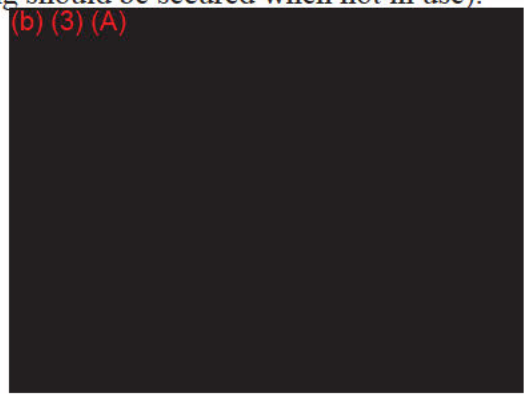
A3) **Finding:** There is an HPV valve on Tank 16 before the skin valve that is missing a plug. Some fuel was noted inside the valve body.
Reference: A/I/J, Mandatory
Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use).

A4) **Finding:** The DBB valves are equipp[redacted] ith a drain valve in-leu of a plug. The end of the valve is not secured with a pipe plug. This was noted on Tank 16 ([redacted] DBB), Tank 15 ([redacted] DBB), Tank 10 ([redacted] DBB), Tank 9 ([redacted] DBB), Tank 8 ([redacted] DBB), Tank 7 ([redacted] DBB), Tank 6 ([redacted] DBB), Tank 4 ([redacted] DBB), Tank 3 ([redacted] DBB), and Tank 2 ([redacted] DBB). Note: The drain valve will see the same pressure as the pipeline when DBB is in the open position.

Reference: A/J, Short-Term

Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use).



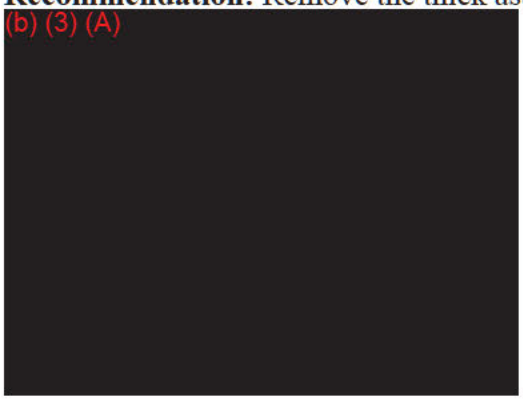


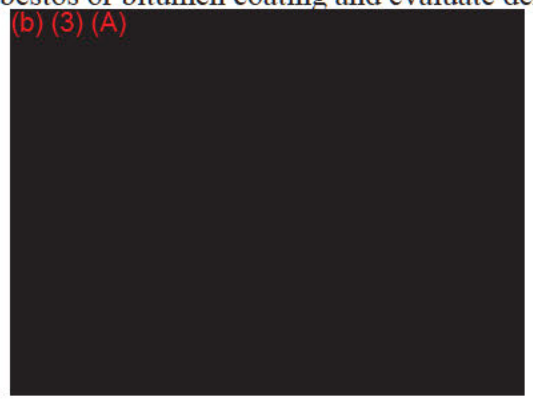
A5) **Finding:** Coating failure and corrosion on tank [redacted] (F-24) pipe at [redacted]

Reference: I, Short-Term

Recommendation: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.

A6) **Finding:** The [redacted] (F-24) line a[redacted]ars to have some type of thick asbestos or bitumen encapsulated asbestos coating from [redacted] to about [redacted]. Inspection of the pipe in this area is limited. There is one location near [redacted] that appears to be a dent underneath the thick coating around the 7 o'clock position. Size could not be verified.
Reference: I, Long-Term
Recommendation: Remove the thick asbestos or bitumen coating and evaluate dent geometry.





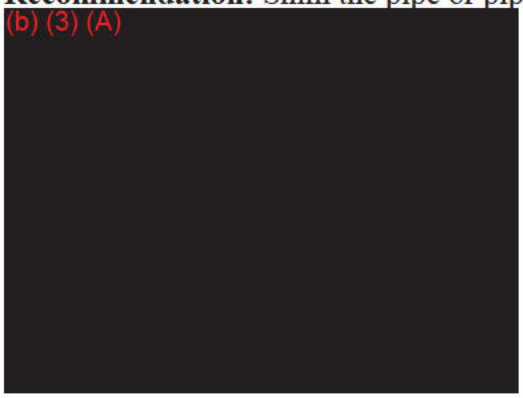
A7) **Finding:** Moderate corrosion on the base of plate and vertical member of [redacted] and 48 on [redacted] (F-24) line. Note the bracing between pipe support is also corroded off at [redacted] (See Table E – Pipe Support Inspection Summary).
Reference: C/I, Short-Term
Recommendation: Replace the base plate and affected section of the vertical member of the pipe support and diagonal bracing.

A8) **Finding:** Pipe not adequately supported at [redacted] on [redacted] (F-24) line. Note: saddle is not engaged, wood shim used, saddle not secured to the I-beam.
Reference: C/I, Short-Term
Recommendation: Install pipe support saddle of sufficient height to support the pipe. Secure the pipe support to the I-Beam structure. Consider installing a Teflon pad between pipe and support.

A9) **Finding:** Long segment of the [redacted] (F-24) pipe is unsupported. One location has 47' of unsupported pipe between [redacted] 46 to 47 with the saddle support missing at [redacted]
Reference: C/I, Short-Term
Recommendation: Install saddle supports at [redacted] and shim as needed to support pipe on the saddles. Secure the saddles to the pipe support.

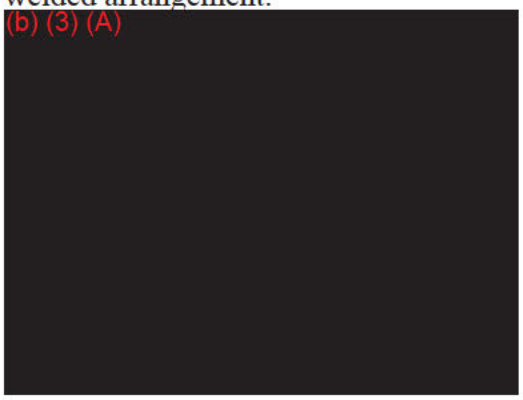
A10) **Finding:** Rail tie used a shim between pipe and pipe saddle support at [redacted] on [redacted] (F-24) line.
Reference: C/I, Short-Term
Recommendation: Remove the rail tie and install Teflon pad between pipe and saddle.

A11) **Finding:** Long segment of the [redacted] (F-24) pipe is unsupported. One location has 57' 11" of unsupported pipe between [redacted]. The pipe is also not adequately supported between [redacted] with only partial support on one side.
Reference: C/I, Short-Term
Recommendation: Shim the pipe or pipe support as needed to support the pipe uniformly.



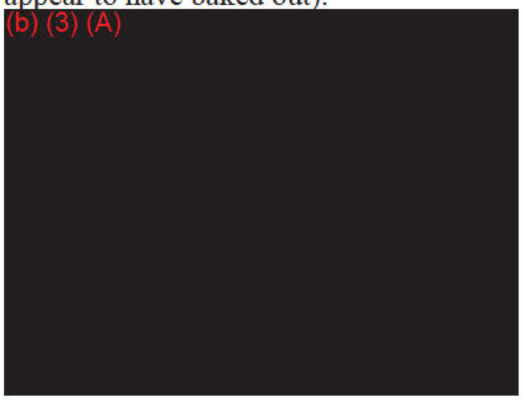
A12) **Finding:** Threaded 2-[redacted] carbon stee[redacted] PD valve mounted on the underside of the [redacted] (F-24) between (b) (3) (A) [redacted].
Reference: A/I/J, Long-Term
Recommendation: Remove the threaded valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

A13) **Finding:** Facility piping at the tank tees has nonstandard (None ASME B16.5) rated flanged fittings and non-standard weld tie-ins. Noted throughout the facility (tees between tanks). Tank 13/14 shown but typical at each Tee at this facility. ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
Reference: I/J, Long-Term
Recommendation: Consider upgrading to an ASME B16.5 rated flange and fittings with butt-welded arrangement.

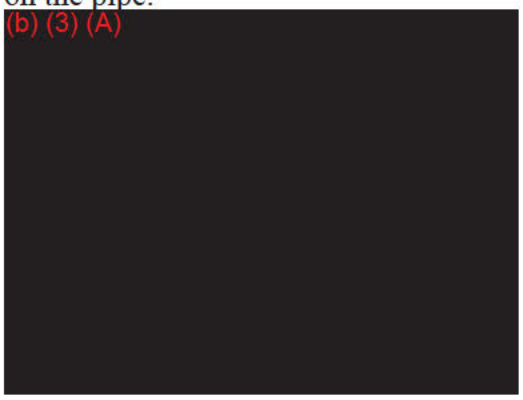

(b) (3) (A)

(b) (3) (A)

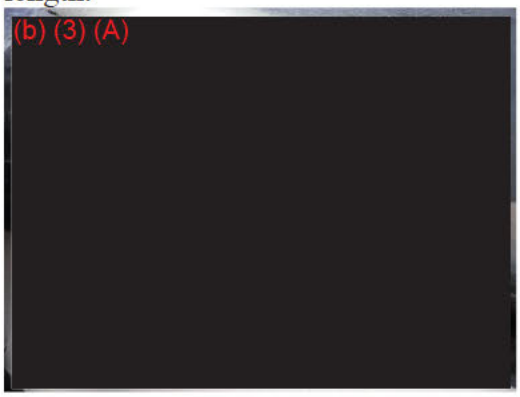
A14) **Finding:** The dresser coupling joint h[redacted]esses on the (b) (3) (A) at Tank 6 lateral has two rods that are loose. Notable movement/gap on the bottom harness lug and deflection rings. A gap of 0.250" to 0.300" measured on both top and bottom joint harnesses.
Reference: A/I/J, Mandatory
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed. (Note: This dresser coupling is provided with double nut and does not appear to have baked out).



A15) **Finding:** There are coating failure and contact/bimetallic corrosion on the (b) (3) (A) (F-24) line between [redacted]6. Pipe corrosion is due to contact with Unistrut.
Reference: I/J, Long-Term
Recommendation: Provide sufficient spacing between pipe and Unistrut. Repair the coating on the pipe.

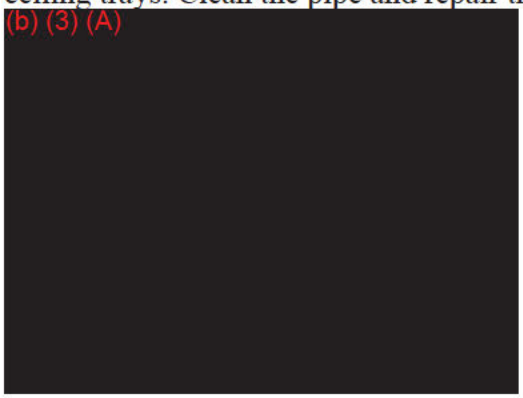


A16) **Finding:** There is a 3-[redacted] welded an[redacted] nged branch connection on top of [redacted] (F-24) line between [redacted] with six bolts that are not fully engaged.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.



A17) **Finding:** There is a threaded fitting with brass (low melting) valve on top of the [redacted] (JP-5) pipe at [redacted]. Note: these types of valves are not intended to be used on fuel systems. Some staining noted at the packing nut.
Reference: A/I/J/M, Mandatory
Recommendation: Remove the threaded brass valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

A18) **Finding:** Coating failure and some corrosion due to material drips from tunnel ceiling on the [redacted] (JP-5) pipe at [redacted] (no significant pitting noted).
Reference: I/J, Long-Term
Recommendation: Seal the tunnel ceiling to prevent material drips on the pipe or provide ceiling trays. Clean the pipe and repair the coating.



A19) **Finding:** Some coating failure and co[redacted]ion between pipe and pipe support on the (b) (3) (A) (JP-5) pipe at (b) (3) (A). (similar corrosion at (b) (3) (A))

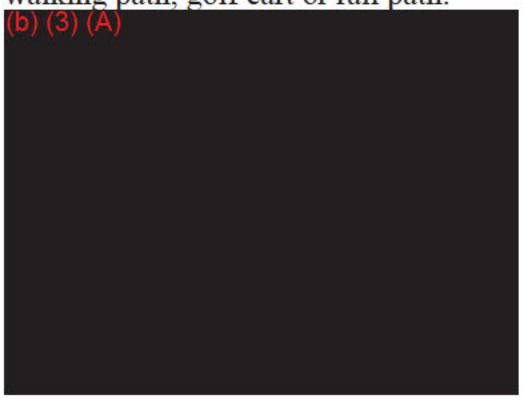
Reference: I, Short-Term

Recommendation: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.

A20) **Finding:** There is a threaded (b) (3) (A) gate valve by Tank 7 and 8 that extends down from the HPV on (b) (3) (A) (JP-5) down below the pipe. Possibility to get damaged by impact.

Reference: A/I/J, Short-Term

Recommendation: Remove the threaded valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Consider routing the piping away from walking path, golf cart or rail path.



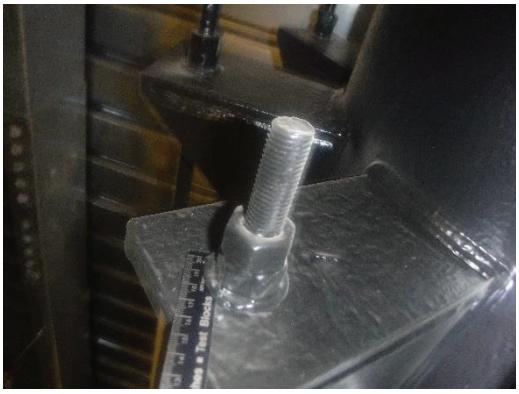
A21) **Finding:** There is a threaded bronze/brass (low melting) valve attached on the top of the [redacted] (F-76) header pipeline between (b) (3) (A). The valve is used to bleed air from the end of the pipe. Note: these types of valves are not intended to be used on fuel systems.

Reference: A/I/J/M, Mandatory

Recommendation: Remove the threaded brass valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

A22) **Finding:** Dresser coupling to Tank 1 [redacted] missing the deflection ring on the (b) (3) (A) line. Small gap noted between the washer and harness lug.
Reference: A/I/J, Mandatory
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed. (Note: This dresser coupling is provided with double nut and does not appear to have baked out).

(b) (3) (A)



A23) **Finding:** Area of inactive corrosion area between (b) (3) (A)). Pit depth = 0.196" – 0.200" and UTT of 0.430" on unaffected area resulting in remaining thickness of 0.219" to 0.250".
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with 60-[redacted] long (b) (3) (A) spool or perform additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

(b) (3) (A)

(b) (3) (A)

(b) (3) (A)

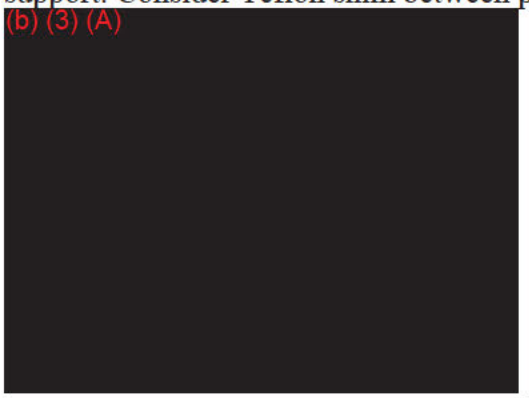
(b) (3) (A)

A24) **Finding:** The (b) (3) (A) (F-76) pipe is [redacted] fully supported at [redacted] 45 (Partial only). Also noted on [redacted] 46.

Reference: C/I, Long-Term

Recommendation: Shim pipe support so as to provide positive contact between pipe and saddle support. Consider Teflon shim between pipe and saddle.

(b) (3) (A)



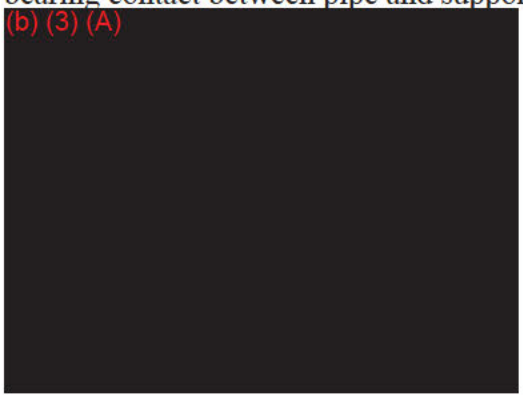
(b) (3) (A)

A25) **Finding:** The second pipe support from Tank 9 for the (b) (3) (A) pipe is not in contact with the pipe (floating pipe). It is 39-[redacted] of unsupported pipe from tank to the tee.

Reference: C/I, Short-Term

Recommendation: Adjust the elevation of the pipe support plate to provide sufficient load bearing contact between pipe and support plate.

(b) (3) (A)



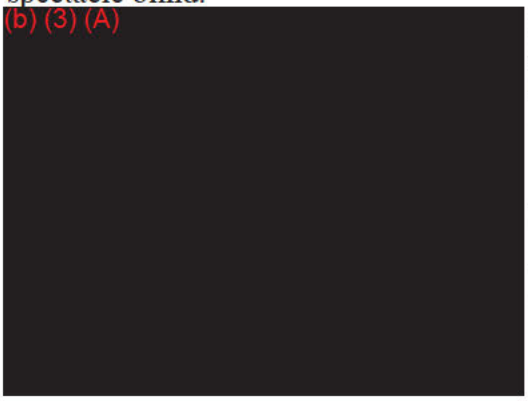
[redacted]

A26) **Finding:** Several of the fasteners o[redacted]ange from the (b) (3) (A) (F-76) header to lateral tees between Tank 9 and 10 have moderate corrosion.

Reference: A/I/J, Short-Term

Recommendation: Replace the fasteners at this flanged joint. Remove corrosion from the spectacle blind.

(b) (3) (A)



(b) (3) (A)

A27) **Finding:** The branch piping on (b) (3) (A) (F-76) header has a welded and flanged branch fitting at about the 2 o'clock position. Two fasteners were not fully engaged. This is located between (b) (3) (A) and (b) (3) (A) (approximately (b) (3) (A) from (b) (3) (A)).

Reference: I/J, Long-Term

Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.

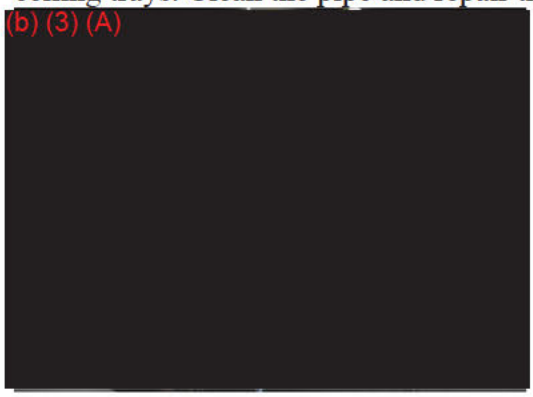
(b) (3) (A)

[redacted]

A28) **Finding:** Coating failure and some c[redacted]sion due to material drips from tunnel ceiling on the (b) (3) (A) (F-76) pipe at (b) (3) (A) (no significant pitting or thickness loss noted).

Reference: I/J, Long-Term

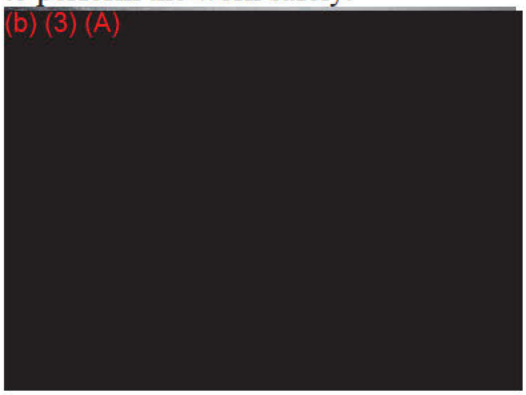
Recommendation: Seal the tunnel ceiling to prevent material drips on the pipe or provide ceiling trays. Clean the pipe and repair the coating.



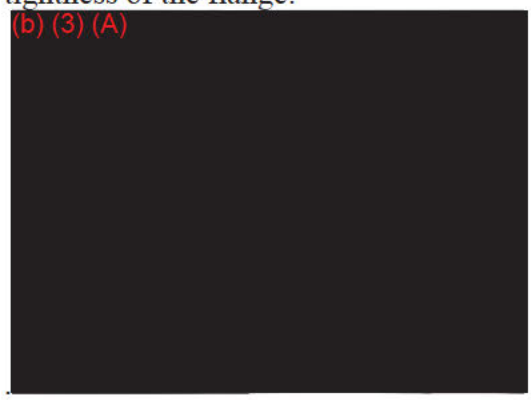
A29) **Finding:** There is a branch connection on the (b) (3) (A) (F-76) by (b) (3) (A) that has a 1-[redacted] threaded fitting and valve. Some fuel staining was noted around the flange and pipe, but no active weeping was noted. The existing 1-[redacted] threaded fittings and ball valve appear to be relatively new.

Reference: A/I/J, Mandatory

Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant. Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint and the threaded fittings. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely.



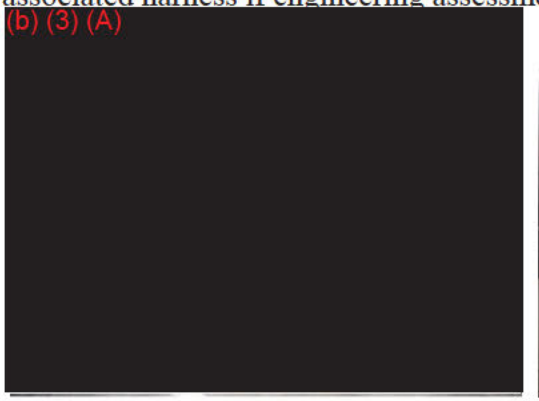
A30) **Finding:** Some staining noted on the [redacted] (F-76) flange tie-in between Tank 3 and 4 (no active weeping noted). Note: the staining did not appear to be F-76 (based on odor and gas meter testing) and had the viscosity of oil. InterSpec suspects this oily substance is caused by one of the two following reasons: oil used to lubricate the bolts or areas rich in polyamide or amine content in the epoxy coating that caused yellowing/blushing and/or an oily exudate. Chemical reactions that form the exudate creates a chain of reactions that can lead to a sticky, oily, or waxy film appearing on the surface of the cured epoxy coating. Amine blush testing or lab testing is suggested to fully determine the fluid type. Review of prior history at this flange and work completed will aid in determining the exact source. Industry standard including gasket manufacturers do not recommend tightening or torquing a flanged fitting while it is in service.
Reference: A/I, Long-Term
Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.



A31) **Finding:** There is a 4 x 6-[redacted] wood support extending from the [redacted] (F-76) to tunnel ceiling. Use and function unknown (Near [redacted]). The wood beams do not appear to be bearing any load on the pipe (based on the gaps between wood and top of the steel saddle as well as gaps at the bolt notches).
Reference: C/I, Long-Term
Recommendation: Investigate the function of the wood support and remove from the pipe. Provide alternate design for the intended function.

[redacted]

A32) **Finding:** One joint harness with gap [redacted]ted on the (b) (3) (A) (F76) dresser coupling at (b) (3) (A). There are no deflection rings and adapters on the harness lugs. Note: Eight out of the sixteen lugs are installed backwards (those on the bulkhead side).
Reference: A/I/J, Mandatory
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed. Rotate lugs or consider removing the dresser coupling and associated harness if engineering assessment indicates it is not needed.



A33) **Finding:** The dresser coupling at (b) (3) (A) on the (b) (3) (A) (F76) has lugs installed backwards. There are no deflection rings and adapters on the harness lugs.
Reference: A/I/J, Short-Term
Recommendation: Rotate lugs or consider removing the dresser coupling and associated harness if engineering assessment indicates it is not needed. All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

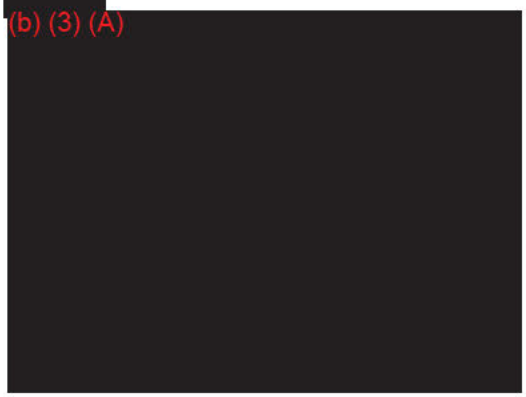
A34) **Finding:** The section of (b) (3) (A) JP-5 Piping from (b) (3) (A) to (b) (3) (A) was not evaluated during this trip (An API-570 inspection along with various NDE was completed on this section of piping in July 2021). It was observed that several repairs were in progress on this segment of piping at the time of the 2022 inspection. Sections of pipe were isolated, cut, or blanked off.
Reference: No Code
Recommendation: Follow the requirements of API Std 570 required repairs and NDE.
(NO PHOTO)

[redacted]

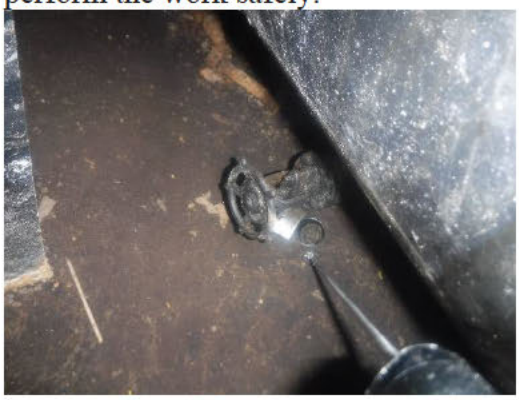
B. Harbor Tunnel Piping (*Note: All clock posit[redacted]; when listed, are looking towards the UGPH)*

B1) **Finding:** Moderate coating failure and corrosion on pipe, flange, and fasteners noted on all three lines (segment from (b) (3) (A) to the UGPH bulk head). Corrosion due to drips from tunnel ceiling; there is currently a yellow tarp hanging above the pipes in this area. Notable corrosion was on the (b) (3) (A) (JP-5) line.
Reference: I/J, Long-Term
Recommendation: Seal the tunnel ceiling to prevent material drips on the pipe or provide ceiling trays. Clean the pipe and repair the coating.

B2) **Finding:** HPV are threaded valves, nipples, and ball float trap. Staining and weeping were noted around the threaded fitting on the (b) (3) (A) (F-76) past isolation valve (b) (3) (A). Similar staining and weeping were noted on the plugged HPV valve just before the bulkhead to UGPH on [redacted] line.
Reference: A/I/J, Mandatory
Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant on plugged/threaded HPV and the threaded ball float trap. Clean the staining from the fittings and pipe. Monitor the threaded fittings. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely (from valve (b) (3) (A) and bypass line to (b) (3) (A)



B3) **Finding:** Staining noted around the th[redacted]ed LPD on the (b) (3) (A) (F-76) just before the bulkhead to UGPH. A total of three threaded LPDs noted between (b) (3) (A) and the UGPH bulkhead.
Reference: A/J, Mandatory
Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant /threaded LPDs (QTY 3). Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely.



B4) **Finding:** Some staining and wetting were noted on the threaded LPD assembly on (b) (3) (A) (F-76) LPD just past (b) (3) (A) 0 (note the drip pan).
Reference: A/I/J, Mandatory
Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely.

B5) **Finding:** The (b) (3) (A) (JP-5) line just past [redacted] 690 and before UGPH bulkhead has a threaded LPD. There is notable corrosion on the pipe nipple (red arrow).
Reference: A/I/J, Mandatory
Recommendation: Disassemble the threaded fitting and replace with extra heavy pipe fittings. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping (from (b) (3) (A)) must be drained to perform the work safely.

B6) **Finding:** Another LPD with notable [redacted]e nipple corrosion on the (b) (3) (A) (JP-5) line before isolation valve #0156. See red arrow.
Reference: A/I/J, Mandatory
Recommendation: Disassemble the threaded fitting and replace with extra heavy pipe fittings. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping (from (b) (3) (A)) must be drained to perform the work safely.

(b) (3) (A)

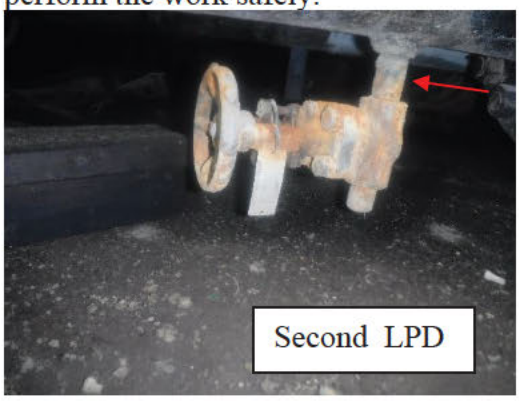
[redacted]

B7) **Finding:** The (b) (3) (A) (F-24) line has two threaded LPDs and one HPV (between (b) (3) (A) and the (b) (3) (A)). The first LPD and the HPV did not have staining or corrosion on fittings.
Reference: A/I/J, Short-Term
Recommendation: Consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping (from (b) (3) (A) and (b) (3) (A)) must be drained to perform the work safely.

(b) (3) (A)

[redacted]

B8) **Finding:** The second LPD on the (b) (3) (A) (F-24) between (b) (3) (A) and the [redacted] has a notable corrosion on the pipe nipple (red arrow).
Reference: A/I/J, Mandatory
Recommendation: Disassemble the threaded fitting and replace with extra heavy pipe fittings. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping (from (b) (3) (A) and (b) (3) (A)) must be drained to perform the work safely.



[redacted]

B9) **Finding:** Twin Seal DBB flange hol[redacted] are drilled and tapped, when there is no possibility of fitting a hexagonal nut behind the flange when manufactured. The [redacted] on the F-24 line between (b) (3) (A) and the (b) (3) (A) [redacted] has four studs on the top and four studs on the bottom with minimal thread engagement to the DBB flange (tank side flange). Threaded engagement of only 0.250 to 0.550 inches was measured. There is also one stud on the other side of the (b) (3) (A) [redacted] that is not fully engaged with less than 0.500 inches measured. Red arrow shows measured engagement depth of studs (white dots/lines marked with white paint on the flange).

Reference: I/J, Short-Term

Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length. See manufacturer's instruction for the required bolt or stud size for drilled and tapped flange holes.

(b) (3) (A)

B10) **Finding:** Several areas of coating failure (minor to moderate noted on all three lines in the harbor tunnel). Location and extent of coating damage is provided in Table H (Coating Failure Summary).

Reference: I/J, Short-Term to Long-Term (noted in the harbor tunnel)

Recommendation: Clean the pipe and repair the coating.

(b) (3) (A)

[redacted]

B11) **Finding:** Four arc strikes/weld lines [redacted]ween the 7 to 10 o'clock position; each approximately 3-[redacted] long, noted near miter weld on [redacted] (F-76) line just before [redacted]. Do not know what the purpose and cause of these weld features are, but arc gouge depth of 1/32" to 3/32" was measured. Note: these appear to be original construction fit-up anomalies.

Reference: I/J, Long-Term

Recommendation: Remove coating and conduct close visual inspection along with liquid penetrant testing (PT) or magnetic particle testing (MT) of the arc strikes/weld lines.

(b) (3) (A)

B12) **Finding:** Nonstandard flange configu[redacted]on (blind flange) noted on the (b) (3) (A) (JP-5) line near (b) (3) (A). A 12-[redacted] welding neck-flange with flat plate welded is used. Note: ASME B16.5 NPS 12 class 150 blind flange has a minimum flange thickness of 1.190". The center plate in the current configuration has thickness of 0.933".
Reference: I/J, Long-Term
Recommendation: Replace with ASME B16.5 rated blind flange.

(b) (3) (A)

B13) **Finding:** Some moderate oil staining noted on (b) (3) (A)) gear box near (b) (3) (A) wye.
Reference: A/I/J, Long-Term
Recommendation: Clean staining from the valve actuator gear box and EIM actuator. Verify sufficient lubricant is still preset. Service the valve actuator gear box and EIM actuator.

(b) (3) (A)

B14) **Finding:** Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points. (b) (3) (A) shown respectively. (See Table E – Pipe Support Inspection Summary)
Reference: C/I, Short-Term
Recommendation: Replace the base plate and affected section of the vertical member of the pipe support along with horizontal support-to-wall attachment angle iron.

[redacted]

B15) **Finding:** Several dents were presen[redacted] all[redacted] lines [redacted]. Note: the assessment indicates these dents are within acceptable limits based on latest edition of API RP 1183; Assessment and Management of Pipeline Dents. Plain dents regardless of shape with depths up to 10 % of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). All the dents were also noted to be within acceptable limits API 579 section 12 Level 1 assessment (acceptable if dent is ≤ 7% of the pipe diameter). Deepest noted dents: [redacted] (F-24) = [redacted], [redacted] (JP-5) = [redacted], [redacted] (F-76) = [redacted] (See Table F for a full list of dents identified during the inspection and the assessment criteria used).
Reference: A/J, Long-Term
Recommendation: Monitor at next API 570 inspection.

[redacted]

B16) **Finding:** Majority of the piping support in the [redacted] has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the [redacted] (F-24) and [redacted] (JP-5) lines. The [redacted] (F-76) line was mostly supported on concrete saddles with some welded steel anchor saddles. [redacted] and [redacted] shown. (See Table E for a full list of pipe support inspection summary)
Reference: C/J, Short-Term
Recommendation: Repair coating on the pipe and support. Provide a Teflon shim at location of metal-to-metal contact points.

[redacted]

B17) **Finding:** The anchor type saddle sup[redacted]t next to (b) (3) (A) was previously cut (likely for pipe repairs or modification). The existing weld attachment is now only tack welds at two locations in the front of the saddle support (weaker anchor).
Reference: C, Long-Term
Recommendation: Engineering assessment may be required to determine if this saddle support is sufficiently anchored.

(b) (3) (A)

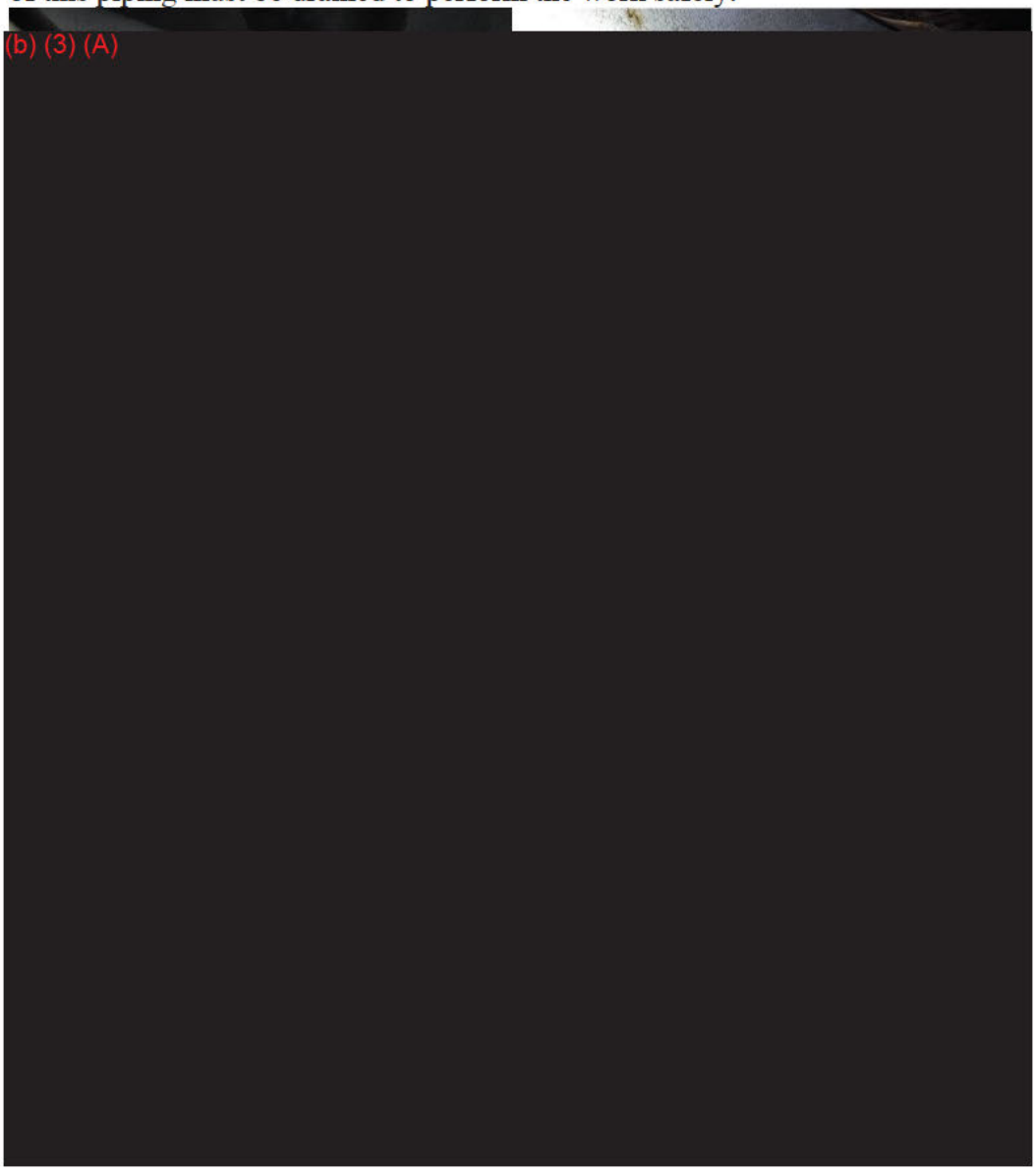
[Inspection finding continued on the next page]

B18) **Finding:** Several threaded fittings no[redacted] on all three piping from (b) (3) (A) [redacted]. Majority of the fittings are equipped with valves and are used as LPDs and HPVs. Minor staining was noted on some threaded fittings, but no active weeping or leaks were noted during the inspection (note: system was not in operation or pressurized during the inspection). Table D-1 is provide to list the threaded fittings identified in the harbor tunnel from [redacted].

Reference: A/I/J, Mandatory (Mandatory for the five locations identified with staining on Table D-1 below). The remaining threaded fitting without stating are considered as Long-term repairs.

Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant for the five locations identified with staining in Table D-1. Alternatively; consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely.

(b) (3) (A)



(See Table below for location of threaded fittings identified in the (b) (3) (A) [redacted])

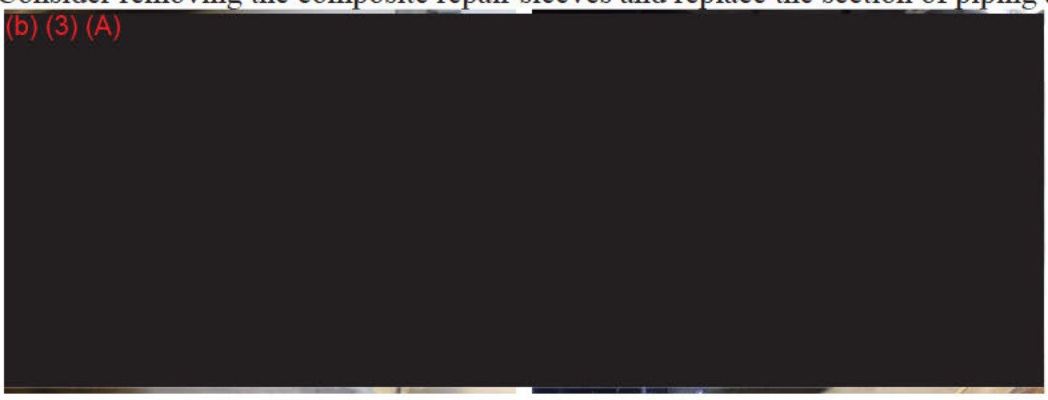
Table D-1 HPV and LPD Location [redacted] n the Harbor Tunnel (From [redacted])			
Relative	**Pipe**	**Description**	**Condition**
(b) (3) (A)		Threaded 1" HPV valve w/plug	Dry/no active corrosion
		Threaded 1" plug (Top)	Dry/no active corrosion
		Threaded 1" plug (Top)	Dry/no active corrosion
		Threaded 1" plug (Top)	Dry/no active corrosion
		Threaded 1" plug (Bottom)	Dry/minor corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/minor corrosion
		Threaded 2" fitting w/ valve (Top)	Small stain at fittings
		Threaded 2" fitting w/ valve (Top)	Dry/minor corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/minor corrosion
		Threaded 1.5" fitting w/ valve (Top)	Dry/minor corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/minor corrosion
		Threaded 2" fitting w/ valve (Top)	Small stain at fittings
		Threaded 1/2" plug (Top)	Dry/no active corrosion
		Threaded 1/2" plug (Top)	Dry/no active corrosion
		Threaded 1" plug (Top)	Small stain at fittings
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 1.5" fitting w/ valve (Top)	Small stain at fittings
		Threaded 1.5" plug (Top)	Dry/no active corrosion
		Threaded 1.5" plug (Top)	Dry/no active corrosion
		Threaded fitting w/ valve (Top) on branch	Dry/no active corrosion
		Threaded 1" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 2" fitting w/ valve (Top)	Large stain at fittings
		Threaded 2" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 1.5" fitting w/ valve (Top)	Dry/no active corrosion
		Threaded 1.5" plug (Bottom)	Dry/no active corrosion
		Threaded 1.5" fitting w/ valve (Bottom)	Dry/no active corrosion
		Threaded 1.5" fitting w/ valve (Top)	Dry/no active corrosion

B19) **Finding:** Isolation DBB (b) (3) (A) on the (b) (3) (A) (F-76) line by [redacted] 2 wye past (b) (3) (A) is missing a nut and bolt on the DBB top plate.
Code Reference: A/I/J, Long-Term
Recommendation: Install a nut and bolt.

(b) (3) (A)

B20) **Finding:** The [redacted] (F-24) line has [redacted] onstandard repair at bulkhead between [redacted] The repair includes a full encirclement welded split sleeve (clamshell) on [redacted] and a partial (patch plate style) repair on [redacted] side of the bulkhead with square corner (API STD. 570 lists all repair patches shall have a min. of 1". Additionally, the patch repair cannot exceed ½ the pipe diameter (a full encirclement sleeve is required if the corroded area exceeds ½ the pipe diameter). Some coating failure and corrosion noted at the penetration.
Reference: I/J, Short-Term
Recommendation: Review repair details. Remove coating and conduct NDE (PT/MT) on the exposed end of patch repair. Repair the coating.

B21) **Finding:** Two locations with composite repair sleeves "Clock Spring" noted on the [redacted] (F-76) pipe at [redacted] each approximately 70-inches long. Review per ASME PCC-2 Article 401 recommended.
Reference: I/J, Long-Term
Recommendation: Review previous document to determine the reason for the repairs. Consider removing the composite repair sleeves and replace the section of piping as need.



B22) **Finding:** The concrete saddle (Saddle # 530) is cracked on the edge with large splint noted on [redacted] (F-76) line at about the 7 o'clock position.
Reference: C, Short-Term
Recommendation: Repair the concrete saddle support. Consider installing a Teflon pad between the saddle and pipe.

B23) **Finding:** The (b) (3) (A) (F-76) pipe [redacted] a threaded (b) (3) HPV welded on top of a full encirclement welded split sleeve repair between (b) (3) (A) [redacted]. The ball valve does not have a lock, and the reducing bushings are not engaged completely in the valve. (Lock valve out)

Reference: A/I/J, Long-Term

Recommendation: Install a lock or wire seal to prevent accidental actuation of valve handle. Remove the reducing busing and install a 2-[redacted] pipe plug. Consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

(b) (3) (A) [redacted]

B24) **Finding:** Coating failure and some corrosion on a welded (b) (3) (A) branch on the (b) (3) (A) (F-76) line. Corrosion around weld noted.

Reference: I/J, Short-Term

Recommendation: Repair the coating to arrest the corrosion on the branch connection and pipe.

(b) (3) (A) [redacted]

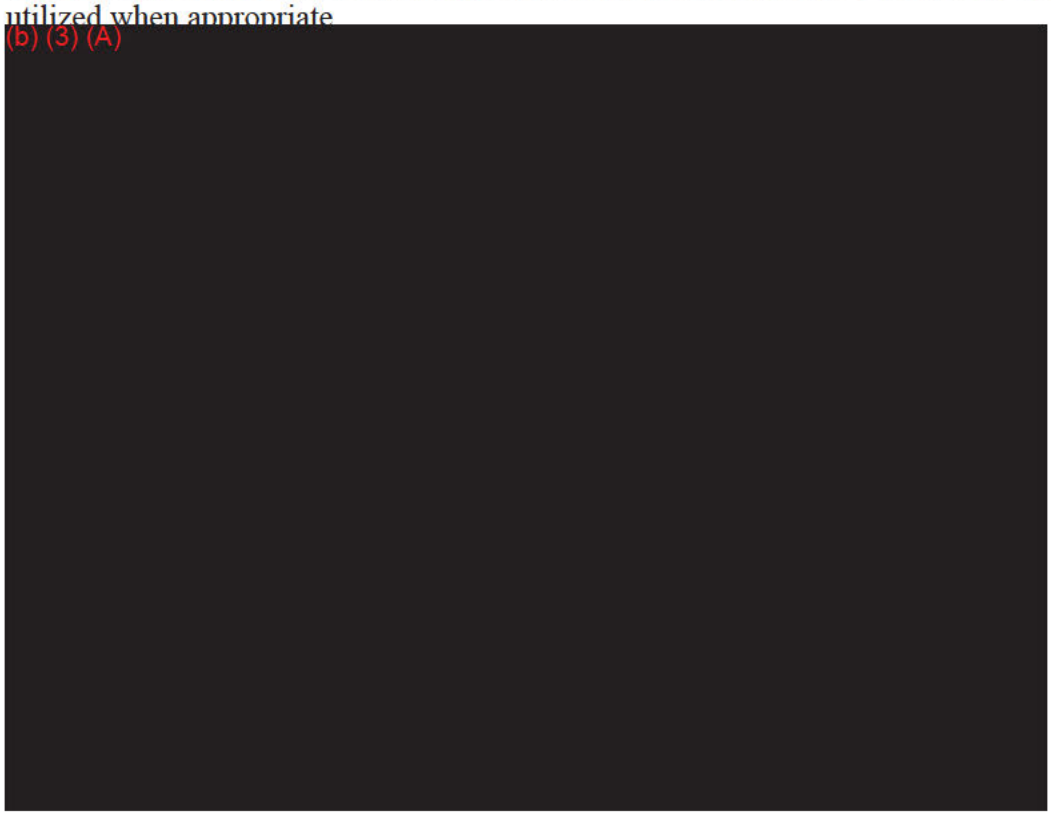
B25) **Finding:** Pipe support with anchor bolts not embedded in the concrete noted on [redacted]. (See Table E – Pipe Support Inspection Summary)

Reference: C/I, Short-Term

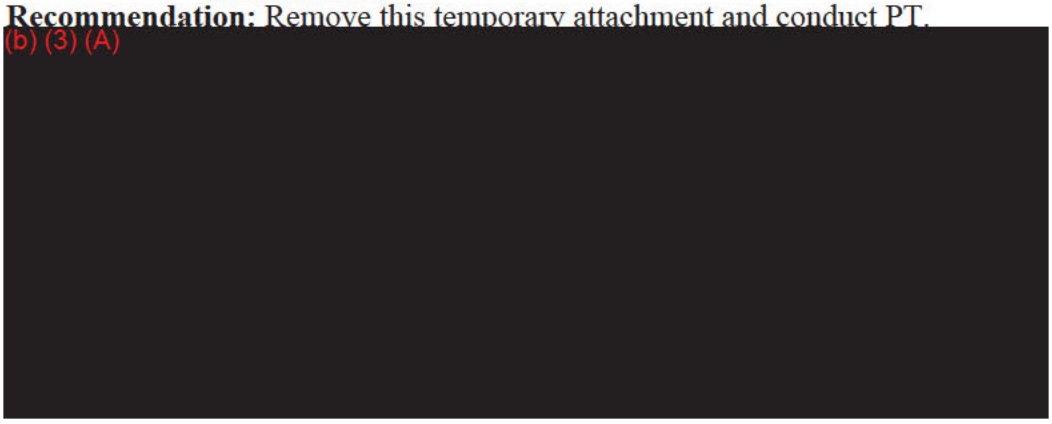
Recommendation: Secure the anchor bolts to the base plate of the pipe support.

[redacted]

B26) **Finding:** Pitting Corrosion on [redacted] 5 line) between [redacted] ([redacted]) at 9 o'clock. Corrosion Area is 9″ x 9″, Pit Depth is 0.050 - 0.140″, Metal thickness on unaffected area is 0.239 - 0.244″ resulting on a remaining metal thickness of 0.099″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with 48-[redacted] pipe spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.



B27) **Finding:** There is a tack-weld fit up ("Welding Dog") tab on the [redacted] (JP-5) line between [redacted]. Approximately 63" from [redacted]. This was probably installed as a welding ground attachment point during recent hot work and never was removed. Not a standard practice. Temporary attachments are supposed to be removed and area tested with appropriate NDE.
Reference: A/J, Long-Term
Recommendation: Remove this temporary attachment and conduct PT.



CUI

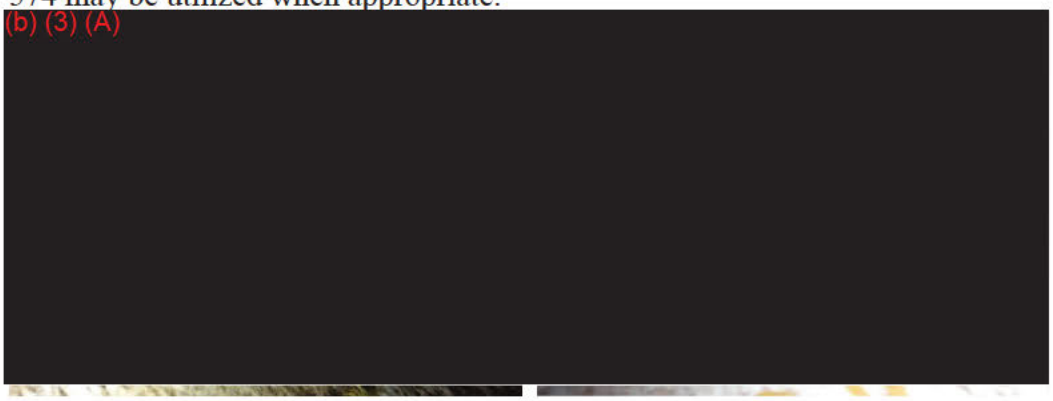
B28) **Finding:** Concrete saddle support (# 337) between [redacted] has several 1/8" rods between the pipe and the concrete saddle. Reason is unknown.
Reference: C/I, Long-Term
Recommendation: Remove the 1/8" rods between the concrete support saddle and pipe. Conduct visual inspection of the interface. Consider a Teflon shim between saddle and pipe.
(b) (3) (A)
[redacted]

B29) **Finding:** Several active and inactive pitting and general corrosion on section of the [redacted] (JP-5) pipe, approximately 21-inches from [redacted] were noted. The pitting/corrosion area is at the 12 o'clock position. Pitting depth of 0.060" to 0.095" was measured with UTT adjacent to the pits was 0.225" - 0.242" inches. Resulting in remaining metal thickness of 0.130" to 0.147".
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with 60-[redacted] long [redacted] spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.
(b) (3) (A)
[redacted]

[redacted]

B30) **Finding:** Several active and inactive [redacted]ng and general corrosion on section of the (b) (3) (A) (F-76) pipe between (b) (3) (A) [redacted]. The pitting/corrosion area is at the 10 o'clock position. Pit depth of 0.080" to 0.140" measured with UTT adjacent to the pits of 0.358" - 0.361 inches. Resulting thickness at this location 0.218" to 0.221". The affected area is approximately 24" x 16" with the deepest pit/corrosion area covering a 9" x 9" area.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with 60-[redacted] long (b) (3) (A) spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

(b) (3) (A)



B31) **Finding:** Pitting Corrosion on (b) (3) (A) (JP-5 line) between (b) (3) (A) [redacted] at 6 o'clock. Corrosion Area is 10″ x 10″, Pit Depth is 0.055″ - 0.102″, Metal thickness on unaffected area is 0.218″ - 0.238″ resulting in a remaining metal thickness of 0.116″ to 0.136″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with 48-[redacted] long (b) (3) (A) spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

(b) (3) (A)

(b) (3) (A)

B32) **Finding:** Corrosion on pipe support a[redacted]e tunnel wall attachment at (b) (3) (A).
Reference: C/I/J, Short-Term
Recommendation: Replace the corroded pipe support members.

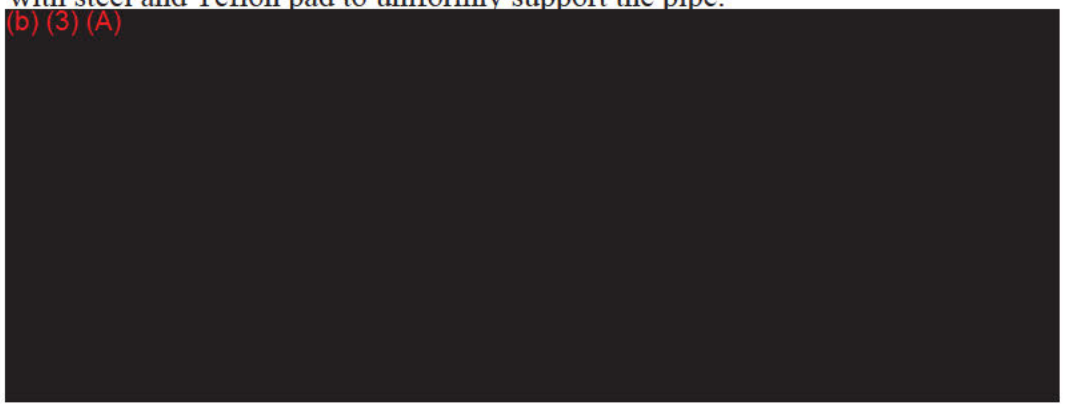
B33) **Finding:** Inactive pitting on (b) (3) (A) (JP-5) line between (b) (3) (A) at 10 o'clock. Corrosion Area is 8″ x 8″, Pit Depth is 0.050″ - 0.135″, Metal thickness on unaffected area is 0.226″ - 0.234″ resulting in a remaining metal thickness of 0.091″ to 0.099″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with (b) (3) (A) pipe spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

B34) **Finding:** Inactive pitting on (b) (3) (A) (JP-5) line between (b) (3) (A) at 5 o'clock. Corrosion Area is 6″ x 6″, Pit Depth is 0.050″ - 0.089″, Metal thickness on unaffected area is 0.241″ - 0.234″ resulting in a remaining metal thickness of 0.152″ to 0.156″.
Reference: I, Short-Term
Recommendation: Consider replacing the section of piping with (b) (3) (A) pipe spool. Continue coating maintenance and periodically survey area until the next API 570 inspection.

B35) **Finding:** Inactive pitting on [redacted] 6) line between [redacted] at 6 o'clock. Corrosion Area is 3″ x 2″, Pit Depth is 0.114″, Metal thickness on unaffected area is 0.383″ - 0.387″ resulting in a remaining metal thickness of 0.269″ to 0.273″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with [redacted] pipe spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

B36) **Finding:** Inactive pitting on [redacted] (F-76) line between [redacted] at 6 o'clock. Corrosion Area is 15″ x 24″, Pit Depth is 0.050″ - 0.114″, Metal thickness on unaffected area is 0.386″ - 0.393″ resulting in a remaining metal thickness of 0.186″ to 0.193″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with [redacted] pipe spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

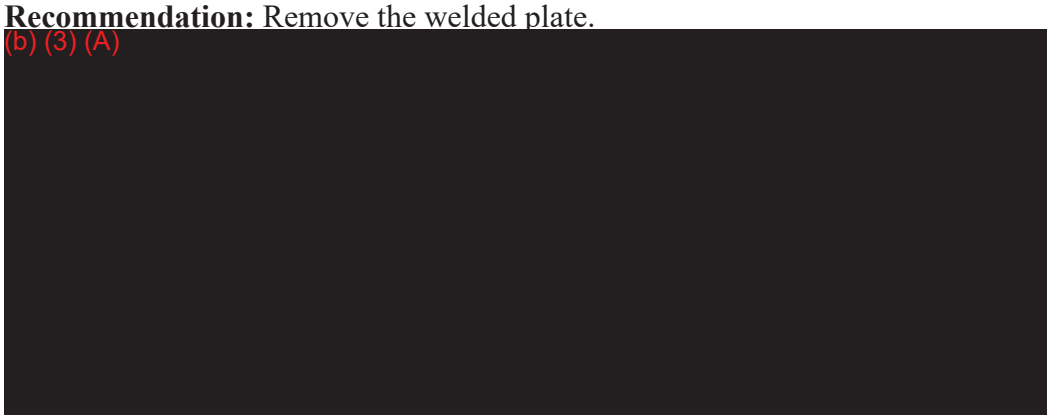
B37) **Finding:** Wood shim installed on [redacted] (F-76) pipe between Teflon pad and concrete saddle in an attempt to correct lack of support at concert saddle # 193 (Between [redacted]). Pipe is not fully and uniformly supported.
Reference: C/I, Short-Term
Recommendation: Repair the concrete saddle support or provide a replacement steel support adjacent to this pipe support. Alternatively, the existing pipe support can be evenly shimmed with steel and Teflon pad to uniformly support the pipe.



B38) **Finding:** (b) (3) (A) (F-76) pipe has a co rete pipe saddle # 501 (Between (b) (3) (A)) not engaged with pipe (floating pipe). There is loose concrete aggregate between pipe and saddle. Borescope inspection in the cavity did not indicate corrosion/erosion at this area.
Reference: C/I, Short-Term
Recommendation: Remove the loose concrete aggregate between pipe and saddle and shim with Teflon pad. Repair the saddle as needed.

B39) **Finding:** The (b) (3) (A) (F-24) pipe has a plate tack welded to the bottom of the wear plate on (b) (3) (A) . This was probably installed as a welding ground attachment point during recent hot work and never was removed. Not a standard practice. Temporary attachments are supposed to be removed and area tested with appropriate NDE. The grounding plate may also interfere with pipe movement (wear plates are designed to allow laterally movement across the pipe supports).
Reference: C/I, Short-Term
Recommendation: Remove the welded plate.

(b) (3) (A)

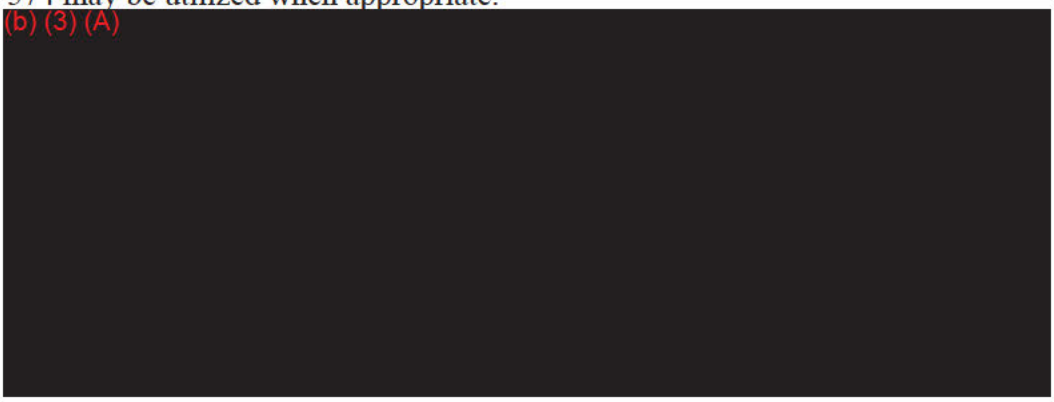


B40) **Finding: Pitting** Corrosion on (b) (3) (A) 18 (JP-5) pipe between (b) (3) (A) at 2 o'clock. Corrosion Area is 2″ x 2″, Pit Depth is 0.113″, Metal thickness on unaffected area is 0.233″ - 0.238″ resulting in a remaining metal thickness of 0.120″ to 0.125″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with (b) (3) (A) pipe spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

(b) (3) (A)

B41) **Finding:** Active pitting on (b) (3) (A) (F- line near (b) (3) (A) at 11 o'clock. Corrosion Area is 18″ x 24″, Pit Depth is 0.050″ - 0.120″, Metal thickness on unaffected area is 0.298″ - 0.321″ resulting in a remaining metal thickness of 0.178″ to 0.201″.
Reference: A/I, Mandatory
Recommendation: Replace the section of piping with (b) (3) (A) spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate.

(b) (3) (A)



B42) **Finding:** One bolt missing a nut on flanged 6- branch fitting mounted on the (b) (3) (A) (F-76) line between (b) (3) (A)
Reference: I/J, Mandatory
Recommendation: Replace the fasteners that are missing a nut. Provide a bolt of sufficient length.

(b) (3) (A)

(b) (3) (A)

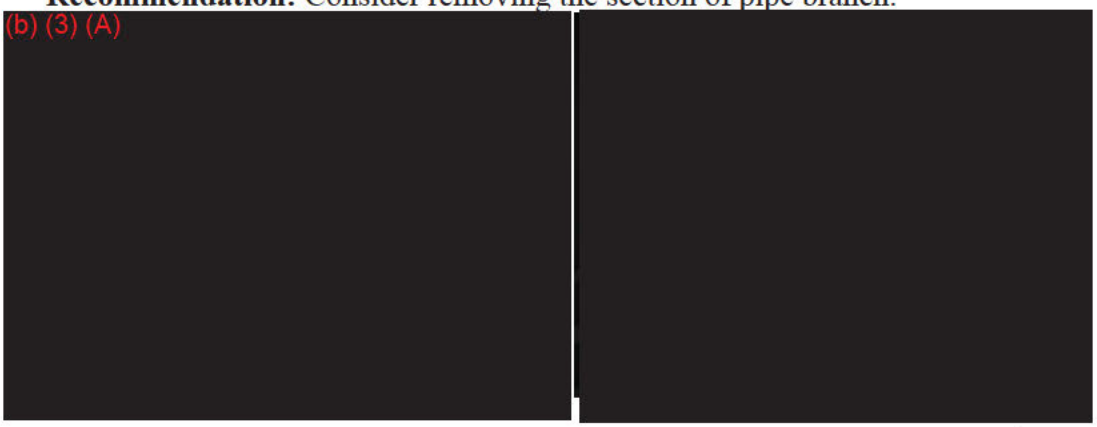
B43) **Finding:** The longitudinal weld on the (b) (3) (A) (F-76) pipe between (b) (3) (A) has a five- long area of weld porosity.
Reference: A/I, Mandatory
Recommendation: Conduct additional NDE to evaluate the extent of the porosity in this weld. A PAUT is recommend to evaluate the affected weld.

(b) (3) (A)

B44) **Finding:** There is unsupported and un[redacted]nforced (b) (3) (A) branch connection on the (b) (3) (A) (JP-5) pipe between (b) (3) (A) [redacted]. Line is not used, has skillet, and blind flange. (ASME B31.3 paragraph 304.3.5)

Reference: C/I, Short-Term

Recommendation: Consider removing the section of pipe branch.



B45) **Finding:** Lack of thread engagement and one bolt missing a nut on flanged 6-[redacted] branch fitting mounted on the (b) (3) (A) (F-76) line between (b) (3) (A) [redacted]. Note: the blind flange used also not ASME B16.5 rated/marked flange. It is a one-[redacted] round plate with bolt holes (Plate thickness is 0.981" and appears to meet thickness required). ASME B16.5 [redacted] class 150 blind flange has a minimum flange thickness of 0.940"

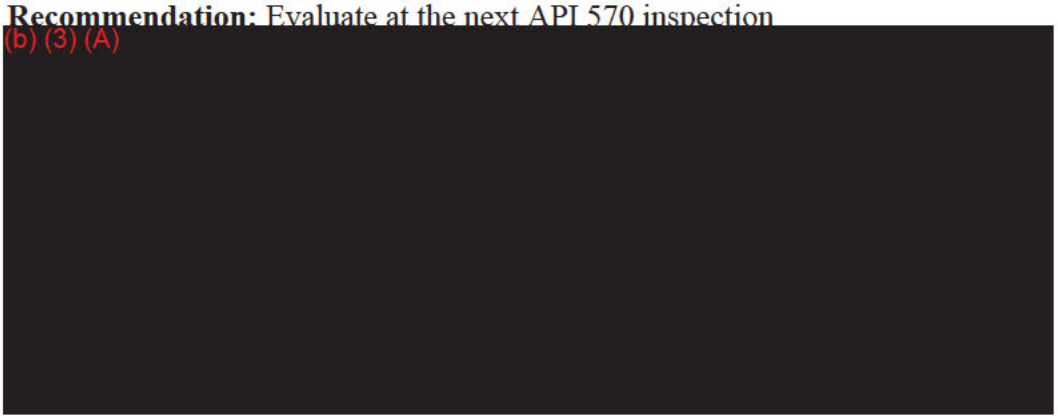
Reference: I/J, Mandatory (for thread engagement)

Recommendation: Replace the fasteners that are missing a nut. Provide a bolt of sufficient length to fully engage the fasteners. Consider installing an ASME B16.5 [redacted] class 150 blind flange.

B46) **Finding:** The concrete saddle (Saddl[redacted]36) is cracked on the edge with large splint noted on (b) (3) (A) (F-76) line at about the 7 o'clock position.
Reference: C/I/J, Short-Term
Recommendation: Repair or replace the concrete saddle support.

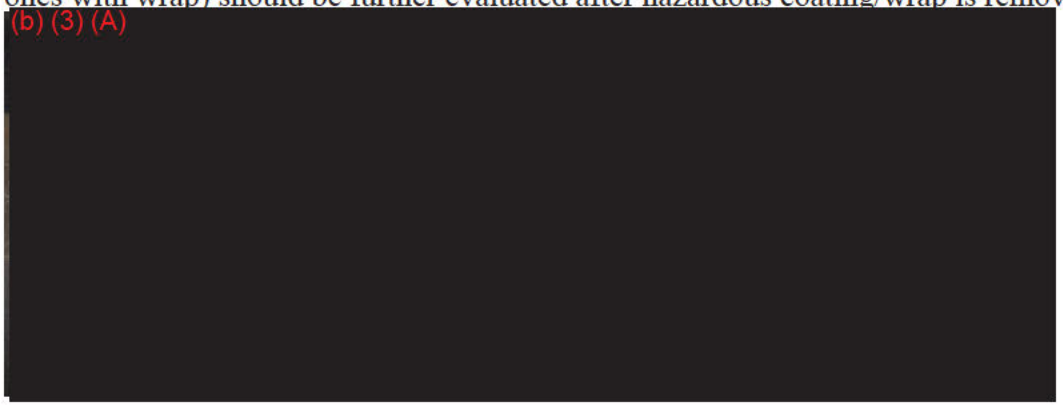
B47) **Finding:** Out-of-round/flat spot noted on the (b) (3) (A) (JP-5) between (b) (3) (A) bell-weld (12 o'clock to 3 o'clock position).
Reference: No Code
Recommendation: Evaluate at the next API 570 inspection

(b) (3) (A)



B48) **Finding:** Coating at the harbor tunnel consisted of bitumen with asbestos wrap; sections with wax tape wrap and coating with lead and another hazardous chemical.
Reference: No Code
Recommendation: Consider using Table H (Coating Failure and Corrosion Table) to prioritize areas to remove and repair coating. Some of the location highlighted in Table H (particularly ones with wrap) should be further evaluated after hazardous coating/wrap is removed.

(b) (3) (A)



B49) **Finding:** Air-to-concrete interface co[redacted]sion and under-wrap corrosion near weld on (b) (3) (A) (JP-5) pipe between (b) (3) (A) (bulkhead penetration). Corrosion is between 2 to 6 o'clock. Pit Depth is 0.0625" to 0.105", Metal thickness on unaffected area is 0.240" - 0.243" resulting in a remaining metal thickness of 0.135" to 0.138". The interface corrosion appears to be due to drips from ceiling and failed coating system. The interface corrosion does not seem to extend in to the concrete (small section of concrete chipped to check).

Reference: A/I, Mandatory

Recommendation: Replace the section of piping with (b) (3) (A) spool. Additional suitability for continued service assessment approach discussed in API STD 570 and AP RP 574 may be utilized when appropriate. Note replacement requires demolition and rebuild of the bulkhead. Alternatively, a (b) (3) (A) pipe can be installed using the existing (b) (3) (A) pipe as a sleeve to avoid bulkhead teardown.

(b) (3) (A)

B50) **Finding:** There are several locations that have a plate tack welded directly to the pipe. The function and use are unknown. One location on the (b) (3) (A) line between (b) (3) (A) has a failed tack weld.

Reference: I, Long-Term

Recommendation: Consider removing these tack welded plates, grind down the tack welds and conduct NDE (PT).

(b) (3) (A)

B51) **Finding:** There is what appears to b[redacted] pipe alignment tab weld that was not grounded flush near a circumferential weld by (b) (3) (A). This appears to be original to the facility. Some corrosion was noted at the alignment tab weld.
Reference: I, Long-Term
Recommendation: Grind alignment tab weld flush and conduct NDE (PT).
(b) (3) (A)
[redacted]

B52) **Finding:** There is a mechanical dent on a bell joint located between [redacted] (b) (3). A dent depth of approximately 0.320 inches was identified at the 3 o'clock position. This is a dent with coincident feature (a dent geometrically overlapping a weld).
Reference: A/I, Mandatory
Recommendation: Conduct a follow-on NDE assessment of the bell weld.
(No Photo)

[redacted]

C. UGPH Piping

C1) **Finding:** Two loose joint harnesses were noted on the discharge side of Pump (b) (3) (A). Gaps measured between harness lug and nut were 0.082" and 0.734". Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the [redacted] of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).
Reference: A/I/J, Mandatory
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

C2) **Finding:** Four loose joint harnesses were noted on the suction side of pump (b) (3) (A). Gaps: lower left = 0.200", lower right = 0.173", top right = 0.010", top left = 0.210" (See Notes above)
Reference: A/I/J, Mandatory
Recommendation: See Dresser Coupling restraining nut recommendation from above. (NO PHOTO)

C3) **Finding:** Pump shaft guard post not secured to the concrete pad on pump (b) (3) (A) (pump appears to be undergoing repair).
Reference: I, Long-Term
Recommendation: Secure the pump shaft guard post prior to returning pump to service.

C4) **Finding:** Several open conduits and s[redacted] or enclosures noted on pump (b) (3) (A) (pump appears to be undergoing repair).
Reference: B, Long-Term
Recommendation: Secure all conduits and sensor enclosures prior to returning pump to service.

C5) **Finding:** Several loose fasteners noted on the upper half casing of Pump (b) (3) (A) (pump appears to be undergoing repair).
Reference: A/I, Long-Term
Recommendation: Secure all fasteners to the casing prior to returning pump to service.

C6) **Finding:** Pump (b) (3) (A) had a skillet installed on the discharge side of the pump nozzle. The assembled joint only had one gasket installed. Similar condition noted on (b) (3) (A).
Reference: I, Long-Term
Recommendation: Consider using two gaskets when installing spectacle blind or skillet to protect the flange face and contact surface from damage; particularly for flanges with serrated finishes (ASME B16.5 and ASME PCC-1-2019). Inspect flange face when reassembling the flange.

C7) **Finding:** Some minor coating cracks [redacted] e noted on the discharge dresser coupling around the middle ring-to-follower joint area of Pump (b) (3) (A) discharge line (indicating potential movement). This movement is most likely due to loosened joint harnesses and not limitation of the dresser coupling (These couplings have demonstrated satisfactory performance when MFG specification and guidance are followed).
Reference: A/I, Short-Term
Recommendation: Inspect the dresser coupling and harness bolts after the spectacle blinds are removed. PM program that verifies dresser coupling mechanical integrity (verifying joint harness retention rod and follower bolt tightness). Alternatively, the dresser coupling can be dissembled and overhauled.

C8) **Finding:** Minor hairline crack noted on Pump (b) (3) (A) pump pad. Note the hairline crack does not appear to be significant to warrant integrity concern and foundation pad is not exposed to precipitation were rebar corrosion is a concern.
Reference: I, Long-Term
Recommendation: Apply maintenance coating and monitor overtime.
(NO PHOTO)

C9) **Finding:** Strainer drain ball valve on the inlet side of the control valve is not plugged. Consider installing a plug on the strainer drain valve and remove only during maintenance (Typical for all control valves on the discharge side of pumps at UGPH).
Reference: A/I, Short-Term
Recommendation: Consider installing threaded pipe plug with appropriate thread sealant on all unplugged ancillary equipment.

[redacted]

C10) **Finding:** Weeping at suction side pre[redacted]e gauge associated with Pump (b) (3) (A).
Reference: A/I/J, Mandatory
Recommendation: Remove pressure gauge and associated fittings; reinstall after applying pipe

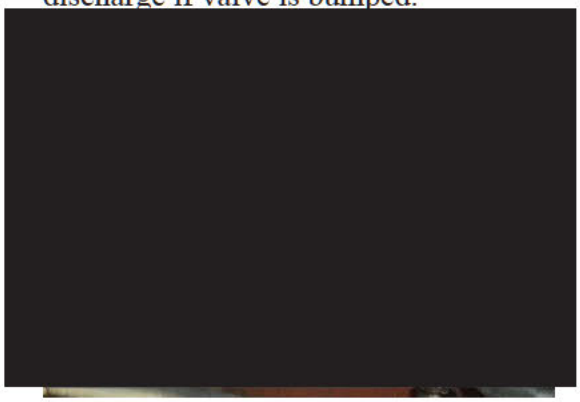
[redacted]

C11) **Finding:** Hairline crack noted on Pump (b) (3) (A) pump pad. Note the hairline crack does not appear to be significant to warrant integrity concern and foundation pad is not exposed to precipitation were rebar corrosion is a concern.
Reference: I, Long-Term
Recommendation: Apply maintenance coating and monitor overtime.

C12) **Finding:** Coating failure on pump casing on Pump (b) (3) (A)
Reference: I/J, Long-Term
Recommendation: Prepare surface and apply maintenance coating.

[redacted]

C13) **Finding:** The ½-[redacted] valve ([redacted]) mounted on the suction side of the pressure gauge pipe on pump [redacted] is missing plug and valve is non-lockable type.
Reference: A/I/J, Short-Term
Recommendation: Install ½-[redacted] pipe plug with thread sealant to prevent accidental discharge if valve is bumped.



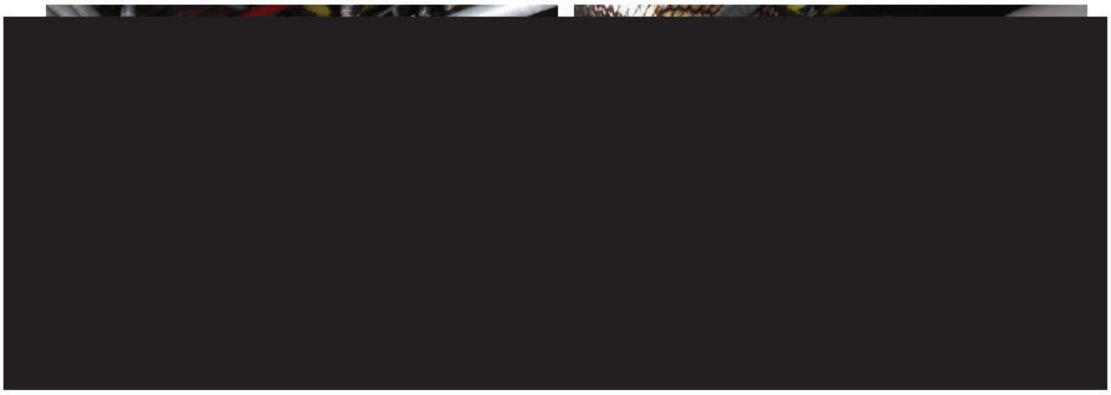
C14) **Finding:** Several of the ball valves on the control valve are missing valve handles. Exact reason is unknown but suspected to prevent operation of the valves (Note: operating during emergency such as a tubing break or damage will be difficult with missing valve handles. (Typical for majority of control valves on the discharge side of pumps at UGPH).
Reference: I/J, Long-Term
Recommendation: Replace the valve handles and consider a car-seal for valve line up purpose in-leu of valve handle removal.

C15) **Finding:** Minor bearing oil staining on pump casing (Typical for some pumps at UGPH). Pump [redacted] shown.
Reference: I/J, Long-Term
Recommendation: Clean the oil staining and service the pumps as needed.

C16) **Finding:** The control valve tubing on [redacted]mp (b) (3) (A) is in contact with UGPH grating I-beam (potential for abrasion damage that can lead to malfunctioning control valve).
Reference: I/J, Short-Term
Recommendation: Protect the control valve tubing from damage. Reroute the tubing or provide sufficient clearance between tubing and UGPH grating I-beam

(b) (3) (A)

C17) **Finding:** Heavy discoloration and staining on control valve body on Pump (b) (3) (A). Drip pan and absorbent pads were noted beneath the control valve. Similar discoloration and staining but minor was noted on (b) (3) (A); control valve shown below.
Reference: A/I/J, Short-Term
Recommendation: Clean staining from valve body and service valve as needed per manufacturer's instruction.



C18) **Finding:** Conduit plug used on pressure gauge pipe tee. This is not per industry standard and not known if this conduit plug has the correct tapper for use as NPT plug. (This was noted at several locations of the pressure gauge piping and at several pumps at UGPH).
Reference: A/I/J, Mandatory
Recommendation: Remove pressure gauge and associated fitting reinstall after applying pipe thread sealant. Replace the conduit plug with a pipe plug. Monitor fitting when pump is under pressure.

(b) (3) (A) (b) (3) (A)

CUI

C19) **Finding:** Weeping at suction side pressure gauge associated with Pump (b) (3) (A).
Reference: A/I/J, Mandatory
Recommendation: Remove pressure gauge and associated fittings; reinstall after applying pipe thread sealant. Monitor fitting when pump is under pressure.

(b) (3) (A)

C20) **Finding:** One slightly loose joint harness was noted on the discharge side of Pump (b) (3) (A). Gaps measured between harness lug and nut were 0.030". Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the [redacted] of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).
Reference: A/I/J, Short-Term
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.
(NO PHOTO)

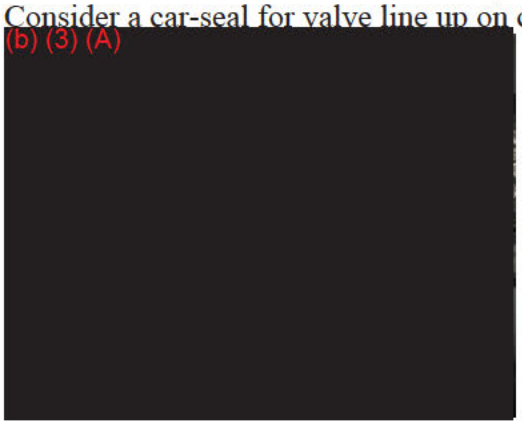
C21) **Finding:** Two loose joint harnesses were noted on the discharge side of pump (b) (3) (A). Gaps measured between harness lug and nut were 0.180" and 0.845" Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the [redacted] of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).
Reference: A/I/J, Mandatory
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

[redacted]

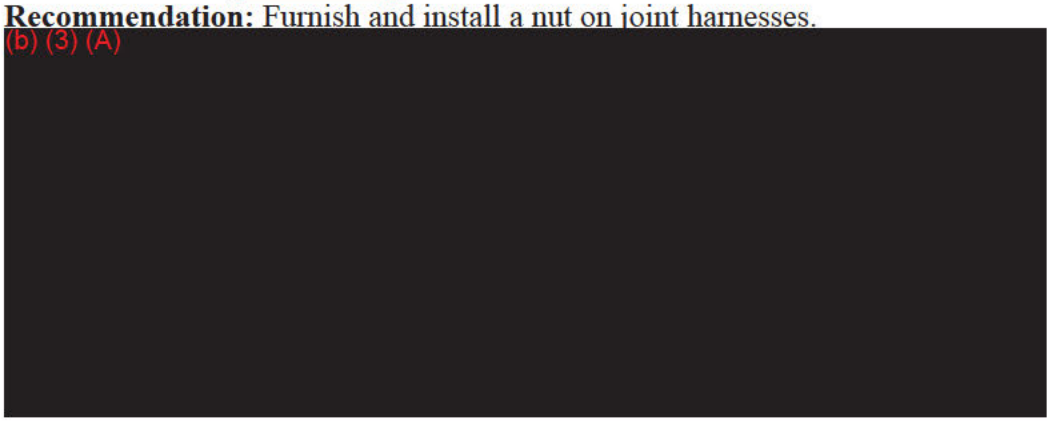
C22) **Finding:** The outlet side flange bolts [redacted] he control valve on Pump [redacted] are not fully engaged.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient [redacted]

C23) **Finding:** Two slightly loose joint harnesses were noted on the discharge side of Pump [redacted]. Gaps measured between harness lug and nut were approx. 0.030". Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the [redacted] of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).
Reference: A/I/J, Short-Term
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

C24) **Finding:** The ball valve before the s[redacted]ner on the inlet side of the control valve was in the closed position at the time of the inspection on (b) (3) (A). The control valve may not function as intended when the system cannot detect differential pressure.
Reference: I/J, Mandatory
Recommendation: Ensure all ancillary equipment is in the correct position prior to operation. Consider a car-seal for valve line up on critical equipment.
(b) (3) (A)



C25) **Finding:** Missing nut observed on the suction side of the joint harnesses of pump (b) (3) (A). Note: before continued operations: All restraining nuts should be installed and snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. (See next item about loose joint harness on the same dresser coupling)
Reference: A/I/J, Mandatory
Recommendation: Furnish and install a nut on joint harnesses.
(b) (3) (A)



C26) **Finding:** Moderate weeping/staining on front bearing shaft and casing on Pump (b) (3) (A). Similar condition noted on Pump (b) (3) (A) shown below.
Reference: A/I/J, Short-Term
Recommendation: Clean staining from pump casing and service as needed per manufacturer's instruction.
(b) (3) (A)

C27) **Finding:** One loose joint harness on t[redacted] suction side of the joint harnesses of Pump (b) (3) (A) (this is the same dresser coupling with the missing nut). Gaps measured between harness lug and nut were: Upper left = 0.250". lower left side = 0.275" (Facing pump) Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the height of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).

Reference: A/I/J, Mandatory

Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

(b) (3) (A)

(b) (3) (A)

C28) **Finding:** Some inactive corrosion and bolt diameter reduction (due to the corrosion) noted on the suction side dresser coupling follower bolts on Pump (b) (3) (A).

Reference: A/I, Long-Term

Recommendation: Consider replacing the dresser coupling follower bolts. Monitor until bolt is replaced.

(b) (3) (A)

C29) **Finding:** The hazardous area rated fl[redacted] switch (MFG by SOR Inc) mounted on the discharge side of Pump (b) (3) (A) has a housing cover that is not secured. Will not meet hazardous area rating (NFPA class I, division II, Group D). Additionally, all housings must be properly "sealed" at the conduit connection and housing cover to maintain the NEMA classification.
Reference: B, Short-Term
Recommendation: Ensure all electronic equipment is sealed per manufacturer and NFPA requirements.

C30) **Finding:** The ½-[redacted] discharge side pressure gauge threaded fittings have several areas of wetting/weeping around the threaded fitting on Pump (b) (3) (A). Wet absorbent pads noted beneath the fittings.
Reference: I, Mandatory
Recommendation: Dissemble the pressure gauge and associated fittings and reassemble the fittings with a suitable thread sealant.

C31) **Finding:** One slightly loose joint harness was noted on the discharge side of pump (b) (3) (A). Gaps measured between harness lug and nut were approx. 0.030" (enough for the rod and bolt to move laterally).
Reference: A/I/J, Short-Term
Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.
(NO PHOTO)

C32) **Finding:** Two slightly loose joint har[redacted]es were noted on the discharge side of Pump (b) (3) (A). Gaps measured between harness lug and nut were approx. 0.030" (enough for the rod and bolt to move laterally).

Reference: A/I/J, Short-Term

Recommendation: All restraining nuts should be snug (not torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Additional design and/or MFG document review is needed.

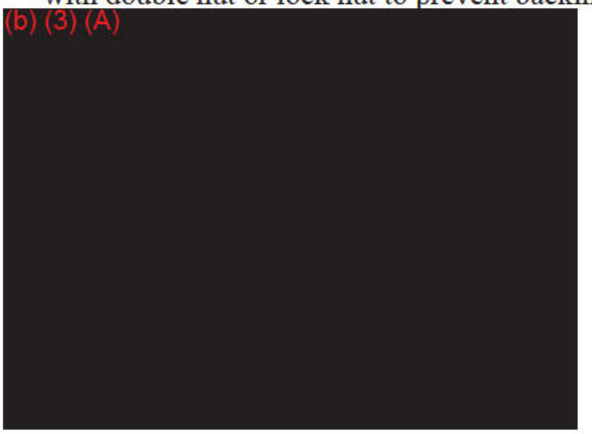
(b) (3) (A)

C33) **Finding:** Dresser lugs on Pump (b) (3) (A) suction side are installed backwards (this was also noted on the other dresser couplings at UGPH). Joint harnesses are not equipped with double nuts

Reference: A/I/J, Short-Term

Recommendation: Rotate lugs or consider removing the dresser coupling and associated harness if engineering assessment indicates it is not needed. The restraining nuts should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations.

(b) (3) (A)

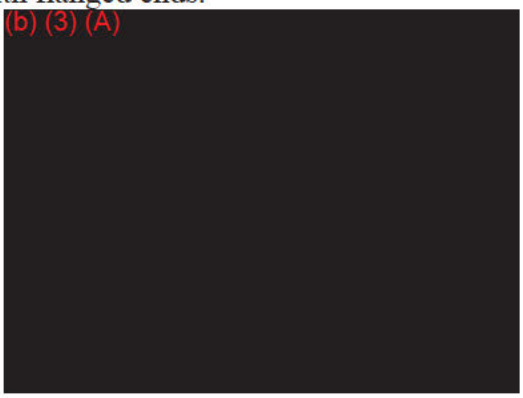


[redacted]

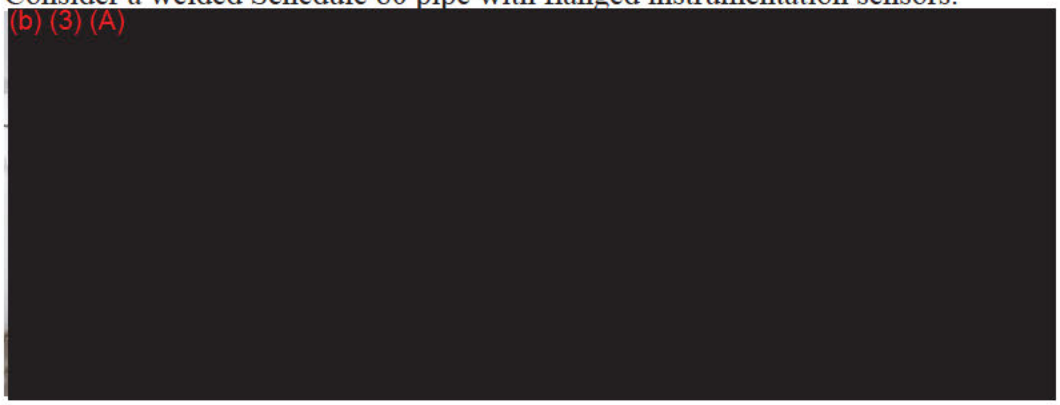
C34) **Finding:** There are several open con[redacted]s, exposed wires, and unsealed electrical equipment housing throughout the UGPH including what appears to be abandoned conduits on the floor. Will not meet hazardous area rating (NFPA class I, division II, Group D).
Reference: B, Short-Term
Recommendation: Ensure all electronic equipment and conduits are sealed per manufacturer's and NFPA requirements.

C35) **Finding:** The open conduit on the UGPH floor will limit the secondary containment capability of the UGPH (no secondary containment).
Reference: B/I, Mandatory
Recommendation: Ensure all electronic equipment and conduits are sealed per manufacturer and NFPA requirements. Ensure all unused conduits are capped to prevent migration of vapors to other areas. Additionally, all unused conduit that penetrated the floor should be capped to prevent fuel escaping from the secondary containment in an event of a spill.

C36) **Finding:** Several brass/bronze fitting [redacted]ed on the fuel system (low melting point material). Gate Valve (b) (3) (A) shown). Same for Valve (b) (3) (A) [redacted]. (QTY 3)
Reference: M, Short-Term
Recommendation: Remove the threaded brass valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.



C37) **Finding:** Several staining, weeping fittings noted in the UGPH piping below the grating (on main header piping to/from the RH and main header to/from the lower yard tunnel). This was noted on tie-ins for temperature sensors, pressure sensors, HPVs, and other small-bore auxiliary fittings.
Reference: A/I/J, Mandatory
Recommendation: Disassemble and reassemble fittings with appropriate thread sealant. Consider a welded Schedule 80 pipe with flanged instrumentation sensors.

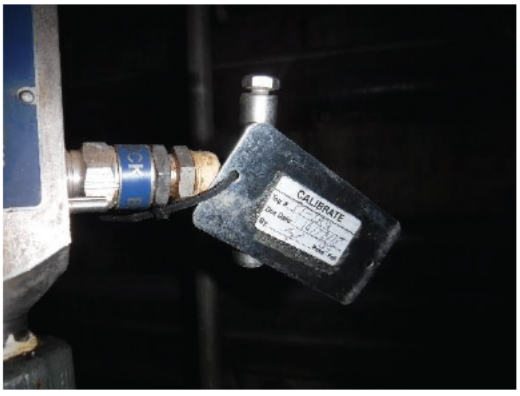


C38) **Finding:** Several threaded fittings noted in the UGPH piping below the grating (on main header piping to/from the RH and main header to/from the lower yard tunnel). Note: some of the branch tie-in welds are not per industry standard (did not use Weldolet and other branch connecting fittings that provide integral reinforcement and reduce stress at joint). This includes HPVs, LPDs, and pressure sensors tie-in fittings.
Reference: A/I/J, Short-Term
Recommendation: Install weldolet and other branch connecting fittings that provide integral reinforcement and reduce stress at joint end of the pipe. Consider a welded Schedule 80 pipe

C39) **Finding:** Lack of thread engagement [redacted] Y 12) on the bypass loop across the (b) (3) (A) (F-76) line to/from the RH. This is on the pup piece that replaced the flow meter.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient [redacted]
(b) (3) (A)
[redacted]

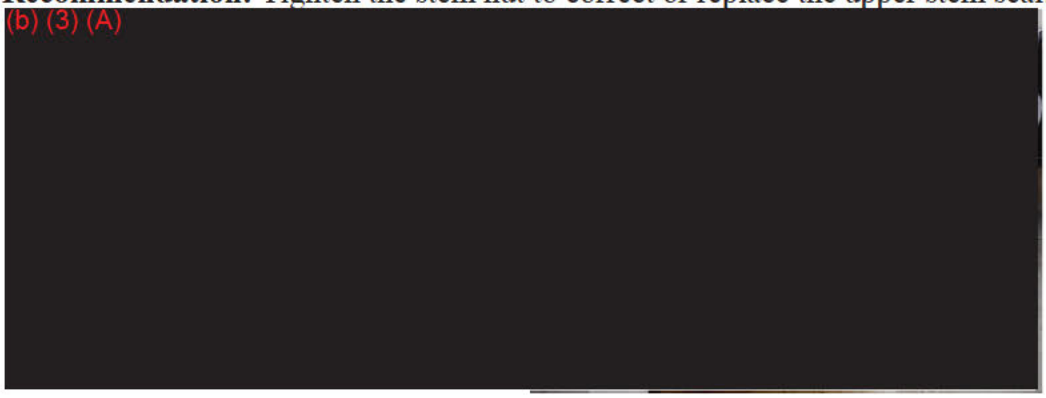
C40) **Finding:** Several transducers are attached to the pipe, and the conduit did not have seal-off fitting. There is no tag or marking on these transducers that provide the hazardous location rating or the enclosure NEMA rating. Additionally, the transducer is connected using ridged conduit which can potentially break during pipe or conduit movement.
Reference: A/B/I, Short-Term
Recommendation: Provide and install transducers and sensors that are in a NEMA rated enclosures or have an FM and ATEX certification for hazardous locations. Consider flexible conduit fitting when attaching transducers and sensors to system that may move during operation. Consider a welded Schedule 80 pipe with carbon steel ends for equipment tie-[redacted]
(b) (3) (A)
[redacted]

C41) **Finding:** Several of the pressure transducers have past due calibration dates. (Due Date of 10/23/18)
Reference: I/H/J, Short-Term
Recommendation: Provide periodic calibration for all sensors and transducer.
(b) (3) (A)
[redacted]

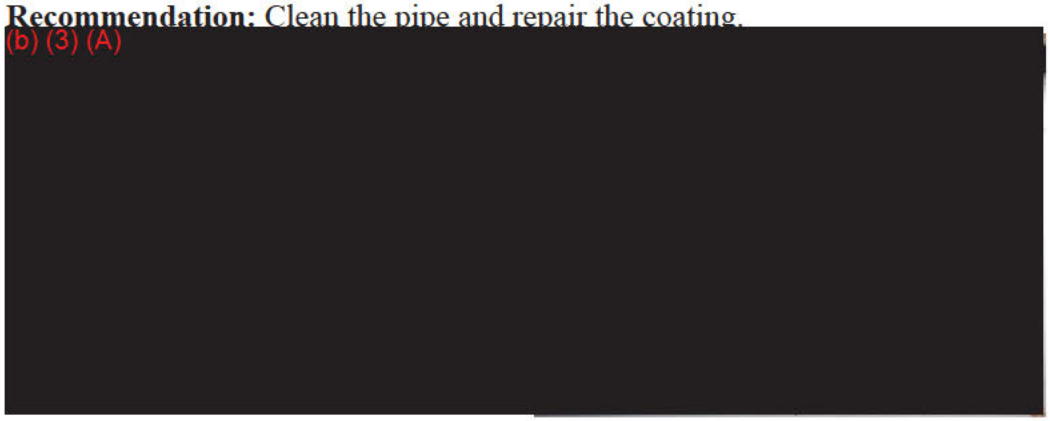


[redacted]

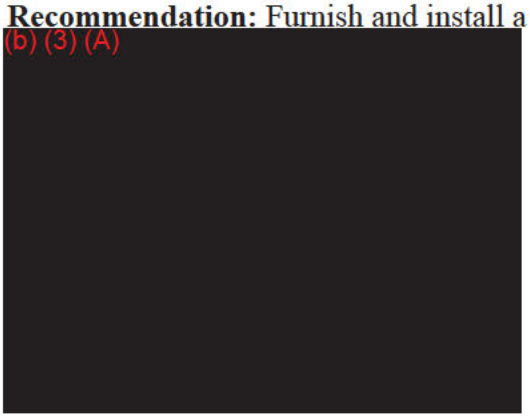
C42) **Finding:** There are staining and some [redacted] noted on the Cameron ball valves. (b) (3) (A) (shown. The staining /drip is from the stem injection port.
Reference: A/I/J, Short-Term
Recommendation: Tighten the stem nut to correct or replace the upper stem seal.



C43) **Finding:** Localized coating failure and corrosion (due to drips) on (b) (3) (A) section of the F76 line just before ball valve (b) (3) (A) . Pit depth = 0.050" to 0.070"
Reference: I/J, Long-Term
Recommendation: Clean the pipe and repair the coating.



C44) **Finding:** There are several NPS 4 branch tie-ins on the F76 line that are used for pressure relief devices. There is one missing gate wheel nut on Gate Valve # (b) (3) (A) .
Reference: I, Short-Term
Recommendation: Furnish and install a valve gate wheel nut.



C45) **Finding:** There is (b) (3) (A) DBB valv[redacted] the F76 line (Valve (b) (3) (A)) with six studs that are not fully engaged. The stud is supposed to be engaged on the upper position of the DBB flange anywhere from 1.75 to 1.88 inches. Threaded engagement of only 0.25 to 0.75 inches where measured. Green arrow shows the available thread depth, the red arrow shows measured engagement depth of studs. (black dots marked with black Sharpie on the flange).

Reference: I/J, Short-Term

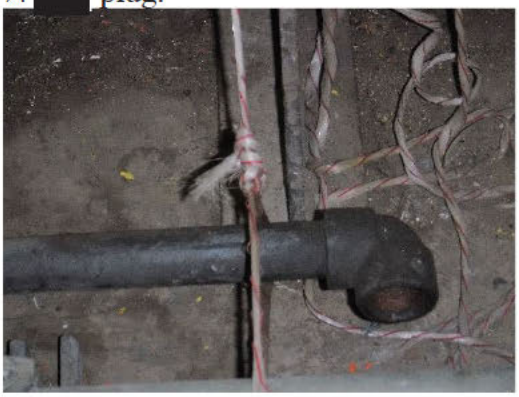
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length. See manufacturers instruction for the required bolt or stud size for drilled and tapped flange holes.

(b) (3) (A)

C46) **Finding:** There is a ¾-[redacted] HPV on the (b) (3) (A) (F-24) line after (b) (3) (A). This ¾-[redacted] line is routed towards the UGPH sump nut and terminates just before the sump. The end of this line is open without a pipe plug. This is located just below the UGPH sump access staircase.

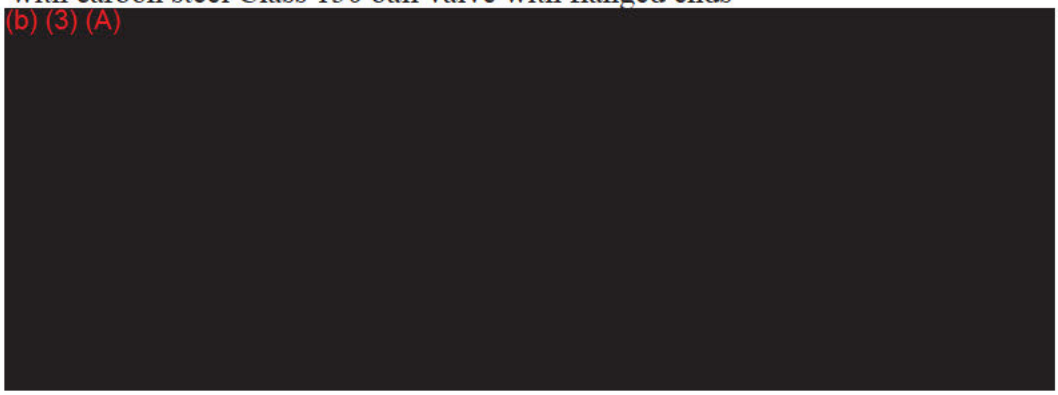
Reference: A/I, Mandatory

Recommendation: Furnish and install a ¾-[redacted] plug.



C47) **Finding:** There is a ¾- [redacted] threaded [redacted] e mounted on the side of the (b) (3) (A) (F-24) line. There is no pipe cap or plug at the end of the valve ((b) (3) (A) [redacted]).
Reference: A/I, Long-Term
Recommendation: Furnish and install a pipe cap. Considered a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends

(b) (3) (A)

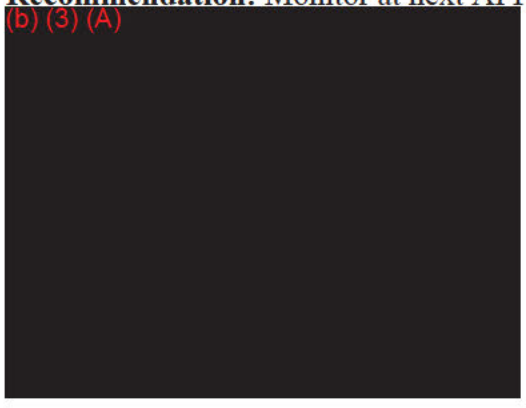


C48) **Finding:** Fuel soaked absorbent pads on the valves, piping, and UGPH floor (typical at several PRD branch connections). Fuel is from the PRD above the grating.
Reference: I, Mandatory

(b) (3) (A)

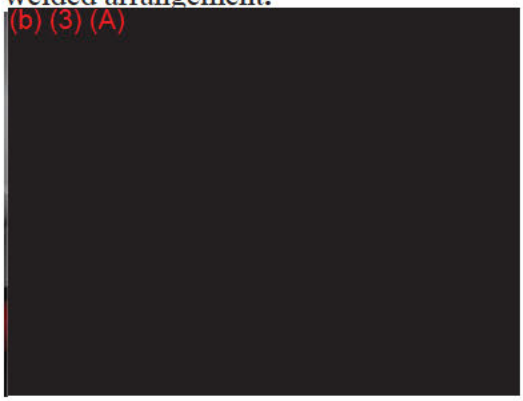
C49) **Finding:** Mechanical dent on (b) (3) (A) (F-24) tie-in line (to/from surge tank). Dent depth is 0.505" with perpendicular orientation and length of 5" located 58" from the miter weld before the surge tank-to-UGPH bulkhead penetration. This results in a dent depth of 3.2%. Note: assessment indicates this dent is acceptable based on latest edition of API RP 1183; Assessment and Management of Pipeline Dents. Plain dents regardless of shape with depths up to 10% of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). Dent is also acceptable per API 579 section 12 Level 1 assessment (acceptable if it is ≤ 7% of the pipe diameter). (See Table F – Mechanical Dent (MD) Inspection Summary).
Reference: I, Long-Term
Recommendation: Monitor at next API 570 inspection.

(b) (3) (A)



C50) **Finding:** (b) (3) (A) pipe flange to/fro[redacted]urge tank before the surge tank-to-UGPH bulkhead penetration does not appear to be ASME standard flange. ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
Reference: I/J, Long-Term
Recommendation: Consider upgrading to an ASME B16.5 rated flange and fittings with butt-welded arrangement.

(b) (3) (A)



C51) **Finding:** Missing one nut and bolt on the (b) (3) (A) e that branches off the (b) (3) (A) F-24 line from the lower yard tunnel ((b) (3) (A)) (No close-up photo, but valve/flange before green arrow. Photo facing Surge tank bulk wall)
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.

(b) (3) (A)

C52) **Finding:** The JP-5 header manifold attached to the piping to/from the lower yard tunnel is equipped with a ¾-[redacted] gate valve ((b) (3) (A)) at the end of header. The ¾-[redacted] valve is allowing product to weep by. NOTE: no pressure relief device (PRD) provided to the header (trapped fuel). The F-24 and F-76 headers also do not have PRDs.
Reference: A/I/J/G, Mandatory
Recommendation: Replace the weeping valve. Consider adding a pressure relief system on the manifold. Considered a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

(b) (3) (A)

(b) (3) (A)

(b) (3) (A)

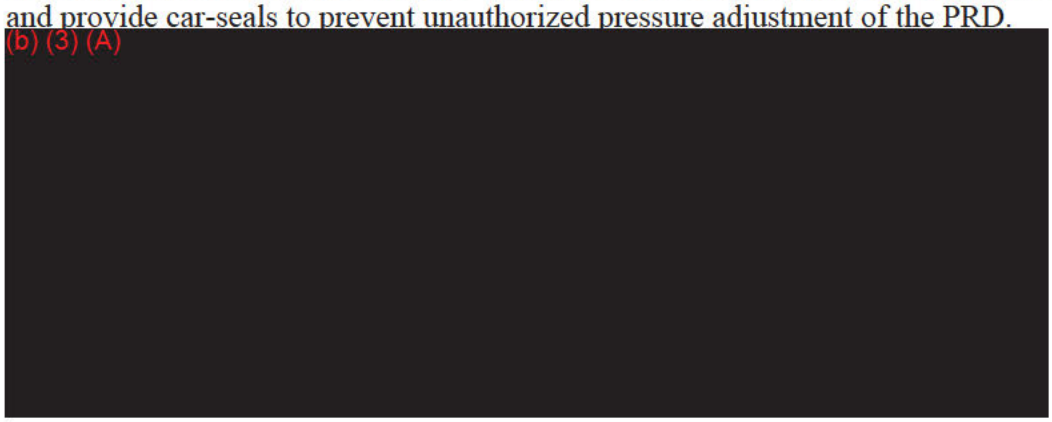
C53) **Finding:** All the gate valves on the [redacted]let and outlet side of pump are equipped with valve actuators mounted on stitch-welded adapter plate (four stitch-welds approximately 1" to 1.5" long used). Several of the welds have hairline cracks (potential for adapter plate to shear off during actuator operation). Some had one affected weld, and some had up to three of the four welds showing sign of hairline cracks. (Note: weld inspection is limited due to coating. Coating removal and NDE required to gain full assessment). This was present on (b) (3) (A)
[redacted]

Reference: I, Short-Term

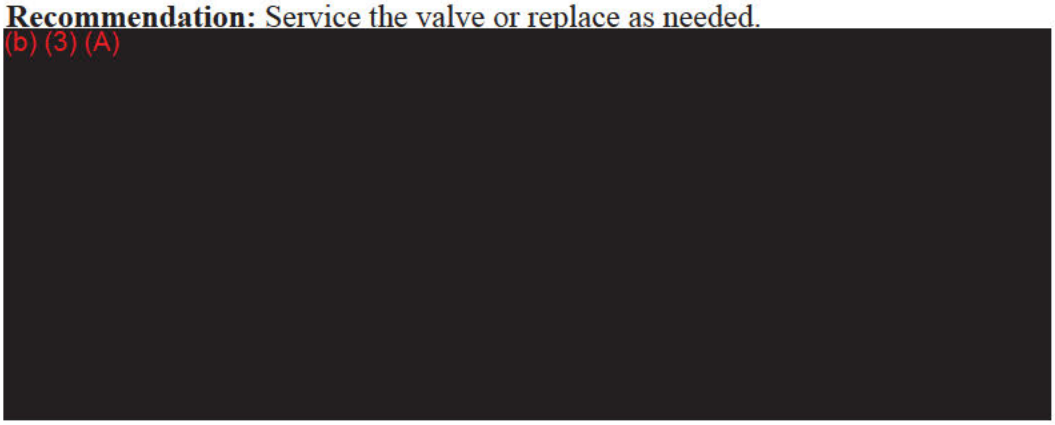
Recommendation: Repair the cracked welds or furnish and install new valve actuator mating post.

[redacted]

C54) **Finding:** Several of the PRDs were [redacted]eeping. Weeping noted on the CRL Pressure Relief Control body (manufactured by CLA VAL). Weeping noted on diaphragm between top cover and lower body. Some drips also noted on the strainer fittings, threaded stainless nipples, and tubing. No car-seal on PRDs and CRL. No pressure calibration sticker.
Reference: A/I/J/G, Mandatory
Recommendation: Service the PRD and associated components. Calibrate PRDs annually and provide car-seals to prevent unauthorized pressure adjustment of the PRD.
(b) (3) (A)



C55) **Finding:** The (b) (3) gate valve used on the JP-5 line to/from (b) (3) (A) is weeping at gate valve bonnet ((b) (3) (A)).
Reference: A/I, Mandatory
Recommendation: Service the valve or replace as needed.
(b) (3) (A)

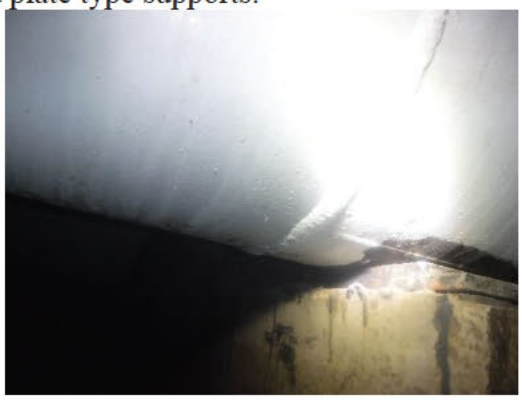


C56) **Finding:** The PRV system for each piping in the UGPH has an Emerson Figure 533 flow control valve with Hydramotor actuator (QTY 6). The Hydramotor actuators still have the factory plastic caps on the unused conduit inlet ports. This will not meet hazardous area rating (NFPA class I, division II, Group D).
Reference: B, Long-Term
Recommendation: Remove plastic caps and install steel conduit plugs; tighten existing steel conduit plugs (typical all).
(b) (3) (A)

[redacted]

D. Surge Tank Piping

D1) **Finding:** Several locations without Teflon or isolation material were noted throughout the surge tank piping system.
Reference: C/J, Short-Term
Recommendation: Install Teflon shims/insulation strips between the pipe and saddle or half round Teflon strips between the pipe and plate type supports.



D2) **Finding:** Deteriorated grout noted at the bottom of the pipe support at (b) (3) (A) (just past the (b) (3) (A)
Reference: C/I/J, Short-Term
Recommendation: Repair grouting at the base of the pipe support.

(b) (3) (A)

D3) **Finding:** The (b) (3) (A) sample/water drain line that ties to the (b) (3) (A) (F-24) has a valve that is not secured in the closed position; potential for accidental spill (note: inspection team closed the valve during the inspection).
Reference: A/J, Short-Term
Recommendation: Consider a self-closing valve or a LOTO program.

(b) (3) (A)

[redacted]

D4) **Finding:** Some minor staining noted [redacted] he bottom of the flange for the (b) (3) (A) [redacted] from [redacted]

Reference: A/I/J, Mandatory

Recommendation: Clean the staining and monitor. Repair as needed.

(b) (3) (A) [redacted]

D5) **Finding:** Some staining noted on the bottom of the flange for the (b) (3) (A) [redacted] just before pipe support (b) (3) (A) (no active weeping noted). Note: the staining did not appear to be JP-5 (based on odor and gas meter testing) and had the viscosity of oil. InterSpec suspects this oily substance is caused by one of the two following reasons: oil used to lubricate the bolts or areas rich in polyamide or amine content in the epoxy coating that caused yellowing/blushing and/or an oily exudate. Chemical reactions that form the exudate creates a chain of reactions that can lead to a sticky, oily, or waxy film appearing on the surface of the cured epoxy coating. Amine blush testing or lab testing is suggested to fully determine the fluid type.

Reference: A/I, Long-Term

Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

[redacted]

D6) **Finding:** Some staining noted on the [redacted]om of the flange for the [redacted]; just before pipe support [redacted] (no active weeping noted). Note: See comment in Item 5 above about non-fuel related oily material.
Reference: A/I, Long-Term
Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

D7) **Finding:** There is a missing cap on a 1-[redacted] ball valve that is mounted to the 4-[redacted] low suction line at [redacted]
Reference: A/I/J, Short-Term
Recommendation: Secure the end of the valve with a threaded pipe cap after applying appropriate thread sealant (Valve opening should be secured when not in use). Consider a self-closing valve or a LOTO program.

D8) **Finding:** Lack of thread engagement noted on the [redacted] low suction pipe flange from [redacted].
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length

[redacted]

D9) **Finding:** There is a missing plug on a [redacted] ch ball valve that is mounted to the (b) (3) (A) [redacted] Note: brass valve used.

Reference: A/I/J/M, Short-Term

Recommendation: Secure the end of the valve with a threaded pipe cap after applying appropriate thread sealant (Valve opening should be secured when not in use). Consider a self-closing valve or a LOTO program. Remove the brass/bronze valve and install carbon steel Class 150 ball valve.

D10) **Finding:** Some minor staining noted on the bottom of the (b) (3) (A) [redacted] (no active weeping noted). Note: See comment in Item D5 above about non-fuel related oily material related to epoxy coating curing.

Reference: A/I, Long-Term

Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

D11) **Finding:** The TRV system flange at [redacted] is equipped with 1/16-[redacted] gaskets instead of 1/8-[redacted] gaskets.
Reference: A/I/G, Long-Term
Recommendation: Consider using 1/8-[redacted] gaskets during the next tank inspection cycle or

D12) **Finding:** Some minor staining noted on the bottom of the flange for the [redacted] from Surge Tank 4; just before pipe support [redacted] (some staining noted on the floor but no active weeping noted). Note: See comment in Item D5 above about non-fuel related oily material.
Reference: A/I/J, A/I, Long-Term
Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

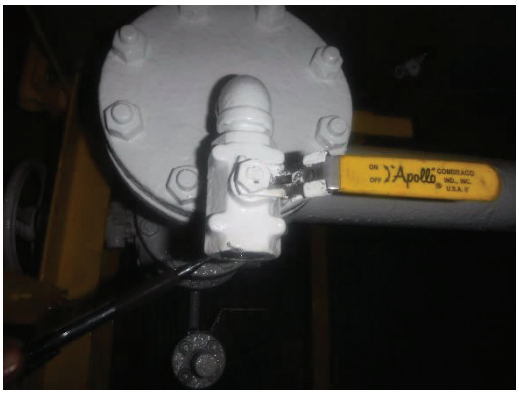
D13) **Finding:** Some staining noted on the bottom of the flange for the [redacted] (some staining noted on the floor but no active weeping noted). Note: See comment in Item D5 above about non-fuel related oily material.
Reference: A/I, Long-Term
Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

[redacted]

D14) **Finding:** Some staining noted on the [redacted]tom of the NPS 4 low suction DBB skin valve flange from Surge Tank 4. Similar discoloration noted on the 1-[redacted] sample line flange (likely due to drips from the 4-[redacted] flange). Operators or others appeared to have applied Kolor Kut fuel gauging paste to detect weather the staining is fuel. Since Kolor Kut fuel gauging paste reacts to hydrocarbons; this method cannot distinguish between fuel versus other oils. Note: See comment in Item 5 above about non-fuel related oily material.
Reference: A/I, Long-Term
Recommendation: Clean the staining from the flange joint, branch pipe and header pipe. Monitor the flanged joint. Alternatively, a hydrostatic test can be conducted to check the joint tightness of the flange.

[redacted]

D15) **Finding:** There is a missing plug on a 1-[redacted] sample ball valve that is mounted to the 4-[redacted] low suction line at Surge Tank 4. Install a plug; consider a self-closing valve or a LOTO program.
Reference: A/I/J, Short-Term
Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use). Consider a self-closing valve or a LOTO program.



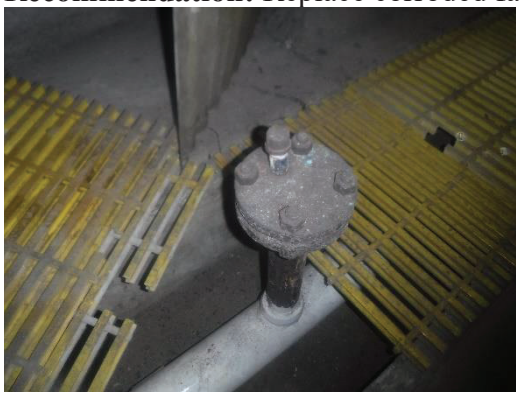
[redacted]

E. FOR Piping

E1) **Finding:** Threaded sampling pipe nipple on Tank 20 FOR Line after tank skin valve. The threaded pipe nipple is for the Bottom "BTM" sampling.
Reference: A/I/J, Long-Term
Recommendation: Consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends.

E2) **Finding:** Missing Teflon pad (metal-to metal contact) between pipe and support on Tank 20 FOR line in the trench past tank sampling line branch.
Reference: C/J, Long-Term
Recommendation: Install Teflon pad between pipe and pipe support.

E3) **Finding:** Moderate corrosion on [redacted] blind flange and fasteners on Tank 19 (abandoned branch to the sampling lines).
Reference: A/I/J, Short-Term
Recommendation: Replace corroded fasteners. Repair coating on pipe and flange assembly.

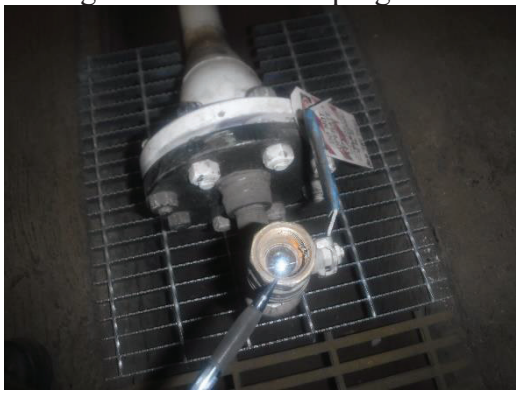


E4) **Finding:** Coating failure and corros [redacted] on the I-beam type pipe supports within the trench (typical throughout the pipe run but noted to be moderate between Tank 20 and Tank 16).
Reference: C/I, Short-Term
Recommendation: Repair coating or replace the corroded pipe support.

E5) **Finding:** Displaced pipe support on piping within trench between [redacted]
Reference: C/I, Short-Term
Recommendation: Adjust the pipe or pipe support to center the pipe across the center of the support. Reinstall the Teflon pad.

E6) **Finding:** Displaced Teflon pad pipe support within trench at [redacted]
Reference: C/J, Short-Term
Recommendation: Repair the pipe support.
(NO PHOTO)

E7) **Finding:** There is a flange installed on Tank 18 FOR line, but there is an [redacted] ball valve that is not plugged off. There is a potential for the ball valve to be bumped and cause spill. This valve appears to be installed temporarily during the tank cleaning/inspection outage.
Reference: A/I/J, Mandatory
Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use). Consider a self-closing valve or a LOTO program.

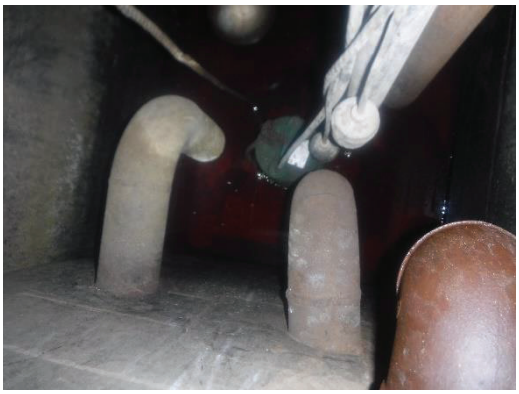


[redacted]

E8) **Finding:** Spray foam material used to [redacted]l edge of AFFF Sump # 1. Foam material is in contact with pipe (Spray foam intent and function unknown).
Reference: I/J, Long-Term
Recommendation: Remove the spray from the bottom of the pipe.

E9) **Finding:** The top of flange just before the FOR concrete pit; Sump 7 (near Door C) is covered with concrete to include side of the flange, face of flange, and fasteners.
Reference: I/J, Long-Term
Recommendation: Clean the concrete splatter from the flanged joint.

E10) **Finding:** FOR concrete pit; Sump 7 (near Door C), is not lined. Fuel contact water is dropped in this sump before it is picked up with sump pump to downstream segment of the FOR line. There is moderate sump floor-to-wall deterioration with periodic bubble formation from bottom the sump.
Reference: A/I/J, Short-Term
Recommendation: Consider installing a stainless-steel tank or lining the concrete pit and testing annually. The sump can be tested by filling the sump with water to within 1" to 2" of the top rim and holding for a minimum of 2 hours. The sump will be considered satisfactory if there is no measurable change in the water level



E11) **Finding:** The pressure gauge on the [redacted]R line (from Sump 7 pump) is out of calibration, and the glass is cracked.
Reference: H, Short-Term
Recommendation: Replace the pressure gauge. Provide gauge calibration annually.

E12) **Finding:** Section of the [redacted] wall mounted pipe by door C has a stained plastic wrap with C-clamp between the TEE and gate valve (indicating a leaking threaded joint).
Reference: A/I, Mandatory
Recommendation: Remove the plastic and investigate the reason for the plastic wrap at the Tee. Disassemble the threaded fitting and reassemble with appropriate thread sealant applied to each joint. Consider a welded piping configuration.

E13) **Finding:** Section of the [redacted] wall mounted pipe by door C has a wood shim between pipe and support. Note: pipe is not secured to the support.
Reference: C/I, Short-Term
Recommendation: Provide a steel pipe support that is secured to the I-beam. Provide Teflon I-rod or Teflon pad between support saddle and pipe.

E14) **Finding:** Section for the FOR pipe fr[redacted] Sump 7 is threaded piping until it ties in to the Tank 15/16 FOR line.
Reference: I/J, Long-Term
Recommendation: Consider a welded piping configuration.

E15) **Finding:** Section of NPS 1.5 threaded FOR piping between (b) (3) (A) [redacted] has three segments of unsupported piping measuring 23 ft, 22 ft and 20 ft respectively. Note: industry standard is nine-[redacted] span for 1.5-[redacted] pipe.
Reference: C/I, Short-Term
Recommendation: Provide additional pipe support.

E16) **Finding:** Section of FOR piping from Sump 7 routes through the electrical room. Section of this pipe is not equipped with Teflon pads (metal-to-metal contact).
Reference: C/J, Short-Term
Recommendation: Install Teflon shims/insulation strips between the pipe and saddle or half-round Teflon strips between the pipe and I-Beam structure.

[redacted]

E17) **Finding:** The segment of the FOR [redacted]ng has four brass/bronze (low melting point) valves where the line ties in to Tank 15/16 FOR trench piping. This includes the temporary line that is attached to the F76 header pipe.
Reference: M, Short-Term
Recommendation: Remove the brass/bronze valve and install carbon steel Class 150 ball valve with flanged ends. Consider a welded piping configuration.

E18) **Finding:** There are three pipe supports in the trench that are displaced near the FOR-line tie-in at Tank 15/16 (past the flange from the above photo).
Reference: C/I, Short-Term
Recommendation: Repair pipe supports; position the Teflon pads between pipe and support.

E19) **Finding:** Tank 16 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed.

(b) (3) (A) [redacted]

(b) (3) [redacted]

E20) **Finding:** Threaded sampling pipe ni[redacted] on (b) (3) (A) [redacted] tank skin valve. The threaded pipe nipple is for the Bottom "BTM" sampling.
Reference: I, Long-Term
Recommendation: Remove the threaded valve and install a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends

E21) **Finding:** (b) (3) (A) [redacted] has one fastener that is not fully engaged.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.

E22) **Finding:** The FOR piping within the trench by Tank 15 has a 2 x 4 wood shim (the support is slanted and not adequately supported).
Reference: C/I, Short-Term
Recommendation: Remove wood shim and provide a steel support of sufficient height. Install Teflon shim between pipe and support.

[redacted]

E23) **Finding:** There are three fasteners o[redacted]ate valve past the (b) (3) skin valve that are not fully engaged at Tank 15.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.

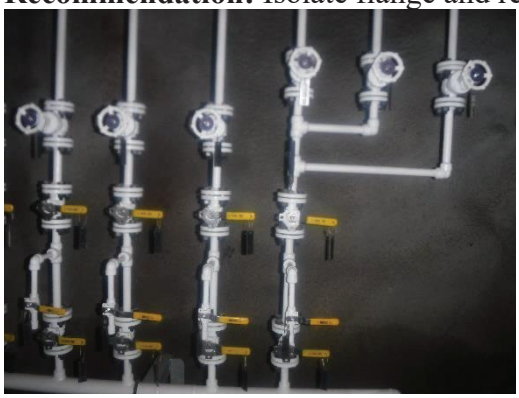
E24) **Finding:** Tank 15 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed.

E25) **Finding:** Product staining noted on (b) (3) (A) skin valve.
Reference: A/I/J, Mandatory
Recommendation: Monitor the plug on the (b) (3) valve until repaired. Service the (b) (3) (A) valve (when the tank is empty).

[redacted]

E26) **Finding:** (b) (3) (A) [redacted] wa[redacted] lated for ongoing repair activity by a contractor.
Reference: No Code
Recommendation: No Recommendation (Information only)
(NO PHOTO)

E27) **Finding:** The tank sampling system at Tank 13 was upgraded with new piping to include installing flanged joints in the past. Three (b) (3) (A) [redacted] flanged joints have cracked gaskets indicating potential improper torque sequence, over torqueing, or use of lubricants that chemically attacked gaskets to soften the binders and reduce the crush strength of the gasket.
Reference: A/I/J, Mandatory
Recommendation: Isolate flange and replace gasket (QTY 3)



E28) **Finding:** The FOR piping within the trench at Tank 13 does not have correct pipe supports. Wood pipe supports noted.
Reference: C/I, Short-Term
Recommendation: Install Teflon shims/insulation strip or half-round Teflon strips between the pipe support.

E29) **Finding:** Tank 12 sample lines are no [redacted] uipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed.

E30) **Finding:** Tank 9 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed.

E31) **Finding:** Tank 8 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed.

E32) **Finding:** Some coating failure and c[redacted]sion noted on the tank sampling lines throughout the facility; mostly on the threaded style sampling system that has not yet been upgraded to welded and flanged system. Tank 9 sampling system had the most aggressive corrosion on piping and supports. There are no skin valves close to the tank for Tank 9 sampling system. NOTE: additional evaluation to include coating/corrosion removal is required to fully access the affected sample pipe. A spill kit and pipe repair clamp should be readily available during corrosion removal.
Reference: A/I, Mandatory
Recommendation: Remove coating and corrosion on the sampling line from tank 9 to evaluate extent of pitting/corrosion. It is recommended to have pipe repair clamps and other temporary line repair materials prior to removal of the corrosion area. Coating failure and corrosion in all other areas can be repaired with maintenance coating.

E33) **Finding:** Missing coated U-bolts and isolation Teflon on Tank 5 FOR piping. (QTY 3)
Reference: C/J, Long-Term
Recommendation: Consider coated U-bolts and install Teflon shims/insulation strips between the pipe and support.

[redacted]

E34) **Finding:** Tank 4 sample lines are not [redacted]ipped with skin valves positioned as close as practical to the tank shell (and or nozzle). This tank has approximately 30-[redacted] of pipe between the tank and the first available isolation valve located at the sample manifold.
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin

E35) **Finding:** Section of FOR piping through the AFFF Sump Pit # 4 (Just past (b) (3) (A) is covered with plastic (reason unknown but assumed to protect FOR pipe during repair at the sump pit area).
Reference: I, Long-Term
Recommendation: Remove the plastic wrap.

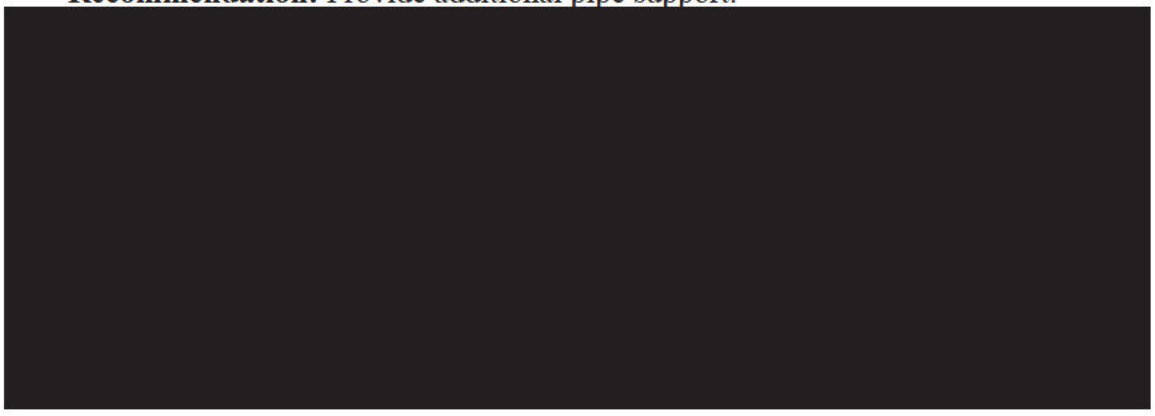
E36) **Finding:** There is a segment of unsupported (b) (3) (A) piping spanning (b) (3) (A) at Tank 3 (Note industry standard is fourteen [redacted] span for 1.5-[redacted] pipe).
Reference: C/I, Short-Term
Recommendation: Install additional pipe supports.

E37) **Finding:** Tank 3 sample lines are not [redacted]ipped with skin valves positioned as close as practical to the tank shell (and or nozzle).
Reference: A/I, Short-Term
Recommendation: Install isolation valves at the tank skin valve at the next clean/inspect/ repair project. Monitor sample lines, associated fittings, and threaded nipples periodically until skin valves are installed

(b) (3) (A)

E38) **Finding:** Some staining noted on Tank 3 sampling system (just below the "135 [redacted] sample line valve). The staining was noted on the downstream side of the valve (bottom, see red arrow). Note the valve was in the closed position. It is possible it may be active weeping when sample line is open but only sign of weeping noted during the inspection.
Reference: A/I/J, Mandatory
Recommendation: Clean the staining. Disassemble the threaded fitting and reassemble with appropriate thread sealant applied to each joint. Consider a welded piping configuration.

E39) **Finding:** There is a segment of unsupported (b) (3) (A) [redacted] piping spanning 31'-0" at Tank 4 (Note: industry standard is fourteen-[redacted] span for 1.5-[redacted] pipe). The weight of the sampling line header is also bearing on the FOR line.
Reference: C/I, Short-Term
Recommendation: Provide additional pipe support.



[redacted]

E40) **Finding:** Missing Teflon pad (metal-[redacted]metal contact) between pipe and support on FOR line between (b) (3) (A)
Reference: C/J, Short-Term
Recommendation: Provide and install a Teflon pad between pipe and support.

E41) **Finding:** Missing Teflon pad (metal-to metal contact) between pipe and support on FOR line between (b) (3) (A)
Reference: C/J, Short-Term
Recommendation: Provide and install a Teflon pad between pipe and support.
(NO PHOTO)

E42) **Finding:** Missing Teflon pad (metal-to metal contact) between pipe and support on FOR line between (b) (3) (A)
Reference: C/J, Short-Term
Recommendation: Provide and install a Teflon pad between pipe and support.
(NO PHOTO)

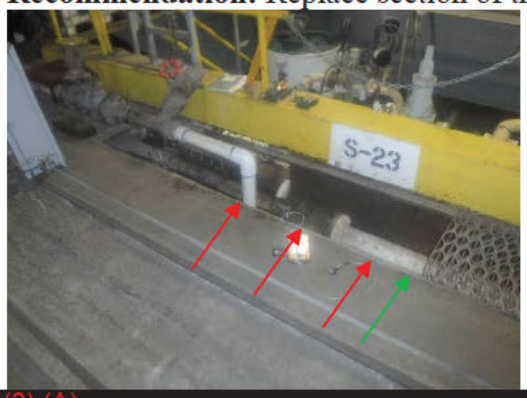
E43) **Finding:** The [redacted] sump/pump bypass valve flange is missing a nut.
Reference: A/I/J, Mandatory
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length.

(b) (3) (A)

E44) **Finding:** There are three locations on [redacted] (b) (3) (A) pipe with repair clamps at the FOR-Sump (S-(b) (3) downstream of the isolation valve (shown with green arrow). The presence of these types of clamps indicate there were areas of compromised pipe sections at this location. A 6", 16" and 8" long full circumferential, single-section stainless steel repair clamp manufactured by Romac Industries is used with a 54-[redacted] section of the pipe. See next related inspection item.

Reference: A/I/J, Mandatory

Recommendation: Replace section of the pipe.



(b) (3) (A)

[redacted]

(b) (3) (A)

E45) **Finding:** Several low ultrasonic thickness (UT) data were recorded near the locations where repair clamps are used. A section of FOR pipe was closely checked with a UT gauge, and several locations with thickness ranging from 0.106" to 0.190" were identified indicating over 55% of metal loss was present. The nominal thickness of [redacted] (b) (3) (A) pipe is 0.237". See next related inspection item.

Reference: A/I/J, Mandatory

Recommendation: Replace section of the pipe.

[redacted]

[redacted]

E46) **Finding:** The section of piping ident[redacted] with low UT data and repair clamps is considered a dead-leg with stagnant area that normally has little or no significant flow. This section requires a low point drain (LPD) or periodic flushing to prevent microbial-influenced corrosion (MIC).
Reference: A/I/J, Mandatory
Recommendation: Install a system with LPD.

(b) (3) (A) [redacted]

E47) **Finding:** The (b) (3) (A) [redacted] on the sump pump discharge line before the strainer is missing a body cavity relief valve handle. The valve is also not plugged when not used.
Reference: A/J, Short-Term
Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use). Replace the valve handle and consider a car-seal for valve line up purpose in-leu of valve handle removal.

(b) (3) (A) [redacted]

E48) **Finding:** The (b) (3) (A) [redacted] valve above the FOR isolation valve has a loose flange with several missing fasteners and a Camlock without a cap (potential spill point).
Reference: A/I/J, Mandatory
Recommendation: Secure the camlock opening by installing a lockable cap. Install new fasteners that are not fully engaged.

[redacted]

CUI

E49) **Finding:** Missing coated U-bolts and isolation Teflon on FOR isolation valves supports.
Reference: C/J, Long-Term
Recommendation: Consider coated U-bolts and install Teflon shims/insulation strips between the pipe and support.

(b) (3) (A)

E50) **Finding:** Segment of tunnel piping from the (b) (3) (A) door is constructed with mechanical coupling (Style 77 Victaulic joint). Some discoloration corrosion cell and staining were noted at the following joints located at (b) (3) (A) were labeled to aide in identifying and locating findings reported. The letter "F" is tacked to the pipe supports (numbers to distinguish the FOR from the facility designated pipe supports.
Reference: A/I/J, Mandatory
Recommendation: Replace Style 77 Victaulic joint with flanged and welded joint.

(b) (3) (A)

E51) **Finding**: (b) (3) (A) is damaged likely [redacted] to impact with displaced pipe support and U-bolt.
Reference: C/I, Short-Term
Recommendation: Replace the damaged pipe support and install Teflon-coated U-bolts with Teflon shim between pipe and support.

E52) **Finding:** Several locations with lose U-bolts, displaced Teflon pads, missing Teflon pads or loose hangers were noted. Some of the locations are summarized below with a full list to be provided in the report.
Reference: C/I, Short-Term
Recommendation: Install Teflon shims/insulation strips between the pipe and saddle or half-round Teflon strips between the pipe and I-Beam structure at all pipe support locations.

(b) (3) (A)

[redacted]

E53) **Finding:** Areas of total coating failu[redacted]nd heavy corrosion were identified on sections of the FOR line. Some of the locations are summarized in the table (note: some coating repair activity was noted during the inspection on some specific locations). See Table H for a full list of coating failure and corrosion locations.
Reference: I/J, Short-Term
Recommendation: Clean the pipe and repair the coating.

E54) **Finding:** There is a 2-[redacted] LPD and ¾-[redacted] HPV near (b) (3) (A) The LPD is missing a camlock cap, and there are two bolts that are not fully engaged on the 2-[redacted] LPD flange.
Reference: I/J, Long-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length. Install a lockable Camlock cap.

(b) (3) (A)

[redacted]

E55) **Finding:** There is a 2-[redacted] LPD and ¾[redacted]ch HPV (b) (3) (A) The LPD is missing a camlock cap, and there are two bolts that are not fully engaged on the 2-[redacted] LPD flange.
Reference: I/J, Short-Term
Recommendation: Replace the fasteners that are not fully engaged. Provide a bolt of sufficient length. Install a lockable Camlock cap.

(b) (3) (A)

E56) **Finding:** An LPD with missing plug and a ball valve that is not locked-out was noted on the FOR line near (b) (3) (A) (note: facility personnel corrected this finding).
Reference: No Code
Recommendation: No recommendation (facility personnel corrected this finding).

(b) (3) (A)

E57) **Finding:** An LPD with missing plug and a ball valve that is not locked-out was noted on the FOR line beneath (b) (3) (A) staircase (note: facility personnel corrected this finding).
Reference: A/I/J, Short-Term
Recommendation: Secure the end of the valve with a threaded pipe plug after applying appropriate thread sealant (Valve opening should be secured when not in use). Replace the valve handles and consider a car-seal for valve line up purpose in-leu of valve handle removal.

(b) (3) (A)

E58) **Finding:** There is moderate coating [redacted]lure and some corrosion noted on the (b) (3) (A) penetration sleeve just below the (b) (3) (A) (water infiltration at penetration) Some corrosion was noted at the NPS 6 pipe by the Link-Seal.
Reference: I/J, Short-Term
Recommendation: Seal the concrete above the pipe penetration to stop water infiltration. Remove the Link-seal, clean the pipe/sleeve and repair the coating.

(b) (3) (A)

E59) **Finding:** There are moderate coating failure and corrosion on the FOR riser flange just outside of (b) (3) door. Note: there is a threaded (b) (3) fitting with a pressure gauge mounted on the flange.
Reference: A/I, Short-Term
Recommendation: Replace the flange and fasteners. Install a welded and flange fitting in-lieu of the threaded assembly currently installed.

E60) **Finding:** Several external pitting area[redacted]ere noted on the (b) (3) (A) [redacted] The thickness data indicates approximately 0.020″ to 0.035″ internal corrosion on the segment of pipe with several external pitting ranging from 0.010″ to 0.190″. This section of FOR pipe is NPS 6 Schedule 40 with original thickness of 0.280″. Pitting near (b) (3) (A) has depth ranging between 0.100″ to 0.140″ and local metal thickness of 0.252″ Remaining metal thickness: (0.252″ - 0.140″ = 0.112″). This is equivalent of approx. 60% loss from original thickness or 56% localized loss. Segment of the piping near (b) (3) (A) has pit depth of 0.190″ with the local metal thickness of 0.248″ resulting in remaining metal thickness of (0.248″ - 0.190″) 0.058″. This is equivalent of approx. 79 % loss from original thickness or 77 % localized loss. There are areas that are not accessible without pipe jacking with moderate corrosion and a suspected weeping/wetting noted at (b) (3) (A) [redacted] Fuel odor detected at this location. This segment of piping from (b) (3) (A) [redacted] is not fit for continued service and requires replacement. Length of pipe from the (b) (3) (A) [redacted]

Reference: A/I, Mandatory

Recommendation: Isolate and secure this segment of the FOR piping from continued use. Replace the FOR piping from (b) (3) (A) [redacted] valve (to DBB valve outside the secondary containment).

E61) **Finding:** Excessive vegetation around pipe (section of FOR pipe to (b) (3) (A) [redacted]

Reference: I, Short-Term

Recommendation: Clear vegetation.

CUI

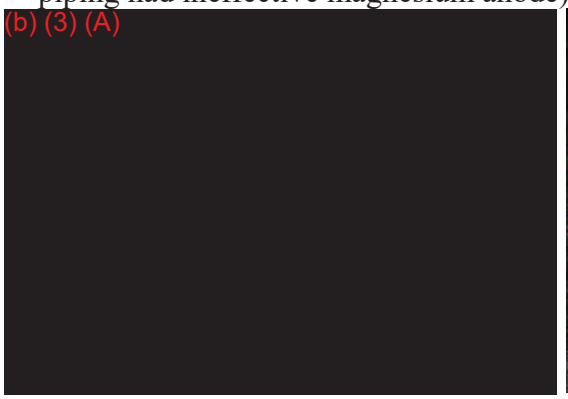
E62) **Finding:** The wooden staircase is partially resting on the pipe at one side of the landing.
Reference: I, Short-Term
Recommendation: Install a steel staircase across the pipe.

E63) **Finding:** The body cavity relief valve of the (b) (3) (A) valve (outside of the secondary containment of (b) (3) (A) is discharging to the isolated side (should discharge towards the tank side).
Reference: A/I/G, Short-Term
Recommendation: Move the differential thermal relief (DTR) bleed system to the other side (tank side) of the DBB valve. A crossover pipe with 1- TRV may also be installed per DoD Standard Design AW 078-24-27.

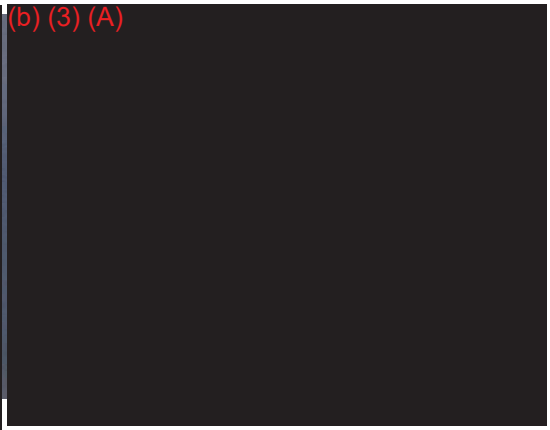
(b) (3) (A)

E64) **Finding:** The (b) (3) (A) (outside of the secondary containment of (b) (3) (A) has one loose fastener. Note: (b) (3) (A) has cathodic protection and fasteners with insulating flange kit (IFK) is required.
Reference: A/I/J, Short-Term
Recommendation: Tighten the loose fastener or replace. IFKs are required for the proper performance of cathodic protection system. Install a complete isolation flange kit

E65) **Finding:** The (b) (3) (A) valve (out [redacted] of the secondary containment of (b) (3) (A) does not have a complete insulating flange kit (IFK). The gasket used does not appear to be insulating type and has one missing insulating washer. Additional test required to determine if IFK is functioning properly. NOTE: (b) (3) (A) and the segment of buried FOR piping outside of [redacted] (b) are protected by two sperate galvanic cathodic protection system.
Reference: I/J, Long-Term
Recommendation: IFKs are required for the proper performance of cathodic protection system. Note: it may be practical to install ICCP on (b) (3) (A) and remove the IFK to extend CP to the section of buried piping at (b) (3) (A) (review of the 2021 CP Report indicated the section of buried piping had ineffective magnesium anode).



E66) **Finding:** The TRV bypass lines (QTY 2) at Tank [redacted] do not have a complete insulating flange kit (IFK). Only has insulating washer on the lower flange. The gasket used also does not appear to be insulating type.
Reference: I/J, Long-Term
Recommendation: IFKs are required for the proper performance of cathodic protection system. Install a complete isolation flange kit.



E67) **Finding:** The body cavity relief valve [redacted] the (b) (3) (A) [redacted] valve (outside of the secondary containment of Tank 311) is discharging to the isolated/capped side (should discharge towards the tank side). There is a potential to develop excessive pressure in the isolated/capped side of the pipe spool; shown with a red arrow below.

Reference: A/I/G, Short-Term

Recommendation: Move the differential thermal relief (DTR) bleed system to the other side (tank side) of the (b) (3) (A) [redacted] A crossover pipe with 1-[redacted] TRV may also be installed per DoD Standard Design AW 078-24-27.

(b) (3) (A)

F. (b) (3) (A) (July 2021 Observations)

NOTE: Pertinent portions of the 2021 report is incorporated in this paragraph. Majority of the deficiency observation are repaired or in the process of being repaired at the time of the 2022 visit. The intent of this paragraph is to consolidate the reported observations and eliminate any data gap.

F1) **Finding:** Dresser coupling joints and associated joint harness at Tanks (b) (3) (A) are damaged due to the event of May 2021. Note: The dresser coupling middle rings at these tanks are only of 0.250″ thick. Typical application per manufacturer is to use the same thickness as the pipe material. Pipe is NPS 12 with 0.375″ thickness.
Reference: I, Mandatory
Recommendation: Replace the joint harness prior to returning pipe to service.

F2) **Finding:** There is mechanical damage with notable deformation at the pipe-support I-beam at Tanks 18, 19, and 20. There is damage to the adjacent ancillary equipment associated with the piping system at these locations (conduits, lights, and fire alarm sensors).
Reference: B/C/I, Short-Term
Recommendation: Replace the damaged I-beams and adjacent damaged conduits.

(b) (3) (A)

F3) **Finding:** There is an unknown style pipe stanchion support welded directly to an elbow on the 8-[redacted] drain line by Door C. It's unknown if the stanchion is seal-welded at the bottom.
Reference: B/C/I, Short-Term
Recommendation: Consider replacing with a conventional adjustable pipe support.

[redacted]

F4) **Finding:** Facility piping at the tank [redacted] have nonstandard (No ASME B16.5) rated flanged fittings and non-standard weld tie-ins. Noted at Tank (b) (3) (A)
Reference: I/J, Long-term
Recommendation: There was no observed damage or limitation at this time, but consideration should be made to upgrade to a rated pipe system (150 # flanges).

(b) (3) (A)

[redacted]

F5) **Finding:** Heavy corrosion with pitting was located at the rolled 45 elbows by [redacted] S 20. Corrosion is due to active drips from the tunnel ceiling mineral deposits. Nominal thickness was likely 0.375". The general metal thickness at this area is now 0.300" with a pit depth of 0.100" resulting in a remaining thickness of 0.200". The remaining life at this location calculates to 15 years (approximate).
Reference: I/J, Mandatory
Recommendation: Replace the section of pipe. Consider a drip plate on the ceiling just above the pipe to redirect drips.

(b) (3) (A)

[redacted]

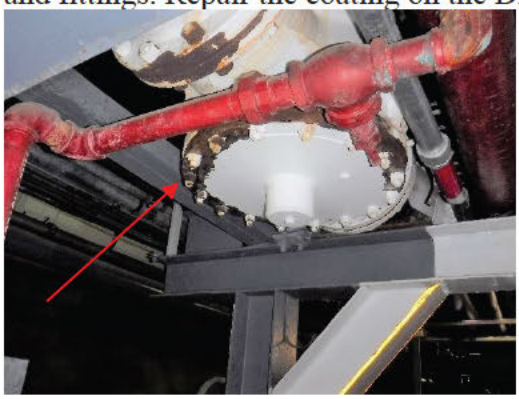
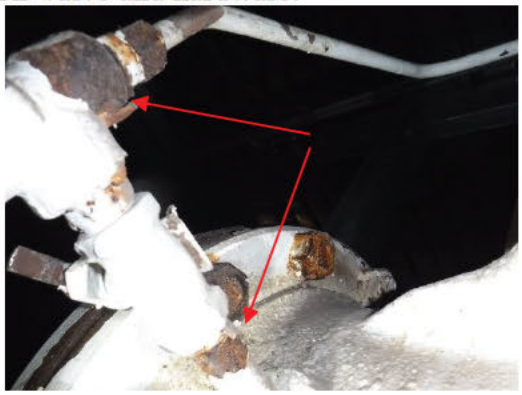
F6) **Finding:** A section of (b) (3) (A) piping is not adequately supported at (b) (3) (A) resulting in an unsupported pipe span of 44 [redacted] between [redacted] S 10 and 12. The maximum suggested pipe support spacing (b) (3) (A) pipe is 28 [redacted]
Reference: I/C, Short-Term
Recommendation: Install saddle supports between the pipe and I-beam at (b) (3) (A)
(No Photo)

F7) **Finding:** A section of (b) (3) (A) piping is not adequately supported at (b) (3) (A) resulting in an unsupported pipe span of 30 [redacted] between (b) (3) (A) and concrete penetration at (b) (3) (A) The maximum suggested pipe support spacing for (b) (3) (A) pipe is 28 [redacted]
Reference: I/C, Short-Term
Recommendation: Install saddle supports between the pipe and I-beam at (b) (3) (A)
(No Photo)

[redacted]

F8) **Finding:** There is spalling and broken [redacted] uting noted between the pipe support I-beam structure base plate and floor at (b) (3) (A)
Reference: I/C/J, Short-Term
Recommendation: Repair the grouting.

F9) **Finding:** There is moderate coating failure and associated corrosion on the (b) (3) (A) valve body and associated hardware. Corrosion on fasteners, flanges, valve body, differential thermal relief (DTR) and pipe nipple noted. Location (b) (3) (A)
Reference: A/I/J, Short-Term
Recommendation: Replace the differential thermal relief (DTR) system including pipe nipple and fittings. Repair the coating on the DBB valve and hardware.

F10) **Finding:** The (b) (3) (A) body cavity relief nipple is in contact with the galvanized conduit. Potential for further corrosion due to dissimilar metal contact is present. Location (b) (3) (A) [redacted]
Reference: A/I/J, Short-Term
Recommendation: Rework the conduit or the DBB relief pipe to eliminate the contact

(b) (3) (A)

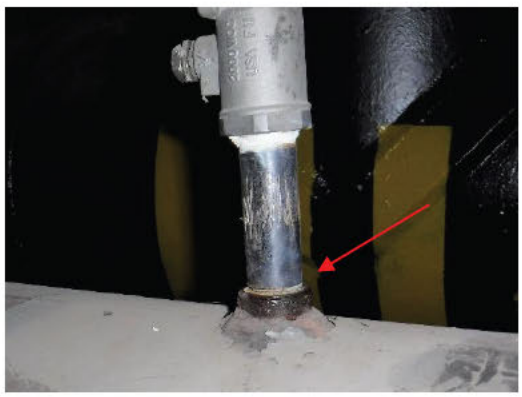
[redacted]

F11) **Finding:** There is heavy corrosion [redacted] the (b) (3) (A) [redacted] valve body flanges promoting crevice corrosion on the fasteners. (b) (3) (A) [redacted]
Reference: A/I/J, Short-Term
Recommendation: Replace the flange fasteners. Consider Teflon coated studs and nuts.

F12) **Finding:** There is heavy corrosion on the conduits and fittings associated with (b) (3) (A) [redacted] MOV may fail to operate properly if the corrosion on the conduit damages the internal wiring. Location (b) (3) (A) [redacted]
Reference: B, Short-Term
Recommendation: Replace the corroded conduit and conduit fittings.

(b) (3) (A) [redacted]

F13) **Finding:** There is a threaded nipple near tanks 11 and 12 installed with a ¾″ ball valve. Note: There is staining/wetting on the lower threaded fitting. Location (b) (3) (A) [redacted]
Reference: I, Mandatory
Recommendation: Disassemble the threaded fitting and reassemble after applying pipe thread sealant on plugged/threaded HPV and the threaded ball float trap. Clean the staining from the fittings and pipe. Monitor the threaded fittings. Consider a welded Schedule 80 pipe with carbon steel Class 150 ball valve with flanged ends. Note: Section of this piping must be drained to perform the work safely.



[redacted]

F14) **Finding:** There are eleven mechani dents identified in this segment of piping inspected. Dents range from minor to moderate (0.030″ to 0.950″ depth). There is one dent (A-MD-2) identified at (b) (3) that a depth of 0.950″ with coincident features (corrosion with multiple gouges). Dents identified are listed in Table F.
Reference: I, Mandatory
Recommendation: Repair the dent located at (b) (3) (A) Monitor the other ten dents at the next API-570 inspection.

F15) **Finding:** Facility piping girth (circumferential) welds include several non-typical bell and spigot style fillet welds. Some welds are direct bell-bell buttweld attachments. These welds appear to be part of the original construction. There has been ongoing replacement effort of these welds with several identified and replaced since the 2015 API 570 inspection. There are currently ten (10) welds with a bell and spigot/ bell-bell weld configuration in the segment inspected.
Reference: No Code
Recommendation: Replace these joints to bring the piping system to current standards. Engineering evaluation may be required to qualify continued long-term use of these welds.

(b) (3) (A)

F16) **Finding:** A weld undercut was ident[redacted]d on the 18″ (located approx. 100-inches past (b) (3) (A) at the 4 o'clock position. Undercut appears to be due to poor weld start/termination tie in technique. Note: Weld direction also charged at this location contributing to the porosity. The measured depth was 1/32″. This is acceptable for normal and Category M fluid service.
Reference: No Code
Recommendation: Apply top coat on the area where the coating was removed for weld measurement.

F17) **Finding:** The piping supports at this facility are partial saddle support with contact at approximately 5 and 7 o'clock position. There is direct metal-to-metal contact with no Teflon shims/insulation strips. There are also several locations where pipe supports are missing with the pipe resting directly on I-Beams. There is pipe coating failure at support contact locations. See: Table E1.
Reference: C/J, Short-Term
Recommendation: Install Teflon shims/insulation strips between the pipe and saddle or half-round Teflon strips between the pipe and I-Beam structure at all pipe support locations. Repair the pipe coating at the pipe supports.

F18) **Finding:** There are moderate coating [redacted] lure and heavy corrosion at the pipe support I-beams The majority of the corrosion was noted at the base of the I-beams. Spalling concrete/broken grouting fill were also noted. These were identified on the second pipe support after Tank 19 (left hand side facing the tank), on the first pipe support after (b) (3) (A) [redacted]

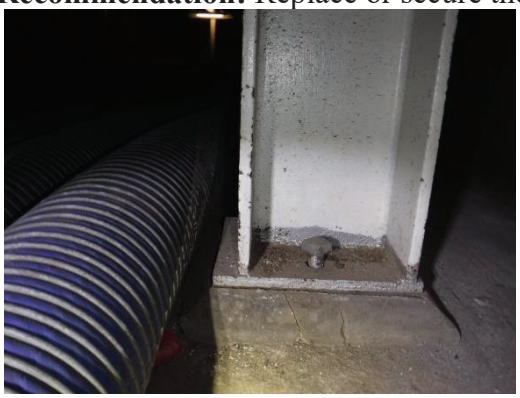
Reference: C/J, Short-Term

Recommendation: Replace the section of I-beams with heavy corrosion. Prepare and recoat the surface. Repair the spalling concrete footing.

F19) **Finding:** There is a loose I-beam base plate anchor bolt at (b) (3) (A)

Reference: C, Short-Term

Recommendation: Replace or secure the I-Beam base plate anchor bolt.



F20) **Finding:** There is an 18-[redacted] dresser coupling joint and associated joint harness between [redacted]S 25 just past the concrete penetration. Visual inspection did not reveal any deficiencies at this location. A slight tilt was noted and documented. Approximately a 0.9 º tilt over a 36" span was recorded.

Reference: No Code

Recommendation: Monitor at the next API 570 inspection.

(b) (3) (A)

F21) **Finding:** The (b) (3) (A) dresser coupli[redacted]oint harness has four lugs that are welded backwards on the upstream side of the coupling. This is not per mfg. details.
Reference: I, Short-Term
Recommendation: Rotate lugs or consider removing the dresser coupling and associated harness if engineering assessment indicates it is not needed

(b) (3) (A)

[redacted]

F22) **Finding:** There is corrosion under insulation (CUI) at the (b) (3) (A) dresser coupling. Located approximately 8 to 10 o'clock position. The remaining insulation was removed at (b) (3) (A) and the area was inspected/documented.
Reference: I, Long-Term
Recommendation: Prepare the area and repair the coating. Add a CUI inspection to the API

(b) (3) (A)

F23) **Finding:** Internal portions of the piping at Tanks (b) (3) (A) were visual inspected to get a condition assessment. The piping is in satisfactory condition with minor pitting. Minor pitting was noted at the bottom of the pipe (likely due to standing water). Pitting depth of 0.030" to 0.050" was noted.
Reference: I, Long-Term
Recommendation: Exercise the tank valves periodically to move product and prevent standing water at low points of the piping system.

[redacted]

F24) **Finding:** Minor pipe pitting was ide [redacted] ed on (b) (3) (A) lateral pipe below a bubbled coating (between pipe support (b) (3) (A)). Piping is (b) (3) (A) Pitting depth of 0.030" to 0.070" was noted.
Reference: I, Long-Term
Recommendation: No integrity impact from the pitting. Repair the pipe coating.

F25) **Finding:** There is some damage to the ceiling trays at [redacted] The ceiling trays were added to redirect water drips away from the pipe.
Reference: I, Long-Term
Recommendation: Repair the ceiling drip trays at (b) (3) (A)

F26) **Finding:** There is no hold down u-bolts or slide-guide to prevent lateral pipe movement at the end of the header pipe run (at (b) (3) (A)
Reference: I, Long-Term
Recommendation: Consider a guided support with hold down lugs at the (b) (3) (A) restraining type pipe support (particularly when adjoining tanks are disconnected from pipe header).

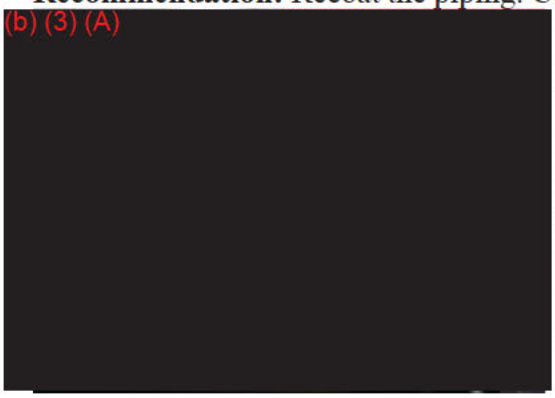
[redacted]

F27) **Finding:** There is coating damage at [redacted] pipe repair sleeve located approximately 2.5 [redacted] from (b) (3) (A)

Reference: I, **Long-Term**

Recommendation: Recoat the piping. Consider drip trays to redirect drips away from the pipe.

(b) (3) (A)



Reference Section

Reference highlights sections of state, federal, manufacturer, and industry standard codes and regulations. Letters are affixed at the beginning of a reference code for ease of reference from the deficiency list. These letters are also color coded in the deficiency report based on the condition of the unit inspected and the timeline for failure (see deficiency section color codes). In accordance with API standards, the owner/operator has ultimate responsibility for complying with the provisions outlined in API publications. The requirements referenced from ASME are based upon sound engineering principles, research, records of tests, and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience.

A Leaks

Tightness of Piping

NFPA 30-27.3.2 – "Piping systems shall be maintained liquid tight. A piping system that has leaks that constitute a hazard shall be emptied of liquid or repaired in a manner acceptable to the authority having jurisdiction, or it shall be emptied of liquid, vapor freed, and no longer be used."

NFPA 30-21.8.6 – "Storage tanks and their appurtenances, including, piping, normal vents, emergency vents, overfill prevention devices, and related devices, shall be inspected and maintained to ensure that they function as intended in accordance with written procedures."

API 570 Section 5.5.5 – "An external visual inspection is performed to determine the condition of the outside of the piping, insulation system, painting, and coating systems, and associated hardware; and to check for signs of misalignment, vibration, and leakage."

API 574 Section 10.1.2
"Leaks can be safety or fire hazards. They can cause premature shutdown of equipment and often result in economic loss." Tightening flange bolts in a pressurized line is only recommended when special steps are taken to avoid the following potential problems: bolt interaction, bolt overloading, and flange deflection."

B Electrical Wiring

NFPA 30-7.3.2 – "All electrical utilization equipment and wiring shall be of a type specified by and installed in accordance with NFPA 70, National Electrical Code."

NFPA 30-6.5.4 (Static Electricity and Grounding) "All equipment such as tanks, machinery, and piping shall be designed and operated to prevent electrostatic ignitions. All metallic equipment where an ignitable mixture could be present shall be bonded or grounded. The bond or ground or both shall be physically applied or shall be inherently present by the nature of the installation. Any electrically isolated section of metallic piping or equipment shall be bonded or grounded to prevent hazardous accumulation of static electricity. All nonmetallic equipment and piping where an ignitable mixture could be present shall be given special consideration."

C Pipe Supports

NFPA 30-27.6.1 – "Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion, or contraction. The installation of nonmetallic piping shall be in accordance with the manufacturer's instructions." (Also, see API 570-7.5).

NFPA 30-27.6.3 – "Piping that passes through or pierces a dike wall or the wall of a structure shall be designed to prevent excessive stresses and leakage due to settlement or fire exposure."

API 570 Section 7.8 – "Piping shall be supported and guided so that (a) its weight is carried safely, (b) it has sufficient flexibility for thermal expansion or contraction, and (c) it does not vibrate excessively."

API 574 Section 7.4.15
"Localized corrosion at pipe support contact points is the result of crevice corrosion due to deposits that contain corrosive species, water, and oxygen typical of an externally corrosive environment."

D Combustible Materials

NFPA 30-22.12.5 – "Structures such as stairways, walkways, instrumentation shelters, and supports for piping and equipment that are located in a remote impoundment area, diked area, or spillway draining to a remote impoundment area shall be constructed of noncombustible materials."

E Underground Piping

NFPA 30-27.6.5.1 – "Underground piping shall be installed on at least 6 [redacted] (150 mm) of well-compacted bedding material."

NFPA 30-27.6.5.2 – "In areas subject to vehicle traffic, the pipe trench shall be deep enough to permit a cover of at least 18 [redacted] (450 mm) of well-compacted backfill material and pavement."

NFPA 30-27.6.5.3 – "In paved areas where a minimum 2 [redacted] (50 mm) of asphalt is used, backfill between the pipe and the asphalt shall be permitted to be reduced to 8 [redacted] (200 mm) minimum."

NFPA 30-27.6.5.4 – "In paved areas where a minimum 4 [redacted] (100 mm) of reinforced concrete is used, backfill between the pipe and the asphalt shall be permitted to be reduced to 4 [redacted] (100 mm) minimum."

NFPA 30-27.6.5.5 – "In areas not subject to vehicle traffic, the pipe trench shall be deep enough to permit a cover of at least 6 [redacted] (150 mm) of well-compacted backfill material."

NFPA 30-27.6.5.6 – "A greater burial depth shall be provided when required by the manufacturer's instructions or where frost conditions are present."

NFPA 30-27.6.5.7 – "Piping within the same trench shall be separated horizontally by at least two pipe diameters. Separation need not exceed 9 [redacted] (230 mm)."

F Pipe and Valve Marking

ANSI / ASME A13. – ANSI/ASME recommends pipe marking labels must effectively communicate the contents of the pipes and give additional detail if special hazards.

G Pressure/Safety Relief Valves

API 570 Section 6.7.1
"Pressure relieving devices (PRDs) shall be tested and repaired by a repair organization experienced in relief valve maintenance. PRDs should be inspected, tested, and maintained in accordance with API 576."

API 570 Section 6.7.3.1
"Pressure-relieving devices shall be tested and inspected at intervals that are frequent enough to verify that the valves perform reliably in the particular service conditions."

API RP 576, Section 6.3.e
"Seals installed to protect the spring setting and ring pin setting have not been broken."

H Pressure Gauge and Flow Meters

Out of calibration, damaged, or broken gauges, flow meters, and other indication devices will fail to indicate when abnormal conditions are present in piping system.

I Structural Integrity/Coating of Piping or System

API 574 Section 5.4 (Flanged Joint)
"Flanged joints should be assembled by trained and qualified personnel (see Appendix A of ASME PCC-1). Consideration should be given to establishing a finished joint examination process. See 6.2 on flanged joint leakage."

API 574 Section 10.1.16
"Defects in protective coatings and in the waterproof coating of insulation will permit moisture to come into contact with the piping. Corrosion may be found under clamps on suspended lines. Piping mounted on rollers or welded support shoes is subject to moisture accumulation with resultant corrosion."

API 574 Section 7.4.14
"To prevent freeze damage, precautions need to be taken to drain, purge, or heat trace systems where moisture could collect and unexpectedly freeze during severe or sudden subfreezing temperature excursions."

API 570 Section 5.1.2
"Flange fasteners should be examined visually for corrosion and thread engagement. Fasteners should be fully engaged. Any fastener failing to do so is considered acceptably engaged if the lack of complete engagement is not more than one thread."

API 574 Section 7.3.3
"A number of factors can affect the rate and nature of pipe wall corrosion. They include, but are not limited to piping external conditions, including: coating/painting, insulation, and soil conditions, as applicable."

[redacted]

API 574 Section 7.4.6 (Soil-to-air Interface – SAI)
"If significant corrosion is noted, thickness measurements and excavation may be required to assess whether the corrosion is localized to the SAI or can be more pervasive to the buried system. Thickness readings at SAIs can expose the metal and accelerate corrosion if coatings and wrappings are not properly restored."

API 574 Section 7.4.4 (dead legs)
"The corrosion rate in dead-legs can vary significantly from adjacent active piping. Consideration should be given to removing dead-legs that serve no further process purpose."

NOTE:
1. Majority of code compliance, when not listed, are in this category based on API 570, ASME B31.3, and other pertaining industry standards.

Systems that have an "I" deficiency code may not necessarily all have a direct code reference or code requirement but are identified as a deficiency to assure the overall integrity of the component if deemed to be out of manufacturer's intended performance, use, or based on good engineering practice.

J Government/Military Standards

Items in this group fall under government and host nation standards or regulations

UFC 3-460-01 paragraph 9-8 (a) (welded flanges)
"For steel piping systems, use weld neck forged flanges with raised faces having a modified spiral serrated gasket surface finish, except for piping 2-[redacted] (50 mm) and less located in contained pumphouses… Slip-on flanges are not permitted in new systems. Use of slip on flanges may be considered in connections between new and existing systems/components only when dimensional factors prevent the effective use of weld neck flanges."

UFC 3-460-01 paragraph 9-8 (e) (welded connections)
"Use welded connections for joining steel pipe. Use flange connections for joining pipe to equipment. Use threaded connections only where unavoidable such as on differential pressure gages, pressure snubbers, and fuel sample points."

UFC 3-460-01 paragraph 9-8 (f) (fasteners)
"Use carbon steel bolts, studs, and nuts with carbon steel flanges. Use stainless steel bolts, studs, and nuts with stainless steel flanges. Stainless steel bolts may be used on carbon steel flanges in corrosive environments."

UFC 3-460-01 paragraph 9-8 (l) (insulating flange kits)
"Provide insulating flange kits at locations required for the proper performance of cathodic protection systems on underground piping."

UFC 3-460-01 paragraph 9-8 (h) (branch connections)
"Make branch connections with butt welded tees except where the branch is at least two pipe sizes smaller than the run, in which case the branch connection can be made with a forged or seamless branch outlet fitting."

UFC 3-460-01 paragraph 9-10 (a) (Pipe Coating)
"Protect the exterior surfaces of all aboveground carbon steel piping systems by coating in accordance with applicable service requirement. Exterior surface of pipe shall be prepared by abrasive blasting and cleaned prior to coating application."

[redacted]

UFC 3-460-01 paragraph 9-3.1 (Pipe Marking/Identification)
"Identify piping in accordance with Chapter 2 of this UFC. In addition, mark fuel lines at head of fueling pier near valves, and mark valve "open" and "close" positions."

UFC 3-460-01 paragraph 9-2.1(h) (Valve Thermal Relief)
"All installed double block and bleed valves and other valves within the piping system should be provided with thermal relief devices."

UFC 3-460-01 paragraph 9-3.3 (Pipe Supports)
"Rest piping on supports, both insulated and uninsulated, on a steel shoe welded to the bottom of the pipe. Leave the shoe free to move on the support (See additional details in Facility Pallet)."

UFC 3-460-01 paragraph 9-3.5 (TRVs)
"Provide any section of pipe that has the potential to be isolated by a shut-off valve or other means with a thermal relief valve to relieve the isolated piping section. Provide a thermal relief of the internal cavity of valves where pressure is trapped when the valve is in the closed position (double block and bleed plug valves for example)."

UFC 3-460-03 paragraph 6-6.3.1 (TRVs)
"Inspect exterior of thermal and pressure relief valves for corrosion. Repaint as required. Information plates attached to thermal and pressure relief valves *must not be painted over.*"

"Thermal and pressure relief valves must be validated for proper calibration by isolating the valve and using the test connection provided on the piping in conjunction with a hand pump and portable reservoir. The operating pressure must be checked against the set pressure listed on the stamped information plate attached to the valve."

UFC 3-460-01 paragraph 9-4.76 (Double-wall piping)
"Provide double-wall piping for Ground Vehicle Fueling Facilities. For other applications, do not use double-wall piping unless required by state or local regulations, and approved by Service Headquarters."

AW 78-24-27 Drawing D.10 Detail 4. (TRV rated for GPM)
This detail shows TRVs rated for liquid service (rated in GPM) versus rated for gas service (SCFH).

UFC 3-460-01 paragraph 6-10 (Aboveground Piping and Equipment Coatings)
"A three coat system (primer, intermediate, and top coat) is the primary protective coating system for aboveground piping. All surface corrosion or damage coating must be removed per coating manufacturer's requirements. In addition, abrade immediate area surrounding repair to feathered edge to allow proper adhesion of repair coating layers. Do not paint stainless steel, aluminum or galvanized surfaces."

UFC 3-460-01 paragraph 9-9 (Exterior pipe Coating)
Protect the exterior surfaces of all aboveground carbon steel piping systems by coating in accordance with applicable service requirement.

K Cathodic Protection

Deficiencies related to cathodic protection based on the visual evaluation of the aboveground section of the piping are listed in this group. Detailed CP assessment, data, and findings will be submitted by others.

NACE SP0169-2013 Section 4.3.1 (Isolation Kits)
"Isolation devices such as flange assemblies, prefabricated joints, unions, couplings, or, where permissible, sections of nonconductive piping should be installed within piping systems in which electrical isolation of portions of the system is required to facilitate the application of external corrosion control. Locations considered:

4.3.1.6 The junction of dissimilar metals;
4.3.1.8 The junction of a coated pipe and an uncoated pipe;
4.3.1.9 Locations at which electrical grounding is used, such as motorized valves and instrumentation."

L Safety System

Deficiencies related to safety systems and devices unrelated to piping systems are referenced in this section based on the visual evaluation of the aboveground section of the piping or components associated with piping.

Unguarded Platform OSHA §1910.25
"Open-sided floors or platforms 4 [redacted] or more above adjacent floor or ground level must be guarded by a standard railing (or equivalent) on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder.

1910.25(b)(1) requires that employers ensure handrails, stair rail systems, and guardrail systems are provided in accordance with final 1910.28. This provision is intended to protect workers from falling off stairways.

1910.28(b)(1)(i)
Except as provided elsewhere in this section, the employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is 4 [redacted] (1.2 m) or more above a lower level is protected from falling.

1910.28(b)(3)(iv)
Each employee is protected from falling into a ladderway floor hole or ladderway platform hole by a guardrail system and toeboards erected on all exposed sides, except at the entrance to the hole, where a self-closing gate or an offset must be used."

M Low Melting Point Material

NFPA 30-27.2.4 – "Low Melting Point Materials. Materials that melt at a low temperature, including but not limited to aluminum, copper, or brass; materials that soften on fire exposure, such as plastics; or nonductile materials, such as cast iron."

NFPA 30-27.4.4 – "…(1) They are resistant to damage by fire, (2) They are located so that any leakage resulting from failure will not expose persons, important buildings, tanks, or structures."

NFPA 30-27.4.4 – "…(1) They are connected above the normal operating liquid level of the tank (See also 27.4.4.5 (2) conditions)."

Table E1 – Pipe Support Inspection Summary ([redacted] (b) (3) (A)

Pipe Support ([redacted] S) #	Type of Support	Finding	Recommendation
(b) (3) (A)	Saddle Type – Partial [1]	Saddle is displaced from support beam with 1.5" Unistrut support placed underneath.	Remove Unistrut and reposition saddle.
	Saddle Type – Partial	Not in contact with saddle with minor gaps.	Refer to Note [2]
	Bulk head penetration	Sleeve in contact with the bottom of the pipe. Abrasion marks on pipe at 3 o'clock and 5 o'clock	Realign pipe to prevent contact (crevice corrosion) at bulkhead penetration
	Missing Saddle Support	Pipe is resting on I-beam with no saddle or Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	There is a mechanical dent on pipe at pipe support location	See Mechanical Dent Table.
	Missing Saddle Support	Pipe is resting on I-beam with Teflon shims/insulation strip and wood	Remove wood shim. Refer to Note [2]
	Broken Saddle Support	Metal to metal contact. No Teflon shims/insulation strip. Pulled anchor stud at concrete footing. Broken grouting.	Install support with insulation or half-round Teflon strip. Re-secure anchor stud and re-grout
	Saddle Type – Partial	Missing one nut at concrete footing. Broken grouting.	Replace missing nut and re-grout.
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Bulk head penetration	Sleeve in contact with the bottom of the pipe. Abrasion marks on pipe at 3 to 4 o'clock and 5 to 8 o'clock positions. Note there is a lap-welded sleeve at this penetration.	Realign pipe to prevent contact (crevice corrosion) at bulkhead penetration
	Missing Saddle Support	Shimmed with Teflon pads.	None
	Saddle Type - Partial	The pipe is partially in contact with the pipe support.	Add shims to support to gain contact.
	Bulk head penetration	Not in contact with pipe	None
	Saddle Type – Partial	Not in contact with saddle.	Add shims to support to gain contact.
	Saddle Type – Partial	The pipe is partially in contact with the pipe support.	Add shims to support to gain contact.
	Missing Saddle Support	There is no saddle support and the pipe is not resting on the I-beam.	Add shims to support to gain contact.
	Sleeved penetration	Minor coating failure with fireproofing seal pushed out	Repair coating & reseal sleeve opening
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
	Missing Saddle Support	There is no saddle support and the pipe is not resting on the I-beam.	Add shims to support to gain contact.
	Saddle Type – Partial	Not in contact with saddle.	Add shims to support to gain contact.
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Welded Saddle	NA	NA
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]
	Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note [2]

[redacted]

(b) (3) (A)

Concrete penetration	Concrete anchor point with pipe incased in the 60″ of concrete.	Continue NDE program (LRUT) at next API 570 inspection
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Bulk head penetration	Direct concrete penetration without sleeve (12″ long).	Continue NDE program (LRUT) at next API 570 inspection
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)
Saddle Type – Partial	Metal to metal contact. No Teflon shims/insulation strip.	Refer to Note (2)

Note:

E1-1) Partial saddle support with contact at approximately 5 and 7 o'clock positions
E1-2) Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
E1-3) Penetration through concrete walls/bulkheads are included in this table
E1-4) Table only includes header piping from (b) (3) (A) [redacted] Laterals to tanks also have several metal-to-metal style saddle supports or are directly resting on I-beam without Teflon shims/insulation (See Table E2)

[redacted]

Photos of Typical Saddle Supports from Table E1

(b) (3)

[redacted]

[redacted]

[redacted]

(b) (3)

[redacted]

[redacted]

[redacted]

(b) (3)

[redacted]

[redacted]

[redacted]

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Table E2 – Pipe Support Inspection Summary (All other sections)

Pipe Support* ([redacted]S) #	Type of Support	Finding	Recommendation
(b) (3) (A)	**FOR PIPING**		
	Saddle Type – Partial [1]	I-Beam type support is displaced	Reposition support and add Teflon shim
	Saddle Type – Partial [1]	I-Beam type support is displaced and Teflon pad has slid out	Reposition support and add Teflon shim
	Saddle Type – Partial [1]	Thee 3 pipe supports that are displaced or not in contact with pipe (at tank 16)	Reposition support and add Teflon shim
	Saddle Type – Partial [1]	Wood used to shim pipe support (at tank 15)	Remove wood add larger pipe support [2]
	N/A	Wood pipe support used (tank 13). Note area was under construction	Install support. Refer to Note [2]
	N/A	27'-11" of unsupported pipe from tank 3 to the next support	Install support. Refer to Note [2]
	N/A	31'-0" of unsupported pipe from tank 4 to the next support	Install support. Refer to Note [2]
	Saddle Type – Partial [1]	Missing Teflon spacer/pad between pipe and support	Refer to Note [2]
	Saddle Type – Partial [1]	Missing Teflon spacer/pad between pipe and support	Refer to Note [2]
	Saddle Type – Partial [1]	Missing Teflon spacer/pad between pipe and support	Refer to Note [2]
	Angle iron with U-bolt [4]	Missing Teflon spacer/pad between pipe and support	Refer to Note [2]
	Angle iron with U-bolt	Damaged pipe support (impacted by a moving vehicle)	Replace support
	Angle iron with U-bolt	Loose U-bolt	Tighten the U-bolts
	Angle iron with U-bolt	Loose U-bolt	Tighten the U-bolts
	Angle iron with U-bolt	Displaced bottom Teflon pad	Refer to Note [2]
	Strap type pipe support	Missing pipe clamp bolt (no isolation Teflon pad)	Install clamp bolt. Refer to Note [2]
	Strap type pipe support	Dislodge pipe clamp bolt (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Dislodge pipe clamp bolt (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Missing pipe clamp bolt (no isolation Teflon pad)	Install Strap. Refer to Note [2]
	Strap type pipe support	Dislodge pipe clamp bolt (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Dislodge pipe clamp bolt (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Dislodge pipe clamp bolt (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Missing pipe strap at the support (no isolation Teflon pad)	Secure Strap. Refer to Note [2]
	Strap type pipe support	Support anchor dislodge from tunnel wall	Secure pipe support. Refer to Note [2]
	Unistrut type pipe clamp	Missing pipe clamp (no isolation Teflon pad)	Secure pipe clamp. Refer to Note [2]
	Angle iron with U-bolt	Heavy corrosion at saddle-to-pipe crevice (no isolation Teflon pad)	Repair support. Refer to Note [2]
	Tank Gallery [5]		
	Adjustable plate type	Small deflection on pipe support after dresser coupling (Tank 16)	Adjust support (raise the plate).
	Adjustable plate type	Pipe is not bearing on support (floating pipe) (F-76)	Adjust support (raise the plate).
	Adjustable plate type	Small deflection on pipe support after dresser coupling (Tank 7)	Adjust support (raise the plate).
	Adjustable plate type	No Teflon between pipe and support (Tank 5)	Refer to Note [2]
	Adjustable plate type	Loose nut on adjustable plate/some deflection on plate (NPS 20)	Secure the nut on the [redacted] Plate
	Adjustable plate type	Pipe is not bearing on support (floating pipe) NPS 20	Adjust support (raise the plate).
	Adjustable plate type	Pipe is not bearing on support (floating pipe) NPS 12	Adjust support (raise the plate).

Pipe Support* ([redacted]S) #	Type of Support	Finding	Recommendation
[redacted]	Steel Saddle	Pipe is not fully bearing on support (partial support) F-24	Shim. Refer to Note (2)
	Utility support	Unistrut in contact with pipe at [redacted] causing coating failure/corrosion	Repair pipe add shim
	Utility support	Unistrut in contact with pipe at [redacted] causing coating failure/corrosion	Repair pipe add shim
	Steel Saddle	Pipe is not fully bearing on support (partial support) F-24	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Moderate corrosion on the steel saddle (F-24)	Replace steel saddle
	Steel Saddle	Moderate corrosion on the steel saddle (JP-5)	Replace steel saddle
	Steel Saddle	Moderate corrosion on the steel saddle (JP-5)	Replace steel saddle
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Pipe is not bearing on support, missing saddle (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel Saddle	Wood shim b/w saddle and pipe support member/dislodge[redacted] (F-24)	Repair
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-24)	Shim. Refer to Note (2)
	Steel support member	There is moderate coating failure and some corrosion on the horizontal pipe support I-beam	Repair coating
	Steel support member	Contact type abrasion and corrosion at pipe support/pipe (JP-5)	Repair coating. Refer to Note (2)
	Steel Saddle	Moderate corrosion on the steel saddle (JP-5)	Replace steel saddle
	Steel Saddle	Pipe is not bearing on support (floating pipe) (F-76)	Shim. Refer to Note (2)
	Steel Saddle	Moderate corrosion on the steel saddle (JP-5)	Replace steel saddle
	Steel Saddle	Unistrut in contact with pipe at [redacted] causing coating failure/corrosion	Repair pipe add shim
	Steel support member	Contact type abrasion and corrosion at pipe support/pipe (JP-5)	Repair coating. Refer to Note (2)
	Steel Saddle	Coating failure and corrosion at saddle support (JP-5)	Repair coating. Refer to Note (2)
	Steel Saddle	The pipe is partially in contact with the pipe support (JP-5)	Shim and monitor at next inspection
	Steel Saddle	The pipe is partially in contact with the pipe support (JP-5)	Shim and monitor at next inspection
	Steel Saddle	Moderate corrosion on the steel saddle (F-24)	Replace steel saddle
	Steel Saddle	Moderate corrosion on the steel saddle (F-76)	Replace steel saddle
	Steel saddle	Moderate corrosion on the steel saddle (F-24)	Replace steel saddle
	Steel saddle	Missing steel saddle (floating pipe) (F-24)	Install saddle. Refer to Note (2)
	Steel saddle	Missing steel saddle (floating pipe) (F-24)	Install saddle. Refer to Note (2)
	Steel saddle	Missing steel saddle (floating pipe) (F-24)	Install saddle. Refer to Note (2)
	Steel saddle	Rail-ties wedged between pipe and saddle (F-24)	Remove rail-ties. Refer to Note (2)
	Steel support member	Corrosion on base of pipe support and I-beam	Repair
	Steel support member	Corrosion on base of pipe support and I-beam	Repair
	Saddle type	Pipe is not bearing on support (floating pipe) (F-76)	Shim. Refer to Note (2)
	Saddle type	Pipe is not bearing on support (floating pipe) (F-76)	Shim. Refer to Note (2)

Pipe Support* [redacted] S) #	Type of Support	Finding	Recommendation
(b) (3) (A)	Saddle type	Pipe is not bearing on support (floating pipe) (F-76)	Shim. Refer to Note (2)
		Harbor Tunnel	
	Steel Saddle type	No wear plate or Teflon pad between pipe and pipe support (F-24)	Refer to Note (2)
	Steel Saddle type	No wear plate or Teflon pad between pipe and pipe support (F-24)	Refer to Note (2)
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	No wear plate or Teflon pad between pipe and pipe support (F-24)	Refer to Note (2)
	Steel support member	No wear plate or Teflon pad between pipe and pipe support (JP-5)	Refer to Note (2)
	Steel support member	No wear plate or Teflon pad between pipe and pipe support (F-76)	Refer to Note (2)
	Steel Saddle (anchor)	Anchor type welded saddle was cut of the pipe (likely for previous repairs/mods). The existing weld attachment is only tack welded at two location (weaker)	Engineering assessment may be required
	Concrete Saddle	Concrete saddle # 530 is cracked on the edge.	Repair as needed/ monitor
	Concrete Saddle	Corrosion on steel plate on saddle # 548 (there is steel plate between pipe and concrete saddle)	Repair as needed/ monitor
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Concrete Saddle	Concrete pipe saddle # 501 is not engaged with pipe (floating pipe). There is loose concrete aggregate between pipe and saddle	Remove aggregate, shim and monitor at next inspection
	Concrete Saddle	Wood shim at saddle #502 (between steel wear plate and saddle	Remove wood and install Teflon shim
	Steel support member	Moderate corrosion on horizontal support attachment to wall (QTY 4)	Replace
	Concrete Saddle	Concrete pipe saddle # 481 is not engaged with pipe (floating pipe)	Shim and monitor at next inspection
	Steel support member	Support wear plate to support not engaged (JP-5) (floating pipe)	Shim and monitor at next inspection
	Steel support member	Minor to moderate corrosion on the base plate due to standing water	Repair corroded base plates
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	Anchor bolt on the base of plate are not secured down to the floor	Secure anchor bolts
	Steel support member	Anchor bolt on the base of plate are not secured down to the floor	Secure anchor bolts
	Steel support member	No wear plate or Teflon pad between pipe and pipe support (JP-5)	Refer to Note (2)
	Steel support member	No wear plate or Teflon pad between pipe and pipe support (JP-5)	Refer to Note (2)
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	Anchor bolt on the base of plate are not secured down to the floor	Defer to next inspection (has grouting)
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	Support wear plate to support not engaged (JP-5) (floating pipe)	Shim and monitor at next inspection
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Steel support member	No wear plate or Teflon provided after repairs (JP-5) (floating pipe)	Shim and monitor at next inspection
	Concrete Saddle	Concrete saddle support (# 337) has several 1/8" rods between the pipe and the concrete saddle. Reason is unknown	Monitor at next inspection
	Steel support member	No wear plate or Teflon provided after repairs (F-24) (floating pipe)	Shim and monitor at next inspection

Pipe Support* ([redacted]S) #	Type of Support	Finding	Recommendation
(b) (3) (A)	Steel support member	No wear plate or Teflon provided after repairs (JP-5)	Refer to Note (2)
	Concrete Saddle	Concrete pipe saddle # 256 is not engaged with pipe (floating pipe)	Shim and monitor at next inspection
	Concrete Saddle	Wood shim at saddle #231 (unknown reason, but no corrosion noted)	Remove wood and install Teflon shim
	Steel support member	No wear plate or Teflon provided after repairs (F-24) (floating pipe)	Shim and monitor at next inspection
	Steel support member	Corrosion on base of pipe support (attachment to tunnel floor)	Repair
	Concrete Saddle	Concrete pipe saddle # 312 is not engaged with pipe (floating pipe)	Shim and monitor at next inspection
	Steel support member	No wear plate or Teflon provided after repairs (JP-5) (floating pipe)	Shim and monitor at next inspection
	Steel support member	Moderate corrosion on horizontal support attachment to wall (QTY 4)	Replace
	Steel support member	Moderate corrosion on horizontal support attachment to wall (QTY 1)	Replace
	Steel support member	No wear plate or Teflon provided after repairs (F-24)	Shim and monitor at next inspection
	Concrete Saddle	Wood shim at saddle #193 (between Teflon wear plate and saddle	Remove wood and install Teflon shim
	Steel support member	No wear plate or Teflon provided after repairs (F-24)	Shim and monitor at next inspection
	Steel support member	No wear plate or Teflon provided after repairs (JP-5) (floating pipe)	Shim and monitor at next inspection
	Steel support member	No wear plate or Teflon provided after repairs (JP-5)	Shim and monitor at next inspection
	Concrete Saddle	Concrete pipe saddle # 178 is not engaged with pipe (floating pipe)	Shim and monitor at next inspection
	Steel support member	The original tack welded wear plate between pipe and support is short. The bell-bell weld is resting on directly on pipe support member	Refer to Note (2)
	Concrete Saddle	Concrete pipe saddle # 110 is not engaged with pipe (floating pipe)	Shim and monitor at next inspection
	Steel support member	Small wood shim between wear plate and Steel support member (JP-5)	Remove wood and install Teflon shim
	Steel support member	No wear plate or Teflon at the intermediate [redacted] next to [redacted] 143 (F-24)	Refer to Note (2)
	Steel support member	Intermediate [redacted] between F-76 and F-24 line is welded directly to pipe	Monitor at next inspection
	Steel support member	No wear plate or Teflon at [redacted] 140 (F-24)	Refer to Note (2)
	Steel support member	Moderate coating failure on support and underside of pipe	Repair coating
	Steel support member	Pipe is not in contact with support (F-24) (floating pipe)	Shim and monitor at next inspection
	Concrete Saddle	Deteriorated saddle with rebar exposed (saddle # 36)	Repair concrete saddle
	Concrete Saddle	Pipe is not in contact with saddle # 24 (floating pipe)	Shim and monitor at next inspection
	Steel support member	Anchor bolt on the base of plate are not secured down to the floor	Secure anchor bolts
	Surge Tank		
	Steel saddle type	No wear plate or Teflon provided after repairs (F 24)	Refer to Note (2)

Note:

* [redacted] starting at tank (b) (3) (A) and ending at the (b) (3) isolation valves ([redacted] (b) (3) (A) were labeled to aide in identifying and locating findings reported. The letter "F" is tacked to the pipe supports ([redacted] numbers to distinguish the FOR[redacted] from the facility designated pipe supports. The two pipe supports at each tank (laterals) are labeled LPS-xA and LPS-xB where x refers to the tank number in the tank gallery.

E2-1) Partial saddle support with contact at approximately 5 and 7 o'clock positions

E2-2) Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.

E2-3) Penetration through concrete walls/bulkheads are included in this table.

E2-4) The FOR pipe from (b) (3) (A) [redacted] is galvanized angle iron with U-bolt supports. From (b) (3) (A) [redacted] are strap type support and (b) (3) (A) [redacted] door are Unistrut type pipe clamp with no Teflon pad or isolation material. All exterior pipe support past (b) (3) (A) [redacted] are steel angle iron with U-bolt.

E2.5) Majority of the pipe support in the tank gallery is steel saddle type with partial contact at the bottom with no Teflon shim or insulation strips.

Photos of Typical Saddle Supports from Table E2

(b) (3)

[redacted]

[redacted]

[redacted]

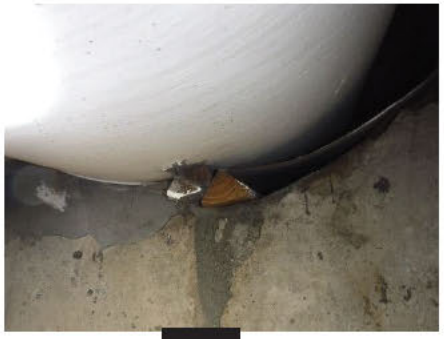
(b) (3)

[redacted]

[redacted]

(b) (3) (A)

(b) (3)


[redacted]

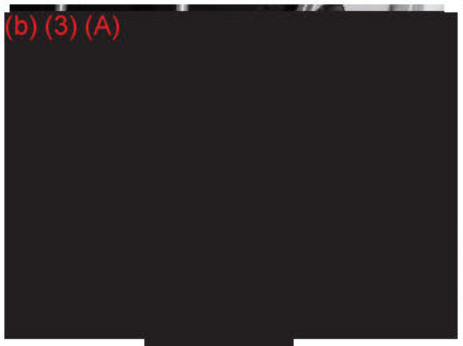
[redacted]

[redacted]

Photos of Typical Saddle Supports from Table E2 (Cont.)

(b) (3)

[redacted]


(b) (3) (A)
[redacted]

[redacted]

(b) (3)

[redacted]

[redacted]

[redacted]

(b) (3) (A)

[redacted]

[redacted]

[redacted]

Table F – Mechanical Dent (MD) Inspection Summary

ID #	NPS	Relative Location	Dent Description (orientation)	Clock** Position	Dent Size Approx. Depth (in.)	Recommendation
(b) (3) (A)			Single uniform Dent (⊥)	8	0.150	Monitor at next inspection
			Single uniform dent (\\) with center gouge of approx. 1/64" Coating damaged at dent location.	7	0.950	Install a pipe spool to eliminate the dent
			Single uniform Dent (⊥)	12	0.188	Monitor at next inspection
			Single uniform Dent (⊥) at tee	8	0.120	Monitor at next inspection
			Single uniform Dent (⊥)	6	0.140	Monitor at next inspection
			Single uniform Dent (⊥)	5	0.030	Monitor at next inspection
			Single uniform Dent (⊥)	7	0.250	Monitor at next inspection
			Single uniform Dent (⊥)	6	0.219	Monitor at next inspection
			Single uniform Dent (⊥)	5	0.156	Monitor at next inspection
			Single uniform Dent (⊥)	5	0.125	Monitor at next inspection
			Single uniform Dent (⊥)	5	0.156	Monitor at next inspection
			Single uniform dent (⊥); 116" from (b) (3) (A)	1	0.162	Monitor at next inspection
			Single uniform dent (⊥)	12	0.090	Monitor at next inspection
			Single uniform dent (//); 83" from (b) (3) (A)	12	0.225	Monitor at next inspection
			Single uniform dent (⊥)	-	0.320	Monitor at next inspection
			Single uniform dent (⊥)	2	0.270	Monitor at next inspection
			Single uniform dent (⊥)	6	0.150	Monitor at next inspection
			Single uniform dent (⊥)	2	0.080	Monitor at next inspection
			Single uniform dent (⊥); More out of round than dent	-	0.386	Monitor at next inspection
			Single uniform dent (⊥); Not visible	-	N/A	Monitor at next inspection
			Single uniform dent (⊥); 114" from (b) (3)	2	0.130	Monitor at next inspection
			Single uniform dent (⊥); 102" from (b) (3)	3	0.200	Monitor at next inspection
			Single uniform dent (⊥); Possibly dent - Remove wrap/coating to evaluate; 40" from 38	-	-	Monitor at next inspection
			Single uniform dent (⊥); Possibly dent - Remove wrap/coating to evaluate; 68" from (b)	-	-	Monitor at next inspection
			Single uniform dent (⊥); 58" from joint; About 5" long	1-3	0.505	Monitor at next inspection
			Single uniform dent (⊥); Between (b) (3) (A) 8" Long	10	0.368	Monitor at next inspection
			Single uniform dent (⊥); Between (b) (3) (A)	10	-	Monitor at next inspection
			Single uniform dent (⊥); Between (b) (3) (A)	11	-	Monitor at next inspection
			Single uniform dent (⊥); 67" from (b) (3) (A)	10	0.100	Monitor at next inspection
			Single uniform dent (⊥); 117" fro	6	0.031	Monitor at next inspection
			Single uniform dent (⊥); 51" from	2:30	0.050	Monitor at next inspection
			Single uniform dent (⊥); 79" from	1:30	0.130	Monitor at next inspection
			Single uniform dent (⊥); 117" fro	5:30	0.224	Monitor at next inspection

(b) (3) (A)	Single uniform dent (⊥); 61" from [redacted] (b) (3) (A)	6	0.208	Monitor at next inspection
	Single uniform dent (⊥)	-	0.146	Monitor at next inspection
	Single uniform dent (⊥)	3	0.224	Monitor at next inspection
	Single uniform dent (\\) on Bell	3	0.320	Conduct a follow-on NDE assessment
	Single uniform dent (⊥); 72" from [redacted] 549	-	0.078	Monitor at next inspection
	Single uniform dent (⊥); 72" from [redacted] 549	-	0.063	Monitor at next inspection
	Single uniform dent (⊥); 77" from [redacted] 549	-	0.143	Monitor at next inspection
	Single uniform dent (⊥)	3:30	0.206	Monitor at next inspection
	Single uniform dent (⊥); 45" from [redacted] 1130; 7" Long	11:30	0.400	Monitor at next inspection
	Single uniform dent (⊥)	3	0.207	Monitor at next inspection
	Single uniform dent (⊥); 31" from [redacted] 496	6	0.286	Monitor at next inspection
	Single uniform dent (⊥)	-	0.125	Monitor at next inspection
	Single uniform dent (⊥)	-	0.166	Monitor at next inspection
	Single uniform dent (⊥)	4	0.047	Monitor at next inspection
	Single uniform dent (⊥)	4	0.138	Monitor at next inspection
	Single uniform dent (⊥); 113" from [redacted] 471 or 113" before [redacted] 1450	7:30	0.200	Monitor at next inspection
	Single uniform dent (⊥)	4	0.156	Monitor at next inspection
	Single uniform dent (⊥)	-	0.245	Monitor at next inspection
	Single uniform dent (⊥)	-	0.295	Monitor at next inspection
	Single uniform dent (⊥)	-	0.094	Monitor at next inspection
	Single uniform dent (⊥)	-	0.156	Monitor at next inspection
	Single uniform dent (⊥)	-	0.250	Monitor at next inspection
	Single uniform dent (⊥)	-	0.109	Monitor at next inspection
	Single uniform dent (⊥)	-	0.125	Monitor at next inspection
	Single uniform dent (⊥)	3	0.188	Monitor at next inspection
	Single uniform dent (⊥)	3	0.047	Monitor at next inspection
	Single uniform dent (⊥)	3	0.109	Monitor at next inspection
	Single uniform dent (⊥)	3	0.125	Monitor at next inspection
	Single uniform dent (⊥)	3	0.151	Monitor at next inspection
	Single uniform dent (⊥)	3	0.293	Monitor at next inspection
	Single uniform dent (⊥)	4	0.141	Monitor at next inspection
	Single uniform dent (⊥) (b) (3) (A)	4	0.188	Monitor at next inspection
	Single uniform dent (⊥); Nea	2	0.146	Monitor at next inspection
	Single uniform dent (⊥); Nea	3:30	0.156	Monitor at next inspection
	Single uniform dent (⊥); Nea	3	0.186	Monitor at next inspection
	Single uniform dent (⊥)	4	0.191	Monitor at next inspection
	Single uniform dent (⊥)	3:30	0.104	Monitor at next inspection
	Single uniform dent (⊥); Near/At	4	0.156	Monitor at next inspection
	Single uniform dent (⊥); Near/At	3:30	0.109	Monitor at next inspection
	Single uniform dent (⊥)	3	0.125	Monitor at next inspection
	Single uniform dent (⊥)	3:30	0.125	Monitor at next inspection
	Single uniform dent (⊥)	1	0.161	Monitor at next inspection
	Single uniform dent (⊥); 39" from (b) (3)	8:30	0.442	Monitor at next inspection
	Single uniform dent (⊥)	3	0.200	Monitor at next inspection

Single uniform dent (⊥); 43" from (b) (3) (A)	7	0.436	Monitor at next inspection
Single uniform dent (⊥); 31" from	3	0.321	Monitor at next inspection
Single uniform dent (⊥); 31" from	4	0.188	Monitor at next inspection
Single uniform dent (⊥); 31" from	10	0.100	Monitor at next inspection
Single uniform dent (⊥); 31" from	10	0.310	Monitor at next inspection
Single uniform dent (⊥); 31" from	2:30	0.191	Monitor at next inspection
Single uniform dent (⊥)	1:20	0.220	Monitor at next inspection
Single uniform dent (⊥) (b) (3)	1:20	0.210	Monitor at next inspection
Single uniform dent (⊥); 56" from (A)	1	0.230	Monitor at next inspection
Single uniform dent (⊥); 27" from	11	0.140	Monitor at next inspection
Single uniform dent (⊥); 154" fro	3	0.140	Monitor at next inspection
Single uniform dent (⊥)	3	0.080	Monitor at next inspection
Single uniform dent (⊥); 134" fro	6	0.242	Monitor at next inspection
Single uniform dent (⊥); 199" fro	5	0.182	Monitor at next inspection
Single uniform dent (⊥); 109" fro	9	0.160	Monitor at next inspection
Single uniform dent (⊥); 181" fro	9	0.140	Monitor at next inspection
Single uniform dent (⊥); 121" fro	3	0.080	Monitor at next inspection
Single uniform dent (⊥); Vertical Crease; 40" from	-	0.231	Monitor at next inspection
Single uniform dent (⊥); 20" from (b) (3)	2	0.380	Monitor at next inspection
Single uniform dent (⊥); 142" fro (A)	2	0.170	Monitor at next inspection
Single uniform dent (⊥)	-	N/A	Monitor at next inspection
Single uniform dent (⊥)	12-3	0.297	Monitor at next inspection
Behind Wrap; *Unknown without Removal	-	-	Monitor at next inspection
Behind Wrap; *Unknown without Removal	-	-	Monitor at next inspection
Single uniform dent (⊥)	12	0.170	Monitor at next inspection
Single uniform dent (⊥); 102" from (b) (3) (A)	4	0.311	Monitor at next inspection
Single uniform dent (⊥); 46" from	3	0.171	Monitor at next inspection
Single uniform dent (⊥); Approx. h een (b) (3) (A)	-	0.160	Monitor at next inspection
Single uniform dent (⊥); 111" from	10	0.170	Monitor at next inspection
Single uniform dent (⊥)	5	0.110	Monitor at next inspection
Single uniform dent (⊥); 144" from	1-2	0.060	Monitor at next inspection
Single uniform dent (⊥); 144" from	1-2	0.050	Monitor at next inspection
Single uniform dent (⊥); 144" from	1-2	0.180	Monitor at next inspection
Single uniform dent (⊥); 36" from	4	0.460	Monitor at next inspection
Single uniform dent (⊥); 34" from th = 3", Width = 1.5"	-	0.156	Monitor at next inspection
Single uniform dent (⊥); 34" from th = 2.5", Width = 2"	-	0.125	Monitor at next inspection
Single uniform dent (⊥); 131" from gth = 2", Width = 1"	-	0.125	Monitor at next inspection
Single uniform dent (⊥); Length = 4", Width = 2.5"; Length along pipe	-	0.219	Monitor at next inspection
Single uniform dent (⊥); 81" from	-	0.250	Monitor at next inspection
Single uniform dent (⊥); Length = 2.8", Width = 1.4"	12	0.1875	Monitor at next inspection
Single uniform dent (⊥); Length = (b) (3) (A)	6	0.375	Monitor at next inspection
Single uniform dent (⊥); 10" from	-	0.330	Monitor at next inspection
Single uniform (b) (3) (A)	-	0.110	Monitor at next inspection

(b) (3) (A)	Single uniform dent (⊥);	-	0.098	Monitor at next inspection
	Single uniform dent (⊥);	9	0.050	Monitor at next inspection
	Single uniform dent (⊥);	9	0.050	Monitor at next inspection
	Single uniform dent (⊥);	9	0.050	Monitor at next inspection
	Single uniform dent (⊥);	9	0.050	Monitor at next inspection
	Single uniform dent (⊥);	9	0.050	Monitor at next inspection
	Single uniform dent (⊥);	2	0.016	Monitor at next inspection
	Single uniform dent (⊥);	-	0.135	Monitor at next inspection
	Single uniform dent (⊥)	1	0.250	Monitor at next inspection
	Single uniform dent (⊥);	-	0.250	Monitor at next inspection
	Single uniform dent (⊥);	11	0.225	Monitor at next inspection
	Single uniform dent (⊥)	12	0.188	Monitor at next inspection
	Single uniform dent (⊥)	1	0.110	Monitor at next inspection
	Single uniform dent (⊥)	1	0.110	Monitor at next inspection
	Single uniform dent (⊥)	3	0.125	Monitor at next inspection
	Single uniform dent (⊥); Near	3	0.100	Monitor at next inspection
	Single uniform dent (⊥)	7	0.200	Monitor at next inspection
	Single uniform dent (⊥); 27" fr	10	0.110	Monitor at next inspection
	Single uniform dent (⊥); 10" fr	9	0.297	Monitor at next inspection
	Single uniform dent (⊥); 73" fr	2	0.214	Monitor at next inspection
	Single uniform dent (⊥)	1	0.080	Monitor at next inspection
	Single uniform dent (⊥)	2	0.284	Monitor at next inspection
	Single uniform dent (⊥)	6	0.140	Monitor at next inspection
	Single uniform dent (⊥)	6	0.600	Monitor at next inspection
	Single uniform dent (⊥)	10	0.210	Monitor at next inspection
	Single uniform dent (⊥)	12	0.125	Monitor at next inspection
	Single uniform dent (⊥)	2	0.050	Monitor at next inspection
	Single uniform dent (⊥); 62" fr	11	0.120	Monitor at next inspection
	Single uniform dent (⊥); 12" L	2	0.392	Monitor at next inspection
	Single uniform dent (⊥); At [redacted]	1	0.230	Monitor at next inspection
	Single uniform dent (⊥); [redacted] fr	10	0.280	Monitor at next inspection
	Single uniform dent (⊥); 154"	2:30	0.328	Monitor at next inspection
	Single uniform dent (⊥); 158"	2:30	0.271	Monitor at next inspection
	Single uniform dent (⊥); 1" Lo	2-3	0.031	Monitor at next inspection
	Single uniform dent (⊥); 2.25"	2-3	0.031	Monitor at next inspection
	Single uniform dent (⊥); Near saddle	5	0.265	Monitor at next inspection
	Single uniform dent (⊥)	2	0.063	Monitor at next inspection

Note:

- *MD = Mechanical Dent*
- *MD/G = Mechanical Dent with Gouge*
- [redacted] # = Girth Weld number marked on pipe (from 2016 ILI run)
- * Dents identified in July 2021
- ** *All clock positions are given facing UGPH59 (flow path towards UGPH59)`*
- *⊥ = perpendicular to pipe run*
- *// = parallel to pipe run*
- *\\ = at an angle to pipe run*

[redacted]

Dent assessment criteria applied

a) API 579-1/ASME FFS-1

1. Level 1 assessment procedure for non-cyclic service is applied. Piping was evaluated assuming non-cyclic service based on facility operation parameters (the piping operates in a relatively constant pressure/temperature relative to process piping used in refinery). The acceptability criterion is based on limiting the maximum dent depth in the pipe to a percentage of the pipe outside [redacted] (≤ 7%).
2. The cyclic service screening procedure in Part 14 is also satisfied by provision of 14.4.2.2 Method A: when a successful experience over a sufficient time frame (greater than or equal to the intended design life of a given component) is obtained with comparable equipment subject to a similar loading time history, then fatigue analysis is not required as part of the FFS Assessment.
   In this case considering satisfactory service history with the flaw in place since the beginning (or at least since the latest year lead based paint was used (Circa 1971)).

b) API RP 1183 (Assessment and Management of Pipeline Dents)

1. The Fitness-for-Service Assessment detailed in paragraph 5.2.5 relies on comprehensive assessment of the data set available. The testing data has shown that plain dents (regardless of shape) with depths up to 10 % of the pipe [redacted] (without coincident metal loss, weld, or crack features) have the same failure pressure as plain line pipe (i.e. does not limit the pressure).

c) The maximum depth and maximum allowable dent depth and % dent are tabulated bellow based on both assessment criteria used in a) and b).

NPS	API 579-1/ASME FFS-1	API RP 1183	Max measured [redacted]	Max measured equivalent % value
	Max dent allowed (7%)	Max dent allowed (10%)		
16	1.12[redacted]	1.6[redacted]	0.386[redacted]	2.4 %
18	1.26[redacted]	1.8[redacted]	0.505 in	2.8 %
32	2.24[redacted]	3.2 in	0.600 in	1.9 %

A-MD-2* is not included in this table since the pipe spool containing the dent was removed during the 2022 trip.

Sample Dent photos

(b) (3) (A)

[redacted]

[redacted]

[redacted]

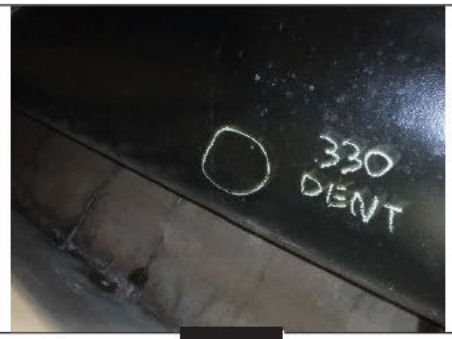
(b) (3) (A)

[redacted]

[redacted]

[redacted]

(b) (3)



[redacted]

[redacted]

[redacted]

[redacted]

Sample Dent photos (cont.)

(b) (3)

(b) (3) (A)

(b) (3) (A)

(b) (3) (A)

(b) (3) (A)

Table G – Validation of Repairs/Inspection Findings (Based on 2015 &2016 revision of EEI/APTIM reports)					
Item #	**EEI/APTIM Item #**	**Pipe Support #**	**Previous API 570 Finding Reported (2015/2016)**	**Recommendation Reported (2015/2016)**	**Follow-on Activity/ Recommendation (July 2021/June 2022)**
1*	TK10-TG-3	-	• Corrosion under dresser coupling insulation	Remove jacketing at dresser coupling and inspect	• Insulation was removed at Tank 10 and area inspected/documented. Add CUI inspection to the API 570 inspection program
2*	TK12-TG-1	-	• Non-standard flange in vertical tee.	None Listed	• Consider upgrading to an ASME B16.5 rated flange and fittings. Typical at various locations. • **Note:** ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
3*	TK13-TG-1	-	• Non-standard flange in vertical tee.	None Listed	• See Item # 2 Recommendation
4*	TK14-TG-1	-	• Dresser coupling under insulation. Additional engineering investigation required	None Listed. Additional engineering investigation requested.	• Add CUI inspection to the API 570 inspection program until dresser couplings are replaced.
5*	TK16-TG-1	-	• Dresser coupling under insulation. Additional engineering investigation required.	None Listed. Additional engineering investigation requested.	• Add CUI inspection to the API 570 inspection program until dresser couplings are replaced.
6*	TK16-TG-2	-	• Non-standard flange in vertical tee.		• See Item # 2 Recommendation
7*	TK19-TG-1	-	• Pipe support corroding steel and spalling concrete	Repair pipe support corroding steel and spalling concrete.	• Same condition identified during this inspection cycle. This was identified on the second pipe support after Tank 19 (left hand side facing the tank). There is a yellow marking on I-beam listing this as "Item g." • Replace pipe support I-beam structure and repair concrete footing.
8*	TK20-TG-1	-	• Corroding steel on pipe support	Replace pipe support corroding steel	• Same condition identified during this inspection cycle. Corrosion was identified on the first pipe support after Tank 20 (right hand side facing the tank). There is a yellow marking on I-beam listing this as "Item b" and "Item d." • Replace pipe support I-beam structure

9*	18-TG-1	at 2	• Floating Pipe Support Pipe is only in contact on one side of saddle pipe support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed Concur with Reported Recommendation
10*	18-TG-2	3 / 4	• Gouge/Dent Approximate dent depth measurement: 0.265".	Remove, provide, and install 4 [redacted] pup piece to eliminate the dent.	• There is a 4[redacted] pup installed between [redacted] S 3 & 4 approx. 55" from [redacted] S 3. No dent. **No further action. *Completed 4/13/2016***
11*	18-TG-3	3 / 4	• Socket Weld	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket weld.	• There is a 4[redacted] pup installed between [redacted] S 3 & 4 (no socket weld here) **No further action**
12*	18-TG-5	at 6	• Missing Guide at Pipe Support Pipe support only has one guide	Provide guide for pipe support.	• Same finding observed (guide at 7 o'clock missing) Concur with Reported Recommendation
13*	18-TG-6	5 / 6	• Dent Approximate dent depth measurement: 0.350".	Remove, provide, and install 4 [redacted] pup piece to eliminate the dent.	• A dent was identified at 12 o'clock with approx. depth of 0.1875 (with coating) (See MD-3). Unclear if this the same dent identified previously in the 2015 inspection; no clock position given. Remove coating to verify dent depth. No impact on fitness for service based on depth of 0.1875
14*	18-TG-11	10 / 11	• Dent/Crease Approximate dent depth measurement: 0.300". Dent located at bottom of a tee	Remove, provide, and install 4 [redacted] pup piece to eliminate the dent.	• Same finding noted at the bottom of the lower tee for Tank 17 & 18 (6 o'clock) with approx. depth of 0.375 (with coating). See MD-5 Concur with Reported Recommendation
15*	18-TG-12	at 11	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed Concur with Reported Recommendation
16*	18-TG-14	12 / 13	• Socket Weld Two socket welds located [redacted] apart.	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket welds.	• There is a 4[redacted] pup installed between [redacted] S 12 & 13 **No further action. Completed 4/11/2016**
17*	18-TG-15	12 / 13	• Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	• This was not identified during this inspection (likely replaced with the pup piece). Several spools in this section of pipe run. **No further action**
18*	18-TG-16	at 12	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed • Concur with Reported Recommendation
19*	18-TG-18	13 / 14	• Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	• Same finding observed. There are two lugs or tabs welded directly to the pipe at 7 o'clock position. Lug is 4″ wide, ½″ thick. Located just before door C.

					• Concur with Reported Recommendation
20*	18-TG-21	at 16	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed Concur with Reported Recommendation
21*	18-TG-22	16 / 17	• Corrosion on Sleeve Minor corrosion on top of encirclement sleeve. Water actively dripping on it	Install drip shield above pipe.	• Moderate coating failure is now present. Sleeve was likely added in the past to correct corrosion areas in the past due to drips. • Concur with Reported recommendation. Remove corrosion spot and recoat piping.
22*	18-TG-23	16 / 17	• Weld Overlay Repair Excessive weld overlay on pipe. Two locations, each one is 2" x 2". Located [redacted] from repair sleeve	Remove weld overlay, remove coating, and perform magnetic particle testing. Recoat after testing.	• This was not identified during this inspection **No further action**
23*	18-TG-25	20 / 21	• Corrosion Heavy corrosion between flange sets. Two rolled 45s. Heavy corrosion and exfoliation. Corrosion extends across girth weld. Pitting measured approximately 0.125"; however, it is difficult to get accurate pit depths	Remove the corroded area of piping between the flange sets 20" downstream and 67" upstream of Pipe Support 20. Provide spool piece. Spool piece includes two rolled 45° elbows, elevation difference of 29", lateral difference of 31", and flange face to face distance of 87".	• Same finding observed. Corrosion is due to active drips from tunnel ceiling mineral deposit. Nominal thickness was likely 0.375". The general metal thickness at this area is now 0.300" with a pit depth of 0.100" resulting in remaining thickness of 0.200". The remaining life at this location calculates to15 years (approximate). • Concur with Reported Recommendation
24*	18-TG-27	20 / 21	• Coating Removal Corrosion under bubble coating. Not able to assess without coating removal	Remove 2[redacted] of coating and inspect.	• This finding is same Item # 24 See Item # 24
25*	18-TG-28	22 / 23	• Socket Weld Two socket welds located 38" apart	Remove, provide, and install 5 [redacted] pup piece to eliminate the socket welds.	• Same finding was observed (location is marked as “item n” with yellow ink • Concur with Reported Recommendation
26*	18-TG-29	25 / 26	• Dresser Coupling • Additional engineering investigation required.	TBD	• Same observation. Note: the four lugs on the upstream side of the dresser coupling welded to the pipe are backwards and are not per mfg. detail. • Rotate lugs or consider removing the dresser coupling if engineering assessment indicated it is not needed
27*	18-TG-30	28 / 29	• Dent • Approximate dent depth	Remove coating and perform magnetic particle testing.	• Same finding noted. Located 81” from [redacted] S 29 (7 o’clock) with approx. depth of

			measurement: 0.230"	Recoat after testing.	0.250" (with coating). See MD-7 • Concur with Reported Recommendation
28*	18-TG-31	at 30	• Corrosion • Corrosion at Pipe Support 30. Pitting depths measured at approximately 0.100" at top of pipe	Remove, provide, and install 4 [redacted] pup piece. Pup piece shall extend 2[redacted] upstream and 2[redacted] downstream of Pipe Support 30.	• There is a 4[redacted] pup installed at this location • **No further action. *Completed 4/9/2016***
29*	18-TG-32	30 / 31	• Socket Weld	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket weld.	• There is a 2[redacted] pup installed at this location • **No further action. *Completed 4/8/2016***
30*	18-TG-33	35 / 36	• Dent • Approximate dent depth measurement: 0.188"	Remove coating and perform magnetic particle testing. Recoat after testing.	• Same finding noted at the bottom of the lower tee for Tank 98" from[redacted] S 35 (6 o'clock) with approx. depth of 0.219 (with coating). See MD-8 • Concur with Reported Recommendation
31*	18-TG-34	38 / 39	• Threaded Small Bore Pipe/Valve • The 3/4" threaded piping is below the minimum structural wall thickness.	Remove 1[redacted] of 3/4" threaded pipe and 3/4" gate valve. Provide 3/4" welded/flanged schedule 80 carbon steel pipe and 3/4" flanged carbon steel Class 150 ball valve.	• A shorter pipe nipple is now installed with ¾" ball valve but still contains threaded fitting. Note: there is staining/wetting on the lower threaded fitting. • Concur with Reported Recommendation
32*	18-TG-35	40 / 41	• Socket Weld Two socket welds located 20" apart	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket welds.	• There is a 4[redacted] pup installed at this location No further action. *Completed 4/4/2016*
33*	18-TG-37	50 / 51	• Socket Weld Two socket welds located 28" apart	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket welds.	• There is a 4[redacted] pup installed at this location • **No further action. *Completed 3/31/2016***
34	18-TG-40	57 / 58	• Non-Standard Components	Replace 1 ½" plastic ball valve with Class 150 carbon steel ball valve. Replace 7[redacted] of small bore threaded pipe and fittings with welded carbon steel pipe and fittings.	• The Plastic ball valve was replaced but threaded piping still exists. • Concur with replacing with welded carbon steel pipe. • Consider routing the piping away from walking path, golf cart or rail path.
35	18-TG-41	59 / 60	• Socket Weld	Remove, provide, and install 6 [redacted] pup piece to eliminate the socket welds.	• Same finding observed • Concur with Reported Recommendation • Coating is removed by others at this location (presumably for repairs)
36	18-TG-42	66 / 67	• Socket Weld	Remove, provide, and install 4 [redacted] pup piece to eliminate the socket welds.	• There is a 4[redacted] pup installed between[redacted] S 66 & 67 • **No further action. Completed 3/24/2016**
37	18-TG-44	66 / 67	• Corrosion	Remove, provide, and install [redacted] tee. The repair will require piping rework to fit a new tee.	• Same finding observed • Concur with Reported Recommendation • Coating is removed by others at this

				Engineering will be required for the repair design.	location (presumably for repairs)
38	18-TG-45	At 67	• Corrosion	Replace pipe support. Recoat bottom of pipe at Pipe Support 67 during Tank Gallery recoat.	• Same finding observed • Concur with Reported Recommendation • Coating is removed by others at this location (presumably for repairs)
39	18-TG-46	68 / 69	• Socket Weld	Remove, provide, and install 6 pup piece to eliminate the socket welds.	• Same finding observed • Concur with Reported Recommendation • Coating is removed by others at this location (presumably for repairs)
40	18-TG-48	69 / 70	• Corrosion	Remove, provide, and install 4 pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a 4 pup installed between S 69 & 70 • **No further action. Completed 3/24/2016**
41	18-TG-49	At 71	• Welded Saddle Pipe Support	Remove, provide, and install 4 pup piece to eliminate the saddle pipe support. Provide new pipe support. 1" overlap at pipe horizontal seam.	• Same finding observed • Review details/engineering and NDE performed • May be deferred until next inspection due to satisfactory service history
42	18-TG-52	72 / 73	• Corrosion	Remove, provide, and install 4 pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a 4 pup installed between S 69 & 70 • **No further action. Completed 3/18/2016**
43	16-UGPH-1	651 / 652	• Non-Standard Repair at Bulkhead	Remove, provide, and install 10 16" pup piece to eliminate the non-standard repair in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be re-anchored as part of the repair.	• Same finding observed (full sleeve at UGPH side of bulkhead and half sleeve on other side of the bulkhead) • Some corrosion noted at the UGPH side of the bulkhead during this trip. • Review repair details • Note: Coating removal and NDE (PT/MT) may be performed
44	16-UGPH-2	UGHP/ 650	• Coating Repair	Recoat 400 of failing coating on the 16" piping between the UGPH and 2.	• Same finding observed • Coating failure is currently close to 500 • Concur with Reported Recommendation
45	16-UGPH-3	N/A	• Threaded Small Bore Pipe / Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV)	• Same finding observed • Concur with Reported Recommendation • 1" LPD b/w valve # 0159 & UGPH wall

				assembly. Provide welded / flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	• 1" HPV b/w valve # 0159 & UGPH wall • 1" LPD b/w valve # 0159 & UGPH wall • 1" LPD past valve # 0159 • 1" HPV past valve # 0159 • 1" LPD past valve # 0159 (additional information in Table D)
46	16-TG-1	25 / 26	• Patch Plate	Remove, provide, and install 4 [redacted] 16" pup piece to eliminate the patch plate.	• There is a 4[redacted] pup installed between [redacted] S 25 & 26 • **No further action. Completed 10/26/2016**
47	16-TG-2	26 / 27	• Threaded Small Bore Valve	Remove 2" threaded bronze gate valve. Provide 2" carbon steel Class 150 ball valve.	• Same finding observed • Concur with Reported Recommendation
48	16-TG-3	At 44	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed • Note 47[redacted] of floating pipe combined with the other unsupported pipe • Concur with Reported Recommendation
49	16-TG-4	At 46 / 47	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed • Concur with Reported Recommendation
50	16-TG-5	47 / 48	• Corroding Pipe Support	Remove, provide, and install the bottom 1[redacted] column of pipe supports 47 and 48. Provide temporary support before repairs.	• Same finding observed at both[redacted] 47 and [redacted] 48 • Concur with Reported Recommendation
51	16-TG-6	56 / 57	• Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	• Lifting lug is removed • It is presumed NDE was also conducted • **No further action. Completed**
52	16-TG-7	56 / 57	• Pitting at Lifting Lug Weld	Remove coating and perform magnetic particle testing. Recoat after testing.	• Lifting lug is removed • It is presumed NDE was also conducted • Visual inspection did not indicate area of concern during this inspection. • **No further action. Completed**
53	16-TG-9	62 / 63	• Arc Strike	Remove coating and perform magnetic particle testing. Recoat after testing.	• Same finding observed • It is presumed NDE was conducted • Visual inspection did not indicate area of concern during this inspection. • **No further action.**
54	16-TG-11	73 / 74	• Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	• Same finding observed • Visual inspection did not indicate area of concern during this inspection. • **No further action.**
55	16-TG-12	At 73	• Floating Pipe Support	Provide shims to close gap	• Same finding observed

				between the pipe and pipe support.	• Note 57' - 11" of floating pipe combined with the other unsupported pipe. with only [redacted] 72 and 76 making contact in this section. • Concur with Reported Recommendation
56	16-TG-13	At 74	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• See Item 55 (16-TG-12)
57	16-TG-15	77 / 78	• 2" Diameter Patch Plate	Remove, provide, and install 16" tee. The repair will require piping rework to fit a new tee. Engineering will be required for the repair design.	• Same finding observed • Visual inspection did not indicate area of concern during this inspection. • The patch plate is acceptable per API 570 and ASME PCC-2 (Article 212) • **No further action.**
58	16-TG-16	79, 80, 81, 82	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed • [redacted] 83 and 84 were also observed to be floating during this inspection cycle. • Concur with Reported Recommendation
59	16-TG-17	87 / 88	• Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	• Same finding observed • Visual inspection did not indicate area of concern during this inspection. • **No further action.**
60	16-TG-19	101 / 102	• Threaded Small Bore Valve	Remove 2" threaded ~~bronze gate~~ valve. Provide 2"arbon steel Class 150 ball valve	• Same finding observed • The existing valve is actually carbon steel • Concur with Reported Recommendation
61	16-TG-20	102 / 103	• Failing Gasket	Remove the failing gasket on the 3" blind flange. Provide and install new gasket.	• Same finding observed • Concur with Reported Recommendation • Did not observe during this inspection • Lack of thread engagement on fasteners was noted on this flange
62	16-TG-21	51/52	• Coating Removal/Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating has not been removed yet by coating removal contractor.	• Completed • **No further action.**
63	16-TG-23	At 69	• Coating Removal/Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating was not adequately removed by coating removal contractor.	• Completed • **No further action.**
64	TK2-TG-1	N/A	• Dresser coupling under insulation	None Listed	• Close visual inspection was completed at all insulated dresser (no tell-tell sign of [redacted] • Add [redacted] inspection to the API 570 inspection program until dresser couplings

					are replaced.
65	TK4-TG-1	N/A	• Dresser coupling under insulation	None Listed	• See Item # 64
66	TK6-TG-1	N/A	• Dresser coupling under insulation	None Listed	• See Item # 64
67	TK6-TG-1	N/A	• Dresser coupling under insulation	None Listed	• See Item # 64
68	TK8-TG-1	N/A	• Dresser coupling under insulation	None Listed	• See Item # 64
69	TK10-TG-1	N/A	• Dresser coupling under insulation	TBD	• See Item # 64
70	TK10-TG-2	N/A	• Non-standard flange in vertical tee.	None Listed	• Consider upgrading to an ASME B16.5 rated flange and fittings. Typical at various locations. **Note:** ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
71	TK10-TG-3	N/A	• Corrosion (Dresser coupling under insulation)	Remove jacketing at dresser coupling and inspect	• Insulation jacket was removed at Tank 10 and area inspected/documented during 2021 inspection cycle • See Item # 64
72	16-LRUT-1	674/675	• Coating Removal/Unknown Repair Scope (2016 LRUT scan reported indication)	Remove 2[redacted] of coating and inspect.	• Assumed completed (coating apereas to be relatively new). • Current inspection did not identify areas of concern at this location • **No further action.**
73	16-LRUT-2	675/676	• Coating Removal/Unknown Repair Scope (2016 LRUT scan reported indication)	Remove 2[redacted] of coating and inspect.	• Assumed completed (coating apereas to be relatively new). • Current inspection did not identify areas of concern at this location • **No further action.**
74	32-TG-42	40/41	• Coating Removal/Unknown Repair Scope	Remove 4[redacted] of coating and inspect.	• Area of in inactive corrosion area between [redacted] 40 and [redacted] 41 (108" from [redacted] 40). Pit depth = 0.196" – 0.200" and UTT of 0.430" on unaffected area resulting in remaining thickness of 0.219" to 0.250" • **Repair (See table D).**
75	32-TG-43	41/42	• Coating Removal/Unknown Repair Scope	Remove 4[redacted] of coating and inspect.	• See item 74 above • **No further action.**
76	32-TG-44	41/42	• Coating Removal/Unknown Repair Scope	Remove 4[redacted] of coating and inspect.	• Assumed completed (coating apereas to be relatively new).

[redacted]

					• Current inspection did not identify areas of concern at this location. There is encirclement Repair Sleeve and some inactive pits (0.050 – 0.180"). • **No further action.**
77	32-TG-45	69/70	• Coating Removal/Unknown Repair Scope	Remove 4[redacted] of coating and inspect.	• Assumed completed (coating apereas to be relatively new). • Current inspection did not identify areas of concern at this location. Inactive pits halfway b/w[redacted] with max pit of 0.120" • **No further action.**
78	32-TG-46	69/70	• Coating Removal/Unknown Repair Scope	Remove 4[redacted] of coating and inspect.	• Assumed completed (coating apereas to be relatively new). • Current inspection did not identify areas of concern at this location. Inactive pits near [redacted] 70 with max pit of 0.150" • **No further action**
79	32-A2A3-1	[redacted]	• Threaded Small Bore Pipe/Valve	Remove 2" threaded high point vent (HPV) assembly. Provide welded/flanged HPV assembly with schedule 80 carbon steel pipe and Class 150 ball valve.	• Same finding observed • Note: some staining was noted but no active weeping • Concur with Reported Recommendation
80	32-A2A3-2	232-233	• Dent/Gouge	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (2/19/2018)**
81	32-A2A3-3	238/239	• Coating Removal/Unknown Repair Scope	Remove 5[redacted] of coating and inspect.	• Same finding observed • Area inspected with through coating UTT probe and has UTT of 0.389" - 0400" on topside of pipe and 0.389" - 0400" on bottom side of pipe with active pits 0.050 – 0.080" and • Repair coating to arrest corrosion.
82	32-A2A3-4	At 246	• Coating Repair	Recoat 3[redacted] of failing coating	• Same finding observed • Concur with Reported Recommendation
83	32-A2A3-5	254/255	• Corrosion	4' Pup Repair. Greater than 50% corrosion on Weld	• There is a pup piece at this location • **No further action. Completed (2/12/2018)**
84	32-A2A3-6	At 260	• Coating Repair	Recoat 5[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
85	32-A2A3-7	At 264	• Coating Repair	Recoat 4[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
86	32-A2A3-8	271/272	• Coating Repair	Recoat 3[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation

87	32-A2A3-9	At 276	• Coating Repair	Recoat 1[redacted] of failing coating at the weld.	• Same finding observed • Concur with Reported Recommendation
88	32-A2A3-10	At 277	• Coating Removal/Unknown Repair Scope (Area of previous repair)	Remove 8[redacted] of coating and inspect.	• Same finding observed • Area inspected and has UTT of 0.298" – 0.321" and a max pit of 0.120" • Repair coating to arrest corrosion.
89	32-A2A3-11	288/BH	• Coating Repair	Recoat 4[redacted] of failing coating.	• There is coating repair b/w[redacted] 288 and BH.(near BH) • **No further action. Completed**
90	32-A2A3-12	294/295	• Coating Repair	Recoat 16[redacted] of failing coating	• Same finding observed • Concur with Reported Recommendation
91	32-A2A3-13	298/299	• Coating Repair	Remove 24[redacted] of wrap coating and recoat.	• Same finding observed • Concur with Reported Recommendation
92	32-A2A3-14	307/308	• Coating Removal/Unknown Repair Scope	Remove 8[redacted] of coating and inspect.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
93	32-A2A3-15	312/313	• Coating Removal/Unknown Repair Scope	Remove 12[redacted] of coating and inspect.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
94	32-A2A3-16	326/327	• Coating Repair	Recoat 10[redacted] of failing coating.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
95	32-A2A3-17	327/328	• Coating Repair	Recoat 4[redacted] of failing coating.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
96	32-A2A3-18	333/334	• Coating Repair	Recoat 15[redacted] of failing coating.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
97	32-A2A3-19	341/342	• Dent/Gouge	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (1/28/2018)**
98	32-A2A3-20	353/354	• Dent/Gouge	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (2/3/2018)**
99	32-A2A3-21	353/354	• Dent	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (3/13/2018)**
100	32-A2A3-22	At 355	• Coating Repair	Recoat 2[redacted] of failing coating at weld.	• Same finding observed • Concur with Reported Recommendation
101	32-A2A3-23	364/365	• Dent	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (2/6/2018)**
102	32-A2A3-24	382/383	• Coating Repair	Recoat 10[redacted] of failing coating.	• Same finding observed

					• Concur with Reported Recommendation
103	32-A2A3-25	391/392	• Coating Repair	Recoat 3[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
104	32-A2A3-26	405/406	• Dent	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (2/26/2018)**
105	32-A2A3-27	406/407	• Dent	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (2/28/2018)**
106	32-A2A3-28	408/409	• Coating Repair	Recoat 3[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
107	32-A2A3-29	414/415	• Coating Repair	Recoat 6[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
108	32-A2A3-30	438/439	• Coating Repair	Recoat 2[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
109	32-A2A3-31	469/470	• Coating Repair	Recoat 4[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
110	32-A2A3-32	470/471	• Corrosion at saddle support	Remove, provide, and install 4ft 32" pup piece to eliminate the corroded area.	• There is a pup piece at this location • **No further action. Completed (3/2/2018)**
111	32-A2A3-33	473/474	• ClockSpring (installed several years ago as a temporary repair)	Remove, provide, and install 32" pup piece to eliminate the Clock spring repair.	• Same finding observed • Concur with Reported Recommendation
112	32-A2A3-34	501/502	• Coating Repair	Recoat 3[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
113	32-A2A3-35	At 527	• Coating Repair	Recoat 2[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
114	32-A2A3-36	527/528	• Coating Repair	Recoat 2[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
115	32-A2A3-37	543/544	• Coating Repair	Recoat 12[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
116	32-A2A3-38	549/550	• Coating Repair	Recoat 6[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
117	32-A2A3-39	559/560	• Coating Repair	Recoat 8[redacted] of failing coating.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
118	32-A2A3-40	576/577	• Coating Repair	Recoat 2[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
119	32-A2A3-41	579/580	• Coating Removal/Unknown Repair Scope	Remove 2[redacted] of coating and inspect.	• Same finding observed • Pipe is wrapped in this area • Concur with Reported Recommendation
120	32-A2A3-42	591/BH	• Coating Repair	Recoat 20[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation

121	32-A2A3-43	BH/595	• Coating Removal/Unknown Repair Scope	Clean, inspect, and recoat approximately 75[redacted] of piping between Pipe Support 595 and the bulkhead.	• Same finding observed • Minimal corrosion noted at this location with UTT of 0.381" • Repair coating to arrest the corrosion
122	32-A2A3-44	595/596	• Clockspring (installed several years ago as a temporary repair)	Remove, provide, and install 32" pup pieces to eliminate the Clockspring repair.	• Same finding observed • Concur with Reported Recommendation
123	32-A2A3-45	596/597	• Coating Repair	Recoat 10[redacted] of failing coating.	• Same finding observed • Minimal corrosion observed at this location with UTT of 0.389" and pitting of 0.030 – 0.060" • Repair coating to arrest the corrosion
124	32-A2A3-46	597/598	• Coating Removal/Unknown Repair Scope	Remove 15[redacted] of coating and inspect.	• Same finding observed • Minimal corrosion observed at this location with pitting of 1/16" • Repair coating to arrest the corrosion
125	32-A2A3-47	612/613	• Coating Repair	Remove 6[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
126	32-A2A3-48	639/640	• Coating Repair	Recoat 20[redacted] of failing coating.	• Same finding observed • Concur with Reported Recommendation
127	32-A2A3-49	640/641	• Coating Removal/Unknown Repair Scope	Remove 30[redacted] of coating and inspect.	• Same finding observed • Minimal corrosion observed at this location with UTT of 0.385" • Repair coating to arrest the corrosion
128	18-UGPH-1	650/651	• Threaded Pipe (NPS 4 blind flange)	Remove threaded 4" blind flange. Provide 4" weld neck flange.	• Did not observe threaded NPS 4 pipe • There is a 1" threaded fitting with a ball valve between[redacted] 650/651. • Replace the NPS 1 ball valve with NPS 80 pipe and welded/flanged fitting
129	18-UGPH-2	652/653	• Dent/Gouge (0.130") 0.120" dent and 0.010" gouge	Remove, provide, and install 4ft [redacted] pup piece to eliminate the dent.	• Dent located at 3 o'clock • Dent is acceptable per API RP 1183 • **No further action.**
130	18-UGPH-5	661/662	• Dent with crease (0.368")	Remove, provide, and install 4ft [redacted] pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (11/15/2017)**
131	18-UGPH-6	664/665	• Dent with crease and sharp geometry (0.275")	Remove, provide, and install 4ft [redacted] pup piece to eliminate the dent.	• There is a pup piece at this location • **No further action. Completed (1/2/2018)**
132	18-UGPH-7	667/668	• Dent/Gouge (0.180") • 0.160" dent and 0.020" gouge	Remove, provide, and install 4ft [redacted] pup piece to eliminate the dent.	• Dent is acceptable per API RP 1183 • **No further action.**
133	18-UGPH-9	681/682	• Dent (0.291")	Remove, provide, and install 4ft [redacted] pup piece to eliminate the	• Dent is acceptable per API RP 1183 • **No further action.**

				dent.	
134	18-UGPH-10	N/A	• Threaded Small Bore Pipe/Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	• Same finding observed • Concur with Reported Recommendation • 1" HPV b/w valve # 0155 & PS690 • 1" LPD b/w valve # 0155 & PS690 • 1" LPD b/w valve # 0155 & UGPH wall • 1" HPV b/w valve # 0155 & UGPH wall • 1" Plug b/w valve # 0155 & UGPH wall (additional information in Table D)
135	18-UGPH-11	N/A	• Coating Repair	Recoat 400 ft of failing coating on the 18" piping between the UGPH and [redacted] 2.	• Same finding observed • Coating failure is currently close to 300 ft • Concur with Reported Recommendation
136	32-UHPH-2	677/678	• Dent/Gouge (0.330")	Remove, provide, and install 4ft 32" pup piece to eliminate the dent.	• Dent is acceptable per API RP 1183 • **No further action.**
137	32-UGPH-6	N/A	• Threaded Small Bore Pipe/Valve	Remove three threaded low point drain (LPD) assemblies and one threaded high point vent (HPV assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	• Same finding observed • Concur with Reported Recommendation • 1" LPD b/w valve # 0151 & PS690 • 1" LPD b/w valve # 0151 & UGPH wall • 1" HPV b/w valve # 0151 & PS690 • 1" HPV past valve # 0151 & UGPH wall Several of this LPDs and HPV were wet at the bonnet or valve body) (additional information in Table D)
138	32-UGPH-7	N/A	• Coating Repair	Recoat 400 ft of failing coating on the 32" piping between the UGPH and [redacted] 2	• Same finding observed • Coating failure is currently close to 600 ft • Concur with Reported Recommendation
139	32-LRUT-1 32-LRUT-2	99/100	• Corrosion at Bulkhead	Remove, provide, and install 10 ft 32" pup piece to eliminate the corroded areas in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be re-anchored as part of the repair.	• Not able to verify without performing LRUT. • Pipe has "x" marking at welds indicating there is a potential repair project all the way up to the isolation valve (MOV HS154). • Small gouges were noted and documented between PS99 and bulkhead measuring 0.030" – 0.080" and all located at 8 o'clock position approximately 23" to 34" from bulkhead.
140	32-LRUT-3	143/144	• Coating Removal/Unknown Repair Scope	Remove 8 ft of coating and inspect.	• No notable corrosion observed at this location. Coating is blistered with some holidays. Two small section of wrap near

					[redacted] 143 and wax tape near [redacted] 144. There is angle iron welded on the top of the NPS 32 pipe to support the NPS 18 pipe • Concur with Reported Recommendation
141	32-TG-1	20/21	• Non-Standard Flanges	Remove non-standard flanges and install standard weld neck flanges	Consider upgrading to an ASME B16.5 rated flange and fittings. Typical at various locations. **Note:** ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
142	32-TG-3	22/23	• Socket Weld (two socket welds located 22" apart)	Remove, provide, and install 4ft 32" pup piece.	• Did not identify during this inspection
143	32-TG-4	25/26	• Dresser Coupling	Remove deteriorating gasket on the Dresser coupling. Provide and install new gasket? Stress analysis?	• Deteriorated gasket was not observed during this inspection • Note: the 8 lugs on the upstream side of the dresser coupling welded to the pipe are backwards and are not per mfg. detail. • Rotate lugs or consider removing the dresser coupling if engineering assessment indicated it is not needed
144	32-TG-5	26/27	• Corrosion (Failed FFS with pits = 0.220")	Remove, provide, and install 4ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a pup piece at this location • **No further action. Completed (12/12/2016)**
145	32-TG-6	[redacted] 28	• Corrosion (bottom of pipe and support)	Recoat bottom of pipe at Pipe Support 28 during Tank Gallery recoat. Section of pipe support may need to be removed to recoat.	• Pipe is coated around support • Consider recoating the pipe support during the next maintenance coating activity
146	32-TG-7	29/30	• Non-Standard Flanges	Remove, provide and install 4[redacted] 32" pup piece. Pup piece shall extend upstream and downstream of the flange set.	Consider upgrading to an ASME B16.5 rated flange and fittings. Typical at various locations. **Note:** ASME B31.3 Paragraph 304.7.2 allows "Unlisted Components" provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
147	32-TG-8	30/31	• Patch Plate ([redacted] patch plate)	Remove, provide and install 4[redacted] 32" pup piece. Pup piece shall extend upstream and	• Same finding observed • Visual inspection did not indicate area of concern during this inspection.

				downstream of the [redacted] patch plate.	• The patch plate is acceptable per API 570 and ASME PCC-2 (Article 212) • **No further action.**
148	32-TG-9	31/32	• Socket Weld	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket welds.	• Same finding observed • Concur with Reported Recommendation
149	32-TG-10	31/32	• Patch Plate (10 patch plate)	Remove, provide and install 4 [redacted] 32" pup piece. Pup piece shall extend upstream and downstream of the 10" [redacted] patch plate.	• Same finding observed • Visual inspection did not indicate area of concern during this inspection. • The patch plate is acceptable per API 570 and ASME PCC-2 (Article 212) • **No further action.**
150	32-TG-11	38/40	• Socket Weld	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket weld.	• Same finding observed between [redacted] 38/39 and [redacted] 39/40 (QTY 2) • Concur with Reported Recommendation
151	32-TG-13	44/45	• Coating Removal/Unknown Repair Scope	Remove 5[redacted] of coating and inspect.	• Ok with inactive pits 0.050 to 0.100 • Area is recoated • Continue coating maintenance to deter corrosion.
152	32-TG-14	At 46	• Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	• Same finding observed • Concur with Reported Recommendation
153	32-TG-15	48/49	• Coating Removal/Unknown Repair Scope	Remove 5[redacted] of coating and inspect.	• Ok with inactive pits 0.050 to 0.100 • Area is recoated • Continue coating maintenance to deter corrosion.
154	32-TG-16	49/50	• Corrosion with pit of 0.186"	Remove, provide, and install 4ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a pup piece at this location • **No further action. Completed (9/16/2016)**
155	32-TG-17	50/51	• Socket Weld	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation
156	32-TG-19	At 52	• Corrosion with estimated pit of 0.200"	Remove, provide, and install 4ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a pup piece at this location • **No further action. Completed (9/16/2016)**
157	32-TG-20	57/58	• Non-Standard Flange	Remove, provide and install 4 [redacted] 32" pup piece. Pup piece shall extend upstream and downstream of the flange set.	Consider upgrading to an ASME B16.5 rated flange and fittings. Typical at various locations. **Note:** ASME B31.3 Paragraph 304.7.2

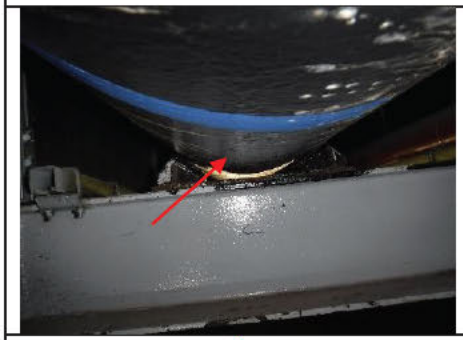
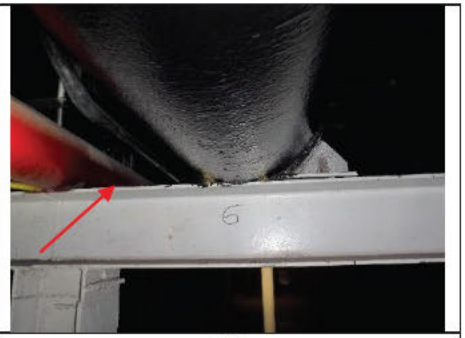
					allows “Unlisted Components” provided engineering analysis is conducted and meets one or more of the means stated in subparts. (a) through (d).
158	32-TG-21	59/60	• Socket Weld (14" apart)	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation
159	32-TG-24a 32-TG-24b 32-TG-24c	At 66 65/66 At 66	• Corrosion Dent/Gouge Corrosion (Corrosion at top of pipe/bottom of pipe at PS66. Dent/gouge 2[redacted] from[redacted] 66 corrosion pit = 0.065" and dent = 0.320")	Remove, provide, and install 4 [redacted] 32” pup piece. Pup piece shall extend upstream and downstream of the corroded/dent area. *Note: 32-TG-24a, 32-TG-24b, 32-TG-24c have been combined into one repair recommendation.	• Same finding observed but corrosion is arrested with coating. • Dent is within acceptable limits of API RP 1183 • Pit does pass ASME calculation (measured depth was 0.080") • Continue coating maintenance to deter corrosion.
160	32-TG-25	At 67	• Corrosion (heavy corrosion at the bottom of[redacted] 67 with reported pits of 0.125")	Remove, provide, and install 4ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	• There is a pup piece at this location with Teflon shims between pipe and support • **No further action. Completed (9/14/2016)**
161	32-TG-27	68/69	• Socket Weld ([redacted] apart)	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation
162	32-TG-28	68/69	• Coating Removal/Unknown Repair Scope	Remove 2[redacted] of coating and inspect.	• Area is ok with no reportable deficiency • Coating appears relatively new • **No further action**
163	32-TG-29 32-TG-30 32-TG-31 32-TG-32 32-TG-33 32-TG-34	68/69 69/70 69/71 69/70 At 70 70/71	• Corrosion, Non-Standard Repair, Coating Removal (Several finding in a 2f[redacted] span including multiple location of pitting with 0.100" measured, coating removal for assessment and nonstandard pipe repair)	Remove, provide, and install 30 [redacted] 32" pup piece. Pup piece shall extend approximately 4ft upstream of Pipe Support 70 and approximately 4[redacted] downstream of Pipe Support 69. *Note: 32-TG-29 through 32-TG-34 have been combined into one repair recommendation.	• Coating appears relatively new • Pitting is within acceptable limits • Insert type repairs noted at two locations before and after[redacted] 70. The insert plates do not have rounded corner per requirements of API STD 570 and ASME PCC-2. Review reason for the repair and NDE performed after the repair, perform additional NDE (PAUT or RT) or replace the section of pipe with non-standard repair at[redacted] 70
164	32-TG-35	71/72	• Coating Removal/Unknown Repair Scope	Remove 2[redacted] of coating and inspect.	• Area is ok with no reportable deficiency • Coating appears relatively new • **No further action**
165	32-TG-36	77/78	• Socket Weld	Remove, provide, and install 4 [redacted] 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation

166	32-TG-37	77/78	• Tunnel Support (tunnel support on pipe? two knee braces on pipe via a 4 x 6 wood beams)	Investigate if supports are load bearing on the piping?	• Same finding observed with a saddle type end piece across the NPS 32 pipe. The wood beams do not appear to be bearing any load on the pipe (based on the gaps between wood and top saddle as well as gaps at the bolt notches) • Concur with Reported Recommendation
167	32-TG-38	80/81	• Socket Weld	Remove, provide, and install 4ft 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation
168	32-TG-39	81/82	• Socket Weld	Remove, provide, and install 4ft 32" pup piece to eliminate the socket weld.	• Same finding observed • Concur with Reported Recommendation
169	32-TG-40	97/98	• Deadleg ([redacted] branch connection as a deadleg does not appear to have usefully purpose)	Remove, provide, and install 4ft 32" pup piece to eliminate the deadleg.	• Same finding observed • Concur with Reported Recommendation
170	32-TG-41	100/101	• Dresser Coupling	TBD	• Same observation • Note: the 8 lugs on the upstream side of the dresser coupling welded to the pipe are backwards and are not per mfg. detail. • One joint harness with gap noted. There are no deflection rings and adapters on the harness lugs (See table D) • Rotate lugs or consider removing the dresser coupling if engineering • assessment indicated it is not needed

Note:

(* for uniformity and completeness; the July 2021 API-570 validation of Repairs/Inspection is incorporated in this 2022 inspection completed by InterSpec, LLC. Segment of piping inspected in 2021 is currently undergoing repairs)

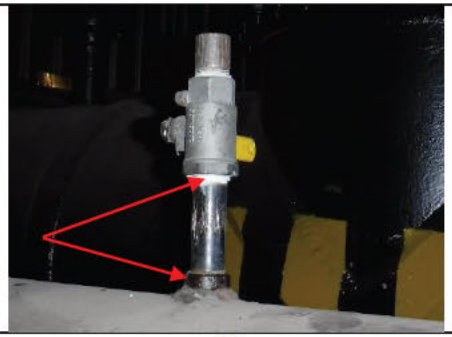
1. Only areas covered in InterSpec's SOW were followed up and documented in the table above.
2. Additional findings observed during this inspection are listed in Table D.
3. Sample pictures of corresponding deficiencies are included in the following page (not all repair or validation photos provided in this section)
4. Several repairs were completed after the 2015 API 570 inspection. Repairs were completed in 2016 – 2019

	(b) (3) (A) [redacted]		
1			
	(b) (3) (A) [redacted]		
5		7	8
	No Photo (repaired)	No Photo (repaired)	
9	10	11	12

[redacted]

		No Photo (floating pipe)	No Photo (repaired)
13	14	15	16
No Photo (repaired)	No Photo (floating pipe)	No Photo (lugs/tabs)	
17	18	19	20
(b) (3) (A) [redacted]	No Photo (not identified)	(b) (3) (A) [redacted]	
	22	23	24

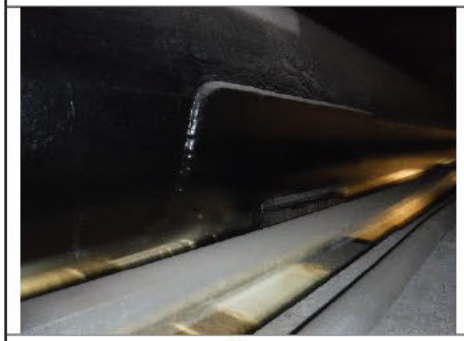
(b) (3) (A) [redacted]

			28
			No Photo (repaired)
29 (repaired)	30	31	32
No Photo (repaired)			
33			

[redacted]

(b) (3) (A)

[redacted]



41

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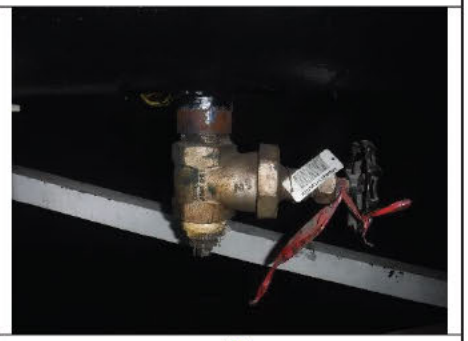
45



47

[redacted]

48

50

(b) (3) (A)

[redacted]

[redacted]

[redacted]

57

60

(b) (3) (A)

[redacted]

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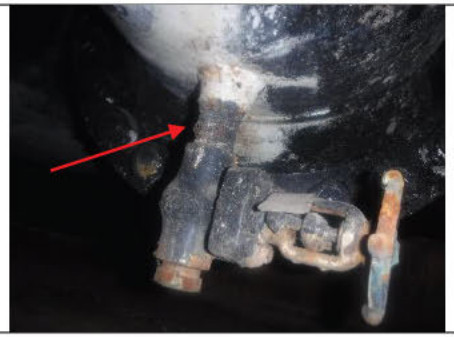
[redacted]

		(b) (3) (A)	
128	134		136
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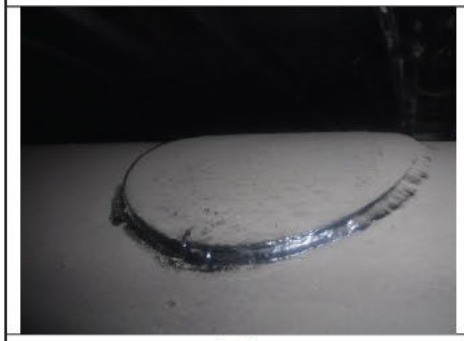	(b) (3) (A)		
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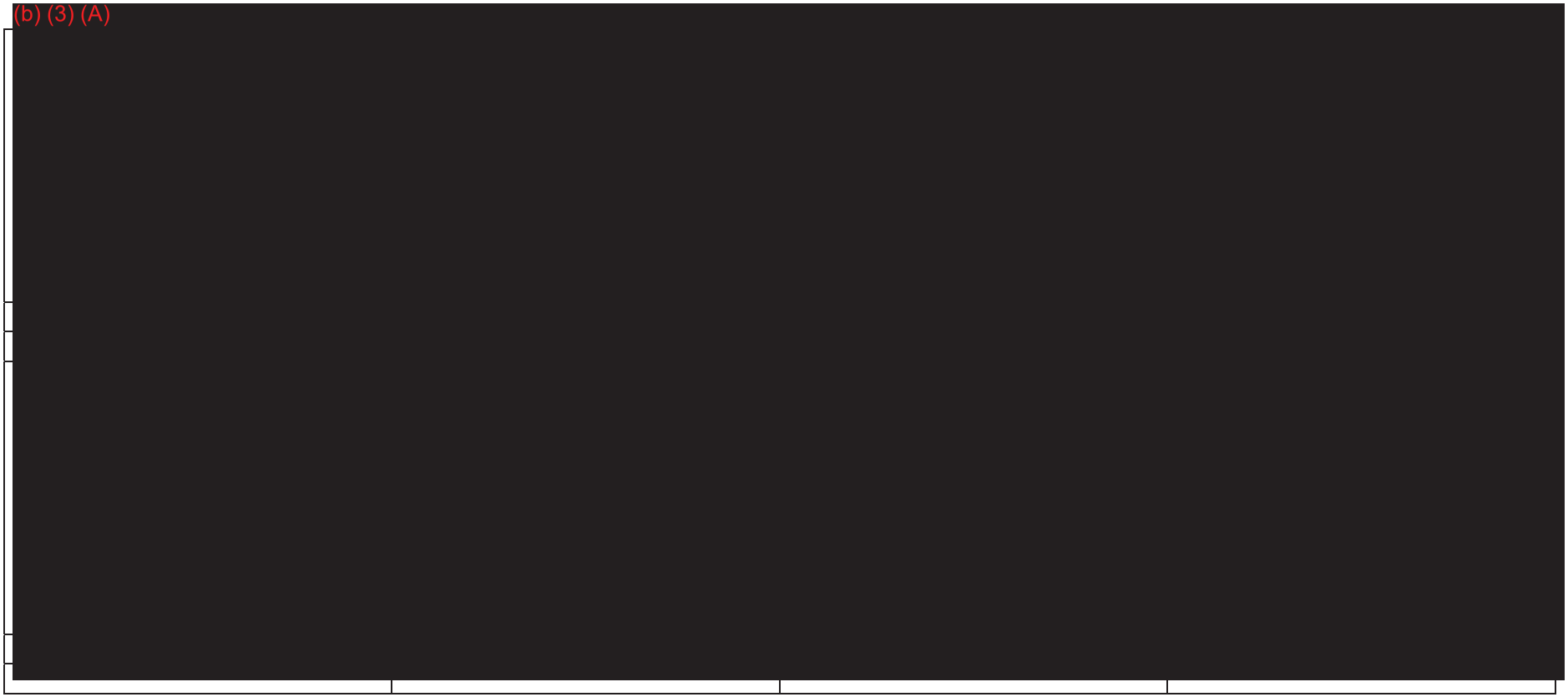
[redacted]

(b) (3) (A)



[redacted]

Table H – Coating failure and corrosion

Item #	NPS	Relative Location	System	Description
1	4	[redacted]	FOR	Coating failure and corrosion on [redacted] flange and fasteners
2	4	[redacted]	Sample Lines	Coating failure and corrosion on sample lines with threaded fittings. Crevice type corrosion at threads
3	4	[redacted]	Sample Lines	Coating failure and corrosion on sample lines with threaded fittings. Crevice type corrosion at threads
4	4	[redacted]	Sample Lines	Coating failure and corrosion on sample lines with threaded fittings. Crevice type corrosion at threads
5	6	[redacted]	FOR	Area of heavy coating failure with rust scale (no significant pits noted)
6	6	[redacted]	FOR	Area of moderate coating failure with rust scale (no significant pits noted)
7	6	[redacted]	FOR	Area of heavy coating failure with rust scale (no significant pits noted)
8	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
9	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
10	6	[redacted]	FOR	Area of heavy coating failure with rust scale (no significant pits noted). Note: facility personnel were applying clear coating compound (rust primmer or cleaning coating) at the time of the inspection
11	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted). Note: facility personnel were applying clear coating compound (rust primmer or cleaning coating) at the time of the inspection
12	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted). Note: facility personnel were applying clear coating compound (rust primmer or cleaning coating) at the time of the inspection
13	6	[redacted]	FOR	Moderate underside coating failure and rust scale
14	6	[redacted]	FOR	Moderate underside coating failure and rust scale
15	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted). Note: facility personnel were applying clear coating compound (rust primmer or cleaning coating) at the time of the inspection
16	6	[redacted]	FOR	Heavy corrosion at this location with some crevice type corrosion on the Victaulic coupling clamp with 30 to 50 mils loose on piping (UTT = 0.230")
17	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
18	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
19	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
20	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted)
21	6	[redacted]	FOR	Isolated area of coating failure and corrosion (no significant pits noted) from F-[redacted] 17 to [redacted] 3 wall penetration.
22	6	[redacted]	FOR	Isolated areas of coating failures at pipe support contact points and general discoloration of piping. Some active and inactive pitting noted and documented on this exterior portion of the FOR piping past [redacted] 3
23	32	[redacted]	F-76	Isolated area of coating failure and corrosion (no significant pits noted). 200 Ft of coating failure
24	32	[redacted]	F-76	Isolated area of coating failure and corrosion (no significant pits noted) mostly at 9 o'clock position
25	32	[redacted]	F-76	Isolated area of coating failure and corrosion (no significant pits noted)
26	18	[redacted]	JP-5	Isolated area of coating failure and corrosion (minor pits noted). Some localized area of coating failure at flange and bolts mostly at 11 to 5 o'clock position due to drips from tunnel (there is a yellow tarp tied off above the pipe at this location) 100 Ft of coating failure
27	18	[redacted]	JP-5	Isolated area of coating failure and corrosion at 12 o'clock near weld
28	18	[redacted]	JP-5	Isolated area of moderate corrosion at BH penetration. Difficult to get good pit depth around that area, approximately 0.063"-0.105" (UTT = 0.240" – 0.243")
29	16	[redacted]	F-24	Isolated area of coating failure and corrosion (no significant pits noted). 100 Ft of coating failure

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
30	32	[redacted]	F-76	Isolated area of coating failure and corrosion with 1/16" isolated pitting at 2 o'clock
31	18	[redacted]	JP-5	Isolated coating failure and corrosion
32	16	[redacted]	F-24	Isolated coating failure and corrosion
33	18	[redacted]	JP-5	Drip from tunnel is damaging coating between [redacted] – BH
34	32	[redacted]	F-76	Minor to moderate coating failure and corrosion with 0.030" – 0.050" pitting
35	18	[redacted]	JP-5	Isolated area of moderate coating failure and corrosion (no significant pits noted).
36	18	[redacted]	JP-5	Moderate coating failure and notable surface corrosion with 0.030" – 0.050" pitting (UTT = 0.231" – 0.242")
37	16	[redacted]	F-24	Moderate coating failure and corrosion due to drip from tunnel with < 0.060" pitting (UTT = 0.240" - 0.248")
38	16	[redacted]	F-24	Majority of the coating has poor adhesion and peeling but no corrosion identified
39	32	[redacted]	F-76	Moderate coating failure and corrosion due to drip from tunnel with (UTT = 0.380")
40	32	[redacted]	F-76	Heavy coating failure and some corrosion noted
41	32	[redacted]	F-76	Minor coating failure with small corrosion at location of wrap (no significant pits noted)
42	32	[redacted]	F-76	Minor to moderate coating failure (no corrosion or significant pits noted)
43	32	[redacted]	F-76	Inactive pits 0.050" – 0.070" at 6 o'clock past sleeve repair
44	32	[redacted]	F-76	Inactive pits 0.050" – 0.100" at 12 o'clock
45	32	[redacted]	F-76	Isolated area of coating failure and corrosion at 8" branch around weld
46	32	[redacted]	F-76	Pipe is wrapped at this location, with surface corrosion on pipe between [redacted] (no significant pits noted)
47	32	[redacted]	F-76	Minor concrete splatter on coating between [redacted]
48	32	[redacted]	F-76	Minor corrosion at 6 o'clock at concrete penetration of bulkhead (no significant pits noted)
49	16	[redacted]	F-24	Pipe is wrapped at this location
50	16	[redacted]	F-24	Isolated small area of coating failure and surface corrosion (no significant pits noted)
51	16	[redacted]	F-24	Poor coating application (no significant pits noted)
52	16	[redacted]	F-24	Pipe is wrapped at this location with spots of minimal failure and poor adhesion on pipe coating
53	32	[redacted]	F-76	Pipe is wrapped at this location; Mostly satisfactory with minor coating failure with no corrosion (no significant pits noted)
54	18	[redacted]	JP-5	Pipe is wrapped in this section and is mostly satisfactory with small wrap failure
55	18	[redacted]	JP-5	Pips is wrapped at this location
56	18	[redacted]	JP-5	9" x 9" corroded area with deep pits 0.050" – 0.140" located at 230-5 o'clock, approximately 46" from [redacted] (UTT = 0.239" – 0.244")
57	16	[redacted]	F-24	Pipe is wrapped at this location
58	16	[redacted]	F-24	Minor peeling of coating (no corrosion, failure or significant pits noted)
59	32	[redacted]	F-76	Approximately 24" of concrete splatter on coating at 11 o'clock
60	32	[redacted]	F-76	Isolated area of coating failure at 6-9 o'clock (no pits or corrosion noted)
61	32	[redacted]	F-76	Areas of concrete splatter between this location, with no coating failure noted
62	32	[redacted]	F-76	Isolated area of coating failure at BTM side, approximately 20' near [redacted] 0
63	32	[redacted]	F-76	Isolated small area of moderate coating failure with no signification corrosion, approximately 5' long (no significant pits noted)
64	32	[redacted]	F-76	Isolated area of coating failure and small corrosion on the surface at 7 o'clock at saddle #400 (no significant pits noted); Approximately 5' of pipe is wrapped at this location
65	32	[redacted]	F-76	Isolated area of coating failure and corrosion at 6-8 o'clock, approximately 3' long
66	32	[redacted]	F-76	Coating failure of the white coating applied to new pup near [redacted]

Table H – Coating failure and corrosion (cont.)

Item #	NPS	[redacted]	System	Description
67	18		JP-5	Approximately 5' of concrete splatter at 12 o'clock on pipe
68	18		JP-5	Isolated area of coating failure wall side with no significant corrosion (no significant pits noted)
69	18		JP-5	Area of moderate coating failure, about 5' long, with no significant corrosion (no significant pits noted)
70	18		JP-5	Isolated area of coating failure (no corrosion or significant pits noted)
71	18		JP-5	Approximately 20' of coating failure with no signification corrosion (no significant pits noted)
72	16		F-24	Isolated area of coating failure on wall side with no significant corrosion (no significant pits noted)
73	16		F-24	Some corrosion on the base of the pipe support
74	16		F-24	Approximately 5' of plaster drips on pipe at 12 o'clock
75	16		F-24	Area of coating failure, approximately 5' long
76	16		F-24	3' of coating failure and corrosion, no significant pits at 8-11 o'clock
77	16		F-24	Approximately 20' of coating failure with no significant corrosion (no significant pits noted)
78	32		F-76	Approximately 6' of coating failure with no significant corrosion (no significant pits noted)
79	32		F-76	Approximately 4' of coating failure with no corrosion at 9 o'clock (no significant pits noted)
80	32		F-76	Approximately 20' of coating failure with no significant corrosion (no significant pits noted)
81	32		F-76	Approximately 10' of coating failure with no significant corrosion (no significant pits noted)
82	32		F-76	Isolated area of coating with minor corrosion at 7-10 o'clock (no significant pits noted)
83	32		F-76	Approximately 3' of coating failure with minor corrosion near saddle (no significant pits noted)
84	18		JP-5	Several inactive and active pits at 12 o'clock, 21" from [redacted], 0.095", 0.080", 0.060" and 0.070" (UTT = 0.046" – 0.101")
85	18		JP-5	Active and inactive pits 0.050" – 0.070"
86	18		JP-5	Approximately 5' of coating failure with no significant corrosion (no significant pits noted)
87	18		JP-5	Approximately 7' of pipe is wrapped near at this location
88	18		JP-5	Isolated area of coating failure and corrosion between 7-11 o'clock with minor pitting.
89	16		F-24	One active pit 0.050" at 7 o'clock, 24" from [redacted]
90	16		F-24	Active and inactive pits 0.050" – 0.080"
91	16		F-24	Isolated area of corrosion on base plate to steel frame
92	16		F-24	Approximately 5' of coating failure with some surface rust (no significant pits noted); Approximately 2' long two small sections of coating failure with no significant corrosion
93	16		F-24	Approximately 2' of small area of coating failure with no corrosion (no significant pits noted)
94	16		F-24	Approximately 2' of small area of coating failure with no corrosion (no significant pits noted)
95	16		F-24	Approximately 10' of coating failure with no significant corrosion (no significant pits noted)
96	32		F-76	Approximately 6' of coating failure with no signification corrosion near [redacted] 415 (no significant pits noted)
97	32		F-76	Approximately 2' of coating failure with minor corrosion near [redacted] at 5-10 o'clock (no significant pits noted)
98	32		F-76	Approximately 2' of coating failure with minor corrosion near [redacted] at 5-10 o'clock (no significant pits noted)
99	32		F-76	Approximately 3' of pipe is wrapped from the coating failure and corrosion location near [redacted]
100	32		F-76	Approximately 3' of coating failure with no corrosion (no significant pits noted)
101	32		F-76	Approximately 5' of coating failure with no significant corrosion (no significant pits noted)
102	32		F-76	Approximately 3' of coating failure with no significant corrosion (no significant pits noted)
103	32		F-76	Approximately 1' of coating failure with no significant corrosion near [redacted] no significant pits noted)
104	32		F-76	Approximately 3' of coating failure with no corrosion near [redacted] (no significant pits noted)
105	18		F-76	Approximately 3' of coating failure with no corrosion near [redacted] (no significant pits noted)

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
106	32	[redacted]	F-76	Approximately 3' of coating failure with no significant corrosion near [redacted] (no significant pits noted)
107	32		F-76	Approximately 3' of coating failure with no significant corrosion near [redacted] (no significant pits noted)
108	32		F-76	Approximately 3' of coating failure with no significant corrosion near [redacted] (no significant pits noted)
109	32		F-76	Approximately 2' of coating failure with no corrosion near [redacted] (no significant pits noted)
110	16		F-24	Approximately 10' of coating failure with no significant corrosion (no significant pits noted)
111	16		F-24	Approximately 24" of this pipe is wrapped at this location
112	16		F-24	Approximately 1' of coating failure with no corrosion (no significant pits noted)
113	16		F-24	Approximately 3' of coating failure with no corrosion near [redacted] (no significant pits noted)
114	16		F-24	Approximately 2' of coating failure with no corrosion near [redacted] (no significant pits noted)
115	32		F-76	Approximately 10' of coating failure with no corrosion (no significant pits noted)
116	18		JP-5	Approximately 10' of coating failure with no corrosion (no significant pits noted)
117	16		F-24	Approximately 8' of coating failure with no corrosion (no significant pits noted)
118	32		F-76	Approximately 24" of this pipe are wrapped at 2 locations in this section
119	32		F-76	Approximately 24" of this pipe are wrapped at 2 locations in this section
120	32		F-76	Approximately 24" of this pipe is wrapped at this location
121	32		F-76	Approximately 60" of this pipe is wrapped at this location
122	32		F-76	Approximately 24" of this pipe is wrapped at this location
123	32		F-76	Approximately 24" of this pipe is wrapped at 4 locations in this section
124	32		F-76	Approximately 24" of this pipe is wrapped at 3 locations in this section
125	32		F-76	Approximately 24" of this pipe is wrapped at 3 locations in this section
126	32		F-76	Approximately 24" of this pipe is wrapped at 2 locations in this section
127	32		F-76	Large section of pipe has been wrapped, no corrosion or pitting noted
128	32		F-76	Large section of pipe has been wrapped, no corrosion or pitting noted, but there is coating failure at areas exposed
129	32		F-76	Smalls section of pipe is wrapped at this location with some areas of coating failure and surface rust was noted in this section (no significant pits noted)
130	18		JP-5	Approximately 2' of this pipe are wrapped at 2 small locations in this section
131	18		JP-5	Approximately 24" of this pipe is wrapped at this location
132	18		JP-5	Approximately 60" of this pipe is wrapped at this location
133	18		JP-5	Approximately 24" of this pipe is wrapped at this location
134	18		JP-5	Approximately 24" of this pipe is wrapped at 4 locations in this section
135	18		JP-5	Approximately 24" of this pipe is wrapped at 3 locations in this section
136	18		JP-5	Approximately 24" of this pipe is wrapped at 3 locations in this section
137	18		JP-5	Approximately 24" of this pipe is wrapped at 2 locations in this section
138	18		JP-5	Large section of pipe is wrapped at this location, no corrosion or pitting noted
139	18		JP-5	Large section of pipe is wrapped, with some corrosion at areas exposed in this section
140	18		JP-5	Small section of pipe is wrapped at this location, no corrosion or significant pitting noted
141	16		F-24	Approximately 2' of this pipe are wrapped at 2 small locations in this section
142	16		F-24	Approximately 2' of this pipe are wrapped at 2 small locations in this section
143	16		F-24	Approximately 24" of this pipe is wrapped at this location
144	16		F-24	Approximately 60" of this pipe is wrapped at this location

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
145	16	[redacted]	F-24	Approximately 24" of this pipe is wrapped at this location
146	16		F-24	Approximately 24" of this pipe is wrapped at 4 locations in this section
147	16		F-24	Approximately 24" of this pipe is wrapped at 3 locations in this section
148	16		F-24	Approximately 24" of this pipe is wrapped at 3 locations in this section
149	16		F-24	Large section of pipe is wrapped at this location, no corrosion or significant pitting noted
150	16		F-24	Large section of pipe is wrapped, with small coating failure near [redacted]
151	16		F-24	Small section of pipe is wrapped at this location, some coating failure and minor surface corrosion noted in this section (no significant pits noted)
152	32		F-76	Most of the pipe is wrapped, there are coating failures in sections of the pipe but no signification corrosion
153	32		F-76	Moderate coating failure, notable corrosion, no significant pits at saddle #237
154	32		F-76	Approximately 24" of this pipe are wrapped at 3-4 locations in this section; there is some damage to the wrap and minor corrosion
155	32		F-76	Approximately 5' of coating failure and corrosion (no pits or significant pits noted)
156	32		F-76	Pipe is spot wrapped at this location and is mostly set
157	32		F-76	Approximately 24" of coating failure with no corrosion (no significant pits noted)
158	32		F-76	Approximately 60" of coating failure with some corrosion on BTM (no significant pits noted)
159	32		F-76	Approximately 24" of coating failure near saddle at 6 o'clock
160	32		F-76	Approximately 24" of coating failure with some corrosion and no significant pits noted
161	32		F-76	Inactive pits 0.080" – 0.140" at 10 o'clock
162	32		F-76	Some isolated paint blisters in this section with new coat
163	32		F-76	Isolated area of coating failure and corrosion with pitting 0.060" at saddle #216
164	32		F-76	Approximately 40' of wrap and coat failure in this section with active and inactive corrosion; pits were noted 0.080" – 0.100"
165	18		JP-5	Pipe is wrapped with some sections only intermittently wrapped. There is minor to moderate coating failure but no notable corrosion.
166	18		JP-5	Approximately 24" of this pipe are wrapped at 3-4 locations in this section; there is some damage to the wrap and minor corrosion
167	18		JP-5	2-4 spot wraps in this section and mostly satisfactory
168	18		JP-5	Approximately 24" of coating failure with no corrosion (no significant pits noted)
169	18		JP-5	Approximately 36" of coating failure with no corrosion (no significant pits noted)
170	18		JP-5	Approximately 140" of pipe is coated and wrapped at this location
171	18		JP-5	Isolated area of coating failure and corrosion 0.050" at 9 o'clock, 70" from [redacted]
172	18		JP-5	Approximately halfway from [redacted] 311-312 to [redacted] is wrapped
173	18		JP-5	Isolated external area of coating failure and corrosion at 6 o'clock and pitting 0.055" – 0.102" (UTT = 0.218" – 0.238")
174	18		JP-5	Supports for this pipe has a corroded base
175	16		F-24	Most of the pipe is wrapped, there are coating failures in sections of the pipe but no signification corrosion
176	16		F-24	Approximately 24" of this pipe are wrapped at 3-4 locations in this section; there is some damage to the wrap and minor corrosion
177	16		F-24	About 1 or 2 spots of this pipe are wrapped at this location
178	16		F-24	Approximately 36" of coating failure with no corrosion (no significant pits noted)

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
179	16	[redacted]	F-24	Approximately halfway from [redacted] is wrapped
180	16		F-24	Supports for this pipe has a corroded base
181	32		F-76	Some active coating failure and corrosion (unknown how much). Remove approximately 5' of wrapping between these pipe supports. Will need a new coating wrapping for VT/570.
182	32		F-76	Isolated area of coating failure and corrosion at pipe saddle #210 (no significant pits noted)
183	32		F-76	Pipe is wrapped at this location. This section has wrap that is failing with some corrosion spot.
184	32		F-76	Pipe is wrapped at this location. This section is mostly okay with minimal bubbles and corrosion spot.
185	32		F-76	Approximately 20' of coating failure and corrosion (no significant pits noted)
186	32		F-76	Pipe is wrapped at this location. This section is mostly okay with isolated area of wrap failure and some coating failure with corrosion.
187	32		F-76	Isolated area of coating failure and corrosion with pitting 0.050" noted at 6 o'clock 57" from [redacted] (UTT = 0.401" – 0.406")
188	32		F-76	Pit 0.114" at 6 o'clock 82" from [redacted] UTT = 0.383" – 0.387")
189	32		F-76	Pit 0.050"-0.200" at 6 o'clock 22" from [redacted] (UTT = 0.386" – 0.393")
190	18		JP-5	Pipe is wrapped up to the middle of this section. There is some coating failure but no significant corrosion in this section.
191	18		JP-5	Approximately 6' of coating failure and corrosion under the wrap. Will need to remove wrap and coat for VT/570.
192	18		JP-5	Pipe is wrapped at this location. The wrap is failing with corrosion noted.
193	18		JP-5	This pipe support to wall attachment is completely corroded (qty 4)
194	18		JP-5	This pipe support has one wall attachment and is corroded
195	18		JP-5	Pipe is wrapped at this location. This section is mostly okay with minimal bubbles and corrosion spot.
196	18		JP-5	Approximately 24" of coating failure and corrosion near [redacted]
197	18		JP-5	Pipe is wrapped at this location. This section is mostly okay with isolated area of wrap failure and some minor coating failure with corrosion.
198	18		JP-5	Isolated wrap failure (approximately 36" long) with some coating failure and corrosion
199	18		JP-5	Pit 0.050"-0.135" at 1 o'clock 50" from [redacted] UTT = 0.050" – 0.135")
200	18		JP-5	Pit 0.050"-0.089" at 5 o'clock 121" from [redacted] UTT = 0.241" – 0.275")
201	16		F-24	Isolated area with minimal coating failure and no significant corrosion
202	16		F-24	Pipe is wrapped at this location. The wrap has minimal corrosion noted.
203	16		F-24	This pipe support to wall attachment is completely corroded (qty 4)
204	16		F-24	This pipe support has one wall attachment and is corroded
205	16		F-24	Pit 0.050"-0.070"(UTT = 0.250" – 0.252") 15" from [redacted]
206	32		F-76	The first 6' is wrap with some as wax tape in this section. The wrap is mostly set and intermittent. Some coating failure is noted but no notable corrosion.
207	32		F-76	Approximately 8' of coating failure and minor corrosion at 6 o'clock
208	32		F-76	Pipe is mostly (70-100%) wrapped at this location
209	32		F-76	Wrap is damaged with some corrosion and spot coating repair done in the past but not 100% completed. Remove 10' of wrap and coat
210	32		F-76	Pup at this pipe support has areas of coating failure and some corrosion. Area was cleaned off in the past (see rust scale under pipe). Spot coat repair is not satisfactory.

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
[redacted]	32	[redacted]	F-76	Pipe is wrapped at this location with some minor coating failure and no significant corrosion. Note: Coat repair was only done in the front 1-6 o'clock. There is heavy coating failure and moderate corrosion between 6-12 o'clock.
212	32		F-76	Pit 0.120" at 11 o'clock (UTT = 0.298" – 0.321")
213	32		F-76	Pipe is wrapped at this location. Wrap is damaged and torn but no coating failure or corrosion noted.
214	32		F-76	Approximately 24" of coating failure and minimal corrosion at 6 o'clock near [redacted]
215	32		F-76	Approximately 24" of coating failure and minor corrosion at 6 o'clock under wrap
216	32		F-76	Pipe is wrapped at this location with some section are spot wrapped only. Wrap is mostly good with minimal damage and good adhesion.
217	32		F-76	Approximately 3' of coating failure and corrosion at 6 o'clock
218	32		F-76	Approximately 48" of coating failure and minor corrosion in no wrap section
219	32		F-76	Approximately 20" of coating failure and minor corrosion in no wrap section
220	32		F-76	Approximately 36" of coating failure and minor corrosion in no wrap section at 6-10 o'clock near [redacted] 258/guided wave
221	32		F-76	Approximately 36" of coating failure and minor corrosion in no wrap section
222	32		F-76	Pipe is spot wrapped at this location.
223	18		JP-5	Pipe has intermittent wrap at this location. Some minor damage on wrap with coating failure in spots but no significant or notable corrosion.
224	18		JP-5	Pipe is mostly (70-100%) wrapped at this location
225	18		JP-5	Pit 0.113" (UTT = 0.233" – 0.238") 17" from [redacted] 1
226	18		JP-5	Isolated area of minimal coating failure and corrosion on the pup at this location. Area was cleaned off (rust removed) in the past for UT with some spot touch up. (UTT = 0.233" – 0.250")
227	18		JP-5	Pup at this pipe support has areas of coating failure and some corrosion. Area was cleaned off in the past (see rust scale under pipe). Spot coat repair is not satisfactory.
228	18		JP-5	Pipe is wrapped at this location with some minor coating failure and no significant corrosion. Note: Coat repair was only done in the front 1-6 o'clock. There is heavy coating failure and moderate corrosion between 6-12 o'clock.
229	18		JP-5	Small section of pipe is wrapped at this location (approximately 12" near [redacted] 275) and is damaged in some sections, but no major coating failure and corrosion noted.
230	18		JP-5	Approximately 12" of coating failure and minor corrosion
231	18		JP-5	Approximately 24" of coating failure and minor corrosion
232	18		JP-5	Pipe has wrap removed and coated at this section. Some inactive pits approximately 0.060" noted.
233	18		JP-5	Approximately 12" of wrap and coating failure with corrosion near [redacted]
234	18		JP-5	Approximately 24" of coating failure and minor corrosion
235	18		JP-5	Pipe is wrapped at this location. Wrap is mostly good with minimal damage and good adhesion. Some sections are only spot wrapped.
236	18		JP-5	Isolated minor area of coating failure and corrosion at the guided wave
237	18		JP-5	Approximately 48" of coating failure and minor corrosion in no wrap section
238	18		JP-5	Approximately 24" of coating failure and minor corrosion in no wrap section at 6-10 o'clock
239	18		JP-5	Approximately 36" of coating failure and minor corrosion in no wrap section
240	18		JP-5	Approximately 24" of coating failure and minor corrosion in no wrap section

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
241	18	[redacted]	JP-5	There are small drips and stains with coating failure at 17 o'clock between near[redacted].
242	18		JP-5	Approximately 24" of coating failure and minor corrosion in no wrap section
243	18		JP-5	Pipe is spot wrapped at this location.
244	16		F-24	There is pipe penetration at the[redacted] 288 side which has approximately 36" of wax tape. There is some minor failure of the wax tape and small corrosion area. Approximately 30-40 pits were noted. Recommend to remove tape and paint.
245	16		F-24	Pipe is wrapped at this location and is mostly satisfactory with some wrap failure. Coating failure and minor corrosion noted but not significant.
246	16		F-24	Approximately 6' of wrap damage at this location. Have previously done spot coat touch up, but not 100%. Remove and recoat. No significant corrosion noted.
247	16		F-24	Approximately 5' of wrap damage at this location. Have previously done spot coat touch up, but not 100%. Remove and recoat. No significant corrosion noted.
248	16		F-24	Pup at this pipe support has areas of coating failure and some corrosion. Area was cleaned off in the past (see rust scale under pipe). Spot coat repair is not satisfactory.
249	16		F-24	Pipe is wrapped at this location with some minor coating failure and no significant corrosion. Note: Coat repair was only done in the front 1-6 o'clock. There is heavy coating failure and moderate corrosion between 6-12 o'clock.
250	16		F-24	Pipe is wrapped at this location. Approximately 10' section at[redacted] has coat. There is some damage and torn sections but no significant coating failure or corrosion was noted.
251	16		F-24	Approximately 12" of coating failure and minor corrosion (no significant pits noted)
252	16		F-24	Pipe is mostly wrapped at this location. Approximately 10' section of coating noted near[redacted] and intermittent wrap (<12' of wrap sections) between[redacted]. There is some damage to wrap but no significant coating failure or corrosion was noted.
253	16		F-24	Pipe is wrapped at this location. Wrap is fairly good with minimal damage and good adhesion to pipe.
254	16		F-24	Approximately 60" of coating failure and minor corrosion in no wrap section (no significant pits noted)
255	16		F-24	Approximately 12" of wrap is damaged and has coating failure with minor corrosion (no significant pits noted)
256	16		F-24	Approximately 36" of coating failure and minor corrosion in no wrap section near[redacted] at previous coat repair
257	16		F-24	Approximately 24" of coating failure and minor corrosion in no wrap section. This is an old coat repair spot.
258	16		F-24	Approximately 24" of coating failure and minor corrosion in no wrap section (no significant pits noted)
259	16		F-24	Small Drips and stain with coating failure at 12 o'clock near[redacted]
260	16		F-24	Pipe is wrapped at this location. Approximately 72" of wrap failure with coating failure and minor corrosion.
261	16		F-24	Pipe is wrapped at this location. Approximately 72" of wrap failure with coating failure and minor corrosion.
262	32		F-76	Pipe is wrapped at this location intermittently. There are 1 or 2 small sections of wraps with minimal peel.
263	32		F-76	Approximately 36" of coating failure and minor corrosion near BH (no significant pits noted)
264	32		F-76	Approximately 60" of coating failure and minor corrosion at[redacted]
265	32		F-76	Approximately 48" of coating failure and corrosion. This was flagged for clean and repair coat in 2010. Pit 0.050"-0.080" noted.
266	32		F-76	Approximately 36" of coating failure and minor corrosion (no significant pits noted)
267	32		F-76	Approximately 24" of coating failure and minor corrosion near[redacted] at 8-11 o'clock
268	32		F-76	Approximately 48" of coating failure with no significant corrosion (no significant pits noted)

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative	System	Description
269	32	[redacted]	F-76	Approximately 48" of coating failure with no significant corrosion (no significant pits noted) near [redacted]
270	32		F-76	Isolated area of coating failure and no corrosion at saddle (no significant pits noted)
271	32		F-76	Approximately 24" of coating failure with no significant corrosion (no significant pits noted) near [redacted]
272	32		F-76	Approximately 24" of coating failure with no significant corrosion (no significant pits noted) each at 3 locations
273	18		JP-5	Pipe is spot wrapped at this location
274	18		JP-5	Approximately 24" of coating failure and minor corrosion near BH (no significant pits noted)
275	18		JP-5	Approximately 60" of coating failure and minor corrosion at [redacted] (no significant pits noted)
276	18		JP-5	Approximately 36" of coating failure and minor corrosion near [redacted] (no significant pits noted)
277	18		JP-5	Approximately 36" of coating failure and minor corrosion near [redacted] (no significant pits noted)
278	18		JP-5	Pipe is spot wrapped at this location
279	18		JP-5	Pipe has isolated wrap at this location
280	18		JP-5	Approximately 36" of coating failure and minor corrosion (no significant pits noted) near [redacted] at 6-10 o'clock
281	18		JP-5	Approximately 48" of coating failure and no corrosion at [redacted] (no significant pits noted)
282	18		JP-5	Pipe is mostly wrapped at this location
283	18		JP-5	Approximately 24" of coating failure and no significant corrosion (no significant pits noted)
284	18		JP-5	Approximately 36" of coating failure with no significant corrosion (no significant pits noted) each at 3 locations
285	16		F-24	Pipe is spot wrapped at this location
286	16		F-24	Approximately 24" of coating failure and minor corrosion (no significant pits noted) in wrap section
287	16		F-24	Approximately 24" of coating failure and minor corrosion (no significant pits noted) in wrap section near [redacted]
288	16		F-24	Approximately 24" of coating failure and minor corrosion (no significant pits noted) in wrap section
289	16		F-24	Isolated area of coating failure and corrosion on the pup piece with pit 0.050" noted
290	16		F-24	Approximately 36" of coating failure and minor corrosion (no significant pits noted)
291	16		F-24	Approximately 24" of coating failure and minor corrosion (no significant pits noted) near [redacted]
292	16		F-24	Approximately 48" of coating failure and no corrosion (no significant pits noted)
293	16		F-24	Approximately 60" of coating failure and minor corrosion (no significant pits noted)
294	16		F-24	Approximately 24" of wrap failure with coating failure and minor corrosion (no significant pits noted) near [redacted]
295	16		F-24	Pipe is mostly wrapped at this location but no major peel or bubbles noted
296	16		F-24	Approximately 36" of wrap failure with coating failure and minor corrosion (no significant pits noted)
297	16		F-24	Approximately 36" of coating failure with no corrosion (no significant pits noted) each at 3 locations
298	16		F-24	Approximately 72" of coating failure and corrosion (no significant pits noted)
299	16		F-24	Approximately 24" of coating failure and corrosion (no significant pits noted)
300	32		F-76	Pipe is wrapped at 1 or 2 spots at this location
301	32		F-76	3 small pits at 3 o'clock all <0.060"
302	18		JP-5	Pipe is wrapped at 1 or 2 spots at this location
303	16		F-24	Pipe is wrapped at 1 or 2 spots at this location
304	32		F-76	Pipe is coated only with one wrap at this location

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
305	32	[redacted]	F-76	Approximately 60" of coating failure and moderate corrosion (no significant pits noted) at 5-10 o'clock
306	32		F-76	Approximately 24" of coating failure and corrosion (no significant pits noted) at 7-10 o'clock
307	32		F-76	Approximately 12" of coating failure and corrosion (no significant pits noted) at 6 o'clock
308	32		F-76	Pipe is spot wrapped at this location
309	32		F-76	Approximately 60" of coating failure and corrosion (no significant pits noted) at 11-6 o'clock
310	32		F-76	Approximately 24" of coating failure and minor corrosion (no significant pits noted) at 6-12 o'clock
311	32		F-76	Approximately 36" of coating failure and minor corrosion (no significant pits noted) at 6-8 o'clock
312	32		F-76	Approximately 36" of coating failure and minor corrosion (no significant pits noted) at 6-10 o'clock
313	32		F-76	Pipe is wrapped at this location
314	18		JP-5	Pipe is coated only with one wrap at this location
315	18		JP-5	Approximately 24" of coating failure and corrosion (no significant pits noted) at 360 o'clock
316	18		JP-5	Pipe is spot wrapped at this location
317	18		JP-5	Isolated area of coating failure and minor corrosion (no significant pits noted) at 6 o'clock
318	18		JP-5	Approximately 36" of coating failure and minor corrosion (no significant pits noted) at 6-12 o'clock
319	18		JP-5	Pipe is wrapped at this location
320	18		JP-5	Pipe is wrapped at this location. There is wrap failure and coating failure with minor corrosion
321	16		F-24	Pipe is coated only with one wrap at this location
322	16		F-24	Isolated area of minor coating failure and corrosion at door wall pen, approximately 6" from the wall
323	16		F-24	Approximately 60" of coating failure and corrosion (no significant pits noted) at 360 o'clock
324	16		F-24	Pipe is spot wrapped at this location
325	16		F-24	Pipe is wrapped at this location
326	16		F-24	Isolated minor area of coating failure and corrosion (no significant pits noted)
327	32		F-76	Approximately 32" of coating failure and minor corrosion (no significant pits noted) at 90-60 o'clock
328	32		F-76	Isolated areas of coating failure with minor corrosion (no significant pits noted) at 3 locations 6-10 o'clock
329	32		F-76	Approximately 12" of coating failure with minor corrosion (no significant pits noted) at 60-90 o'clock at guided wave
330	32		F-76	Approximately 12" of coating failure (no corrosion or significant pits noted) at 6-8 o'clock
331	32		F-76	Approximately 36" of coating failure with minor corrosion (no significant pits noted) at 6-9 o'clock
332	32		F-76	Approximately 24" of coating failure with minor corrosion (no significant pits noted) at 7-9 o'clock
333	32		F-76	Approximately 36" wrap failed at this location with coating failure and minor corrosion at 6-9 o'clock near [redacted]
334	32		F-76	Approximately 36" of wrap failed at this location with coating failure and corrosion at 6-12 o'clock
335	32		F-76	Approximately 12" of coating failure (no corrosion or significant pits noted) at 6-3 o'clock near [redacted]
336	32		F-76	Approximately 24" of coating failure with minor corrosion (no significant pits noted) at 6-9 o'clock near [redacted]
337	32		F-76	Approximately 24" of wrap failed at this location with coating failure and corrosion at 6 o'clock near saddle
338	32		F-76	Approximately 36" of wrap failed at this location with coating failure and minor corrosion at 6-9 o'clock
339	32		F-76	Approximately 36" of wrap failed at this location with coating failure and corrosion 0.369"-0.384" at 6-9 o'clock
340	32		F-76	Approximately 36" of wrap failed at this location with coating failure and unknown severity of corrosion at 6 o'clock near saddle

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
341	18	[redacted]	JP-5	Pipe is spot wrapped at this location
342	18		JP-5	Approximately 24" of coating failure (no corrosion or significant pits noted) at 6-8 o'clock
343	18		JP-5	Approximately 18" of wrap failed at this location with coating failure and corrosion at 6 o'clock with 0.050"-0.080" pits noted
344	18		JP-5	Approximately 12" of coating failure (no corrosion or significant pits noted) at 6 o'clock near [redacted] 0
345	18		JP-5	Approximately 24" of coating failure (no significant corrosion or pits noted) at 6-9 o'clock
346	16		F-24	Approximately 12" of coating failure (no corrosion or significant pits noted)
347	16		F-24	Approximately 36" of coating failure with minor corrosion (no significant pits noted) near [redacted]
348	16		F-24	Approximately 24" of wrap failed at this location with coating failure and minor corrosion at 6-10 o'clock
349	16		F-24	Approximately 24" of wrap failed at this location with coating failure and minor corrosion at 6-8 o'clock
350	16		F-24	There is coating failure and corrosion noted at BH concrete penetration. Note some concrete spalling also noted at the BH penetration
351	32		F-76	Isolated area of moderate coating failure and minor corrosion 0.020"-0.080" at 6-10 o'clock
352	18		JP-5	Approximately 24" of coating failure with minor corrosion (no significant pits noted) each at 2 locations
353	18		JP-5	Approximately 36" of coating failure with no significant corrosion (no significant pits noted)
354	18		JP-5	Approximately 24" of wrap failed at this location with corrosion near [redacted] Recommend to remove wrap.
355	16		F-24	Isolated area of moderate coating failure (no corrosion of pits noted)
356	16		F-24	Isolated area of moderate wrap failure with coating failure and corrosion
357	16		F-24	Approximately 30" of coating failure with minor corrosion (no significant pits noted) each at 2 locations
358	16		F-24	Approximately 36" of coating failure with no significant corrosion (no significant pits noted) near [redacted]
359	16		F-24	Approximately 36" of coating failure with no significant corrosion (no significant pits noted) past [redacted]
360	32		F-76	Pipe is spot wrapped at a couple of spots in this location. No significant wrap failure noted.
361	32		F-76	Isolated area of wrap failure near BH with some minor corrosion 0.050"-0.080" at 12-6 o'clock
362	32		F-76	Isolated area of coating failure with no significant corrosion at saddle #36, 8-11 o'clock due to water drip
363	32		F-76	Isolated area of coating failure with no significant corrosion at 7-11 o'clock
364	32		F-76	Pipe is spot wrapped 60-70% in this location
365	32		F-76	Approximately 24" of coating failure (no corrosion or significant pits noted) at 6-10 o'clock
366	32		F-76	Approximately 36" of coating failure with minor corrosion (no significant pits noted) at 6-11 o'clock due to wrap failure
367	32		F-76	Approximately 24" of wrap failure with coating failure and minor corrosion (no significant pits noted) at 6-10 o'clock
368	32		F-76	Approximately 24" of wrap failure with coating failure (no corrosion or significant pits noted) at 6-9 o'clock
369	18		JP-5	Approximately 24" coating failure and no significant corrosion (no significant pits noted) at about the halfway point
370	18		JP-5	Pipe is spot wrapped 60-70% in this location
371	18		JP-5	Approximately 36" of coating failure with minor corrosion (no significant pits noted) at 6-10 o'clock due to wrap failure
372	18		JP-5	Approximately 36" of coating failure (no corrosion pits noted) at 6-10 o'clock
373	18		JP-5	Isolated area of coating failure (no corrosion or significant pits noted) at 12-6 o'clock

Table H – Coating failure and corrosion (cont.)

Item #	NPS	Relative Location	System	Description
374	18	[redacted]	JP-5	Approximately 24" coating failure (no corrosion or significant pits noted) at 12-6 o'clock
375	16		F-24	Approximately 24" of coating failure with no significant corrosion (no significant pits noted) near[redacted]
376	16		F-24	Approximately 24" of coating failure with no significant corrosion (no significant pits noted) at about the halfway point
377	16		F-24	Pipe is spot wrapped 40-50% in this location
378	16		F-24	Approximately 48" of coating failure with minor corrosion (no significant pits noted)
379	16		F-24	Approximately 36" coating failure (no corrosion or significant pits noted)
380	16		F-24	Approximately 24" coating failure with minor corrosion (no significant pits noted) at 6-9 o'clock
381	16		F-24	Approximately 14" coating failure with minor corrosion (no significant pits noted) at 6-12 o'clock
382	32		F-76	Approximately 36" of wrap failure with coating failure and minor corrosion (no significant pits noted) at 6-10 o'clock
383	32		F-76	Isolated area of wrap failure with coating failure and minor corrosion and inactive pitting 0.060"-0.080" at 6-8 o'clock
384	32		F-76	Isolated area of wrap failure at 6 o'clock after saddle #15 and corrosion severity unknown
385	32		F-76	Isolated area of coating failure with minor corrosion at 6-10 o'clock
386	32		F-76	Pipe is spot wrapped 50-70% in this location
387	18		JP-5	Approximately 24" of wrap failure with coating failure and minor corrosion (no significant pits noted)
388	18		JP-5	Approximately 24" of wrap failure with coating failure and (no corrosion or significant pits noted) at 8-12 o'clock
389	18		JP-5	Isolated area of coating failure (no corrosion or significant pits noted)
390	18		JP-5	Isolated area of coating failure (no corrosion or significant pits noted) at 6 o'clock
391	18		JP-5	Isolated area of a wrap failure
392	18		JP-5	Pipe is spot wrapped 50-60% in this location
393	16		F-24	Pipe is spot wrapped 30-40% in this location
394	16		F-24	Approximately 24" of wrap failure with coating failure (no corrosion or significant pits noted) at 6-12 o'clock
395	16		F-24	Approximately 24" of wrap failure with coating failure (no corrosion or significant pits noted) at 6-10 o'clock
396	16		F-24	Isolated area of a wrap failure
397	16		F-24	Isolated area of wrap failure with coating failure and minor corrosion (no significant pits noted)
398	16		F-24	Isolated area of corrosion on pipe sleeve weld 2" HPV and LPV before flange
399	32		F-76	Approximately 6' of coating failure (no corrosion or significant pits noted)
400	18		JP-5	BH Pipe Penetration has pitting 0.026"-0.046" at 1-4 o'clock (UTT = 0.231" – 0.240")
401	18		JP-5	Isolated area of coating failure (no corrosion or significant pits noted)
402	NA		F-76 JP-5 F-24	The coating on the UGPH piping is mostly in satisfactory condition with minor isolated coating failure noted on segments of piping below the grating. One location of moderate coating failure and pitting (0.050-0.070) noted on[redacted] line just before ball valve #232E4. Some coating failure and inactive pitting was noted on the flange, dresser coupling and appurtenances. Some discoloration due to staining also noted on segments of UGPH piping.
403	NA		F-76 JP-5 F-24	The coating at the tank gallery is in satisfactory condition with very minor isolated coating failure. Most of the coating failures were localized due to contact type abrasion damage or location were ceiling material is dripping on the pipe. Locations with material drips from the ceiling did not have any significant coating failure. Specific locations of coating failures and corrosion areas on the pipe and support are listed in Table D and E.

Table H – Coating failure and corrosion (cont.)				
Item #	**NPS**	**Relative Location**	**System**	**Description**
404	NA	[redacted]	F-76 JP-5 F-24	The coating at the surge tank is in satisfactory condition with very minor isolated coating failure. There were no areas of corrosion noted due to coating failure at the surge tank. Majority of the coating damage is due to impact (nick and scratches) from resent tank cleaning and inspection staging. There are several equipment staged in surge tank area. There is one location on [redacted] 2 line that was prepared for coating touch up (section taped off with blue masking tape) but not completed.

**All clock positions are given facing U[redacted] (flow path towards U[redacted]*
*** BH = Bulkhead*

4.2. Maintenance Recommendations

Refer to Table D to identify areas of correction required to assure longevity of piping systems. Some general deficiencies and preventive maintenances are highlighted below:

4.2.1 Periodically inspect and maintain all above ground piping and appurtenances per requirements outlined in UFC 3-460-03.

4.2.2 There are minor to moderate coating failures noted on carbon steel pipes, flanges, appurtenances, and hardware. Repair coating per UFC 3-460-03.

4.2.3 Repair the pipe supports; consider installing thermoplastic spacers, shims, or half round (I-Rod) type supports to help reduce metal/metal contact and prevent crevice corrosion.

4.2.4 Report all segments of piping where excessive vibration and swaying are noted during operation for a follow-up inspection per API STD 570.

4.3. Compliance Requirements

Refer to Table D to identify areas of correction required to assure longevity of piping systems.

4.3.1 All deficiencies with a mandatory color code should be repaired as soon as practical or before the piping is returned back to normal operating service.

5.0 Serviceability and Schedule

The piping systems covered by this report are certified for continued normal service contingent on the completion of the mandatory items identified in Table D. See requirements noted in Section 4.3. This certification is based on the data recorded, the engineering analysis and recommendations presented in the body of this report, and no change to the piping products or service. This certification is in accordance with API-570. This is a baseline assessment of the facility piping, and inspection and testing should be ongoing. This report classifies the piping systems as Class 1 in accordance with API-570.

5.1.1 The next formal visual inspection should be conducted by an API-570 inspector by May, 2027 (every five years for Class 1 piping).

5.1.2 The next ultrasonic thickness evaluation should be conducted by an API-570 inspector by May, 2027 (every five years for Class 1 piping).

5.1.3 The following owner/user inspection schedule is added to aid in the integrity of the facility pipeline and may be accomplished by facility personnel or outside contractor.

5.1.3.1 Visual inspection by maintenance personnel. (Daily)
5.1.3.2 Visual inspection with log/checklist by maintenance personnel. (Monthly)
5.1.3.3 Inspect exterior coatings by maintenance personnel. (Semi-Annually)
5.1.3.4 Thermal Relief Valve (TRV) inspection and testing by maintenance personnel (Annually).
5.1.3.5 Low Point Drains (LPDs) exercising by maintenance personnel (including dead legs when present).

Annex A
Phased Array Ultrasonic and Guided Wave Results

1. Phased Array Ultrasonic Testing Results
2. Guided Wave Results

[redacted]

Annex 1

Results of the Ultrasonic Phased Array Ultrasonic Testing Conducted

A.1.1 Executive Summary

Phased Array Ultrasonic Testing (PAUT) of selected welds were conducted under this project. The PAUT condition monitoring locations (CMLs) were selected based on pipe movement and anticipated/potential exposure of shear and bend stress due to operating conditions. The purpose of this PAUT weld examination was to detect any service induced defects such as cracking or erosion/corrosion that may be present in selected welds and heat affected zones. Welds selected are intended to be a representative sample of facility piping and selected based on areas that could see higher than normal stress due to pipe movement, cyclic stresses, or boundary restraints (sections between anchor points). The primary focus of the PAUT weld examination was the circumferential welds, but select abutting longitudinal welds were also examined for completeness when possible. The original welding flaws were considered non-relevant (unless gross weld flaw was detected) for this inspection since there is satisfactory service history. A combination of manual and semi-automated PAUT was performed and results documented. The PAUT data indicated there was no service induced defects on all tested welds. Eight-six locations (86) were completed throughout the facility.

The PAUT condition monitoring locations are documented in the tables in Annex 1 and shown in Appendix C (Drawings).

Project included removal of lead-based paint at 86 locations to support the PAUT weld examinations. PAUT weld examination locations also required surface preparation (weld spatter filling) to ensure adequate coupling to aid the transmission of ultrasonic energy. Locations where the coating was removed for the PAUT testing were restored with a Kem Kromik Universal Metal Primer.

A.1.2 Introduction and Background:

This annex presents the work carried out and an analysis of data collected during the PAUT inspection conducted from April 19, 2022 through May 12, 2022 at Joint Base Pearl Harbor Hickam; Hawaii, under contract for Austin Brockenbrough & Associates LLC. The inspection was performed by a certified PAUT Level III technician. The testing was conducted by a teaming partner from Engineering & Inspection Hawaii, Inc (E&I Inc) under the supervision of a certified weld inspector from InterSpec, LLC.

A.1.3 Test Procedure:

PAUT techniques are used for identification of discontinuities in welds and heat affected zones (HAZs). The sound beam enters the area of the weld at an angle. If the sound reflects from a discontinuity, a portion of the sound beam returns to the receiver where it is displayed on the ultrasonic instrument. PAUT is conducted using manual, semi-auto or fully automated scanning using probes consisting of various piezoelectric elements that are pulsed individually to create the phased aspect of the signal generation.

Daily calibration using a test block containing side dried holes are performed prior to and at the completion of an examination at the end of the day.

Approximately six-[redacted] of the coating on either side of the weld were removed and surface prepared accordance with the written procedure. Both longitudinal and transverse scans were completed at each weld unless limited by the geometrical features of the pipe weld. A full circumferential scan was completed unless access was limited at the weld by adjacent pipes, ventilation ducting, conduits, etc.

[redacted]

PAUT was conducted per ASME Section V, Article 4, Ultrasonic Examination Methods for Welds, 2015 edition. Results of the PAUT is included in this Annex.

[redacted]

Table I - PAUT Evaluation Summary Table

CML ID	Area	Line	Location	NPS	Weld Type	Coating Removed	CML Label	HAZ Cleaned	PAUT Done	Restored	Result*
ST3	Surge Tank	F-76	[redacted]	[redacted]	W	X	X	X	X	X	Satisfactory
ST2	Surge Tank	F-24			W	X	X	X	X	X	Satisfactory
ST1	Surge Tank	F-76			W	X	X	X	X	X	Satisfactory
2B	UGPH	JP-5			W	X	X	X	X	X	Satisfactory
3B	UGPH	F-24			W	X	X	X	X	X	Satisfactory
4B	UGPH	F-76			W	X	X	X	X	X	Satisfactory
5B	UGPH	JP-5			W	X	X	X	X	X	Satisfactory
1A	UGPH	F-76			W**	X	X	X	X	X	Satisfactory
2A	UGPH	JP-5			W	X	X	X	X	X	Satisfactory
3A	UGPH	F-24			W	X	X	X	X	X	Satisfactory
5A	UGPH	JP-5			W	X	X	X	X	X	Satisfactory
6A	UGPH	F-24			W	X	X	X	X	X	Satisfactory
D1	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
D2	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
D3	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
D5	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
C1	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
C2	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
C3	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
C4	Tank Gallery	F-76			W	X	X	X	X	X	Satisfactory
B1	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
B2	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
B3	Tank Gallery	JP-5			W	X	X	NA	X	X	Satisfactory
B4	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
B5	Tank Gallery	F-76			W	X	X	NA	X	X	Satisfactory
A1	Tank Gallery	F-24			W	X	X	NA	X	X	Satisfactory
A3	Tank Gallery	F-24			W	X	X	NA	X	X	Satisfactory
A4	Tank Gallery	F-24			W	X	X	NA	X	X	Satisfactory
A5	Tank Gallery	F-24			W	X	X	NA	X	X	Satisfactory

[redacted]

[redacted]

Table I - PAUT Evaluation Summary Table (Cont.)

CML ID	Area	Line	Location	NPS	Weld Type	Coating Removed	CML Label	HAZ Cleaned	PAUT Done	Restored	Result*
[redacted]		F-24	[redacted]	[redacted]	BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			MW	X	X	X	X	X	Satisfactory
		JP-5			MW	X	X	X	X	X	Satisfactory
		F-76			MW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory

[redacted]

[redacted]

Table I - PAUT Evaluation Summary Table (Cont.)

CML ID	Area	Line	Location	NPS	Weld Type	Coating Removed	CML Label	HAZ Cleaned	PAUT Done	Restored	Result*
[redacted]		JP-5	[redacted]	(b) (3) (A)	BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			W	X	X	X	X	X	Satisfactory
		F-24			MW	X	X	X	X	X	Satisfactory
		JP-5			MW	X	X	X	X	X	Satisfactory
		F-76			MW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			BBW	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			W	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			W	X	X	X	X	X	Satisfactory
		F-24			BBW	X	X	X	X	X	Satisfactory
		JP-5			BBW	X	X	X	X	X	Satisfactory
		F-76			W	X	X	X	X	X	Satisfactory
		F-24			MW	X	X	X	X	X	Satisfactory
		JP-5			MW	X	X	X	X	X	Satisfactory
		F-76			MW	X	X	X	X	X	Satisfactory

* The purpose of this PAUT weld examination was to detect any service induced defects such as cracking or erosion/corrosion. The original welding flaws were considered non-relevant for this inspection since there is satisfactory service history. However, any gross original weld flaw would be flagged when identified.

** Partial weld Girth and seam weld

[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII. INC.

Safety • Quality • Integrity • Reliability

Inspection Date: April 19th through May 12th, 2022

Red Hill, PAUT of Piping Butt Welds

No service induced defects detected at time of inspection.

SCOPE

Engineering & Inspections Hawaii, conducted manual and semi-automated Phased Array Ultrasonic Testing (PAUT) examinations for Interspec at the Red Hill facility in Aiea, HI on April 19th through May 12th, 2022. The purpose of this examination was to detect any service induced defects such cracking or erosion/corrosion that may be present in selected welds and heat affected zones. Original welding flaws were considered non-relevant for this inspection. Examples of typical original welding flaws found during this inspection are included in Appendix A at the end of this report.

If you have any questions regarding this matter or require any additional information, please do not hesitate to contact J(b) (6) [redacted]

[redacted]

(b) (6) [redacted]

[redacted]

API-QUTE
API-570
AWS CWI
Engineering & Inspections Hawaii, Inc

P. O. Box 700217 • Kapolei, HI 96709-0217 • Tel: (808) 682-1667 • Fax: (808) 682-1834 • E-Mail: E I Hawaii@aol.com

[redacted]

TECHNIQUE

Welds with a wall thickness of 0.375 or greater were scanned with a 5MHz linear array probe using 32 active elements to produce a sectorial scan utilizing shear waves from 45° to 70° focused at 1.5x the pipe thickness.

Welds with a wall thickness of 0.250 or less were scanned with a 5MHz linear array probe using 16 active elements to produce a sectorial scan utilizing shear waves from 43° to 70° focused at 1.5x the pipe thickness.

The client had coating removed and scanning surfaces manually filed smooth to remove weld spatter and ensure adequate coupling to aid the transmission of ultrasonic energy.

All welds in the Surge Tank and Galley areas were accessible and encoded. All welds in the Pump House and Harbor Tunnel areas had limitations which did not allow for encoding and were manually scanned instead.

CALIBRATION

Wedge delay calibration
Steel NAVSHIPS calibration standard (S/N: 03-8269) with 3/64” side drilled holes.
Sensitivity and TCG calibration
Steel NAVSHIPS calibration standard (S/N: 03-8269) with 3/64” side drilled holes.

INSPECTION RESULTS

Specification: ASME Section V
Procedure: NDT-005.6, Rev. A
Acceptance: Client Information Only. Report all service induced defects.

Description	Results
ST1	No service induced defect indications detected
ST2	No service induced defect indications detected
ST3	No service induced defect indications detected
2B	No service induced defect indications detected
3B	No service induced defect indications detected
4B	No service induced defect indications detected
5B	No service induced defect indications detected
1A	No service induced defect indications detected
2A	No service induced defect indications detected
3A	No service induced defect indications detected
5A	No service induced defect indications detected
6A	No service induced defect indications detected

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT1	No service induced defect indications detected
HT2	No service induced defect indications detected
HT3	No service induced defect indications detected
HT4	No service induced defect indications detected
HT5	No service induced defect indications detected
HT6	No service induced defect indications detected
HT7	No service induced defect indications detected
HT8	No service induced defect indications detected
HT9	No service induced defect indications detected
HT10	No service induced defect indications detected
HT11	No service induced defect indications detected
HT12	No service induced defect indications detected
HT13	No service induced defect indications detected
HT14	No service induced defect indications detected
HT15	No service induced defect indications detected
HT16	No service induced defect indications detected
HT17	No service induced defect indications detected
HT18	No service induced defect indications detected
HT19	No service induced defect indications detected
HT20	No service induced defect indications detected
HT21	No service induced defect indications detected
HT22	No service induced defect indications detected
HT23	No service induced defect indications detected
HT24	No service induced defect indications detected
HT25	No service induced defect indications detected
HT26	No service induced defect indications detected
HT27	No service induced defect indications detected
HT28	No service induced defect indications detected
HT29	No service induced defect indications detected
HT30	No service induced defect indications detected
HT31	No service induced defect indications detected
HT32	No service induced defect indications detected
HT33	No service induced defect indications detected
HT34	No service induced defect indications detected
HT35	No service induced defect indications detected
HT36	No service induced defect indications detected
HT37	No service induced defect indications detected
HT38	No service induced defect indications detected
HT39	No service induced defect indications detected

[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT40	No service induced defect indications detected
HT41	No service induced defect indications detected
HT42	No service induced defect indications detected
HT43	No service induced defect indications detected
HT44	No service induced defect indications detected
HT45	No service induced defect indications detected
HT46	No service induced defect indications detected
HT47	No service induced defect indications detected
HT48	No service induced defect indications detected
HT49	No service induced defect indications detected
HT50	No service induced defect indications detected
HT51	No service induced defect indications detected
HT52	No service induced defect indications detected
HT53	No service induced defect indications detected
HT54	No service induced defect indications detected
HT55	No service induced defect indications detected
HT56	No service induced defect indications detected
HT57	No service induced defect indications detected
A1	No service induced defect indications detected
A3	No service induced defect indications detected
A4	No service induced defect indications detected
A5	No service induced defect indications detected
B1	No service induced defect indications detected
B2	No service induced defect indications detected
B3	No service induced defect indications detected
B4	No service induced defect indications detected
B5	No service induced defect indications detected
C1	No service induced defect indications detected
C2	No service induced defect indications detected
C3	No service induced defect indications detected
C4	No service induced defect indications detected
D1	No service induced defect indications detected
D2	No service induced defect indications detected
D3	No service induced defect indications detected
D5	No service induced defect indications detected

**Original welding flaws were considered non-relevant to this inspection. Examples of typical original welding flaws found during this inspection are included in Appendix A at the end of this report.*

[redacted]

Engineering [redacted] Inspections Hawaii
91-515 Nukuawa St. Kapolei, HI 96707
(808) 682-1667

Project

Client	**Interspec**	Contact	[redacted]		
Project	**Red hill piping**	Location	**Red Hill, Aeia, HI**		
Project No.	**22-131**	Inspector Name	[redacted]		
Inspection No.	**220419-PAUT-RH**	Inspector Licence	**ASNT UT level III**	Total pages	**3**
Description	**PAUT examination of piping butt welds wall thickness approx 0.375 +**				

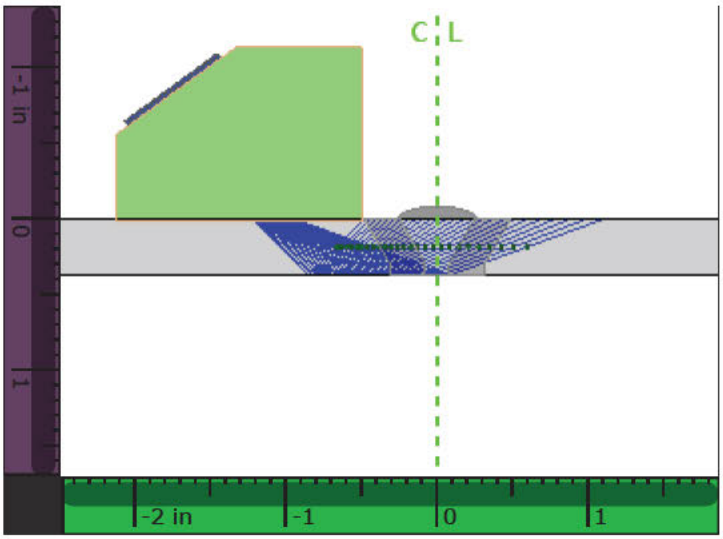
Instrument Specifications

Instrument	**OmniScan X3**	Data File Name	**220507-RH-D1-090.odat**
Instrument Serial	**QC-0075896**		
Software Version	**OmniPC 5.6.0**		
Inspection Version	**5.6.0.2057**		
Model	**OMNIX3-PA32128PR**		

OLYMPUS omniscan X3

Part & Weld

Material	**Steel, Mild**	Fill Height	**0.000 in**
Geometry	**Pipe**	Fill Angle	**0.0 °**
Thickness	**0.375 in**	Hot-Pass Height	**0.296 in**
Outside Diameter	**12.750 in**	Hot-Pass Angle	**30.0 °**
Weld Type	**V Offset**	Land Height	**0.079 in**
Symmetry Type	**Symmetric**	Land Offset	**0.079 in**
		Root Height	**0.000 in**
		Root Angle	**0.0 °**
		Haz Width	**0.236 in**
		Cap Height	**0.079 in**
		Cap Width	**0.259 in**



Inspection Summary

No service induced flaw indications detected.

Inspector Signature [redacted]

Certified

Engineering & Inspections Hawaii
91-515 Nukuawa St. Kapolei, HI 96707

Scan Area

Scan Start	**0.00 in**
Scan End	**65.00 in**
Scan Resolution	**0.04 in**
Max. Speed	**5 in/s**

Scan Encoder	
Encoder Type	**Quadrature**
Encoder Resolution	**304.80 step/in.**
Polarity	**Normal**
Input	**1**

Inspection and Environment Context Notes

[Click/Tap to edit]

PA-1

Probe Characteristics

Probe Model	**5L32-A11**	Scan Offset	**0.000 in**
Serial	**_1**	Index Offset	**-0.500 in**
Frequency	**5.0 MHz**	Probe Skew	**90.0 °**
Probe Aperture	**32**		
Wedge Model	**SA11-N55S 5L3**		
Fill Angle	**36.1 °**		

Setup

Group: **GR-1**

Type	**PA**	Averaging Factor	**1**	Gain	**27.8 dB**
Beam Delay	**22.79 µs**	Compression	**4**	Mode	**PE (Pulse-Echo)**
Start True Depth	**0.250 in**	Effect. Digit. Frequency	**100 MHz**	Video Filter	**Off**
Wave Type	**Shear**	Net Digit. Frequency	**25 MHz**	Range True Depth	**0.832 in**
Rectification	**Absolute**	Velocity	**0.1276 in/µs**	Acq. Rate	**120.0 Hz**
Filter	**BP 5.25 MHz**	Pulse Width	**100.0 ns**	Voltage	**40.00 V**

Gates	Start	Width	Treshold	Synchro	Peak Selection
A	0.200 in	0.591 in	15 %	Pulse	Highest

TCG Point Number	Position True Depth	Gain	TCG Point Number	Position True Depth	Gain
1	0.000 in	0.0 dB	2	0.749 in	2.7 dB

Calculator

Law Configuration	**Sectorial**	Element Step	**-**	Angle Resolution	**1.0 °**
Element Qty Used	**32**	Start Angle	**45.0 °**	Focus	**0.563 in**
First Element	**1**	Stop Angle	**70.0 °**	Focusing Type	**True Depth**
Beam Skew	**0°**	Last Element	**32**		

Engineering [redacted] Inspections Hawaii
91-515 Nukuawa St. Kapolei, HI 96707
(808) 682-1667

Project

Client	**Interspec**	Contact	[redacted]		
Project	**Red hill piping**	Location	**Red Hill, Aeia, HI**		
Project No.	**22-131**	Inspector Name	[redacted]		
Inspection No.	**220419-PAUT-RH**	Inspector Licence	**ASNT UT level III**	Total pages	**3**
Description	**PAUT examination of piping butt welds wall thickness approx 0.250"**				

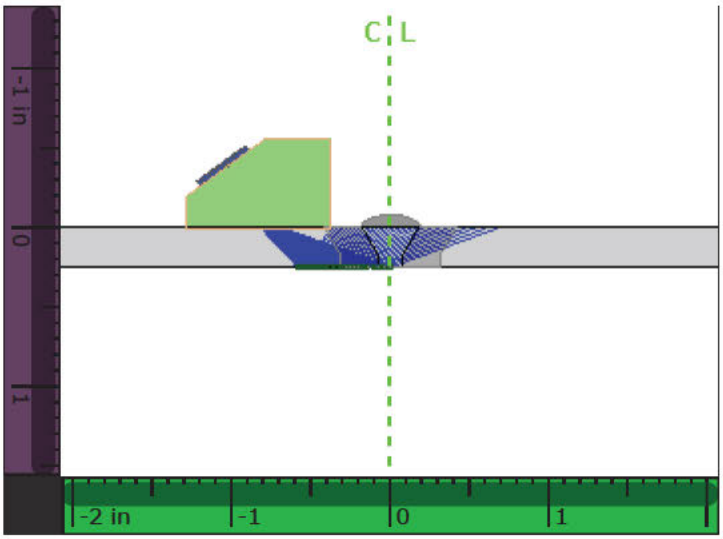
Instrument Specifications

Instrument	**OmniScan X3**	Data File Name	**220422-RH-HT9.odat**
Instrument Serial	**QC-0075896**		
Software Version	**OmniPC 5.6.0**		
Inspection Version	**5.6.0.2057**		
Model	**OMNIX3-PA32128PR**		

OLYMPUS omniscan X3

Part & Weld

Material	**Steel, Mild**	Fill Height	**0.000 in**
Geometry	**Pipe**	Fill Angle	**0.0 °**
Thickness	**0.250 in**	Hot-Pass Height	**0.171 in**
Outside Diameter	**18.000 in**	Hot-Pass Angle	**30.0 °**
Weld Type	**V Offset**	Land Height	**0.079 in**
Symmetry Type	**Symmetric**	Land Offset	**0.079 in**
		Root Height	**0.000 in**
		Root Angle	**0.0 °**
		Haz Width	**0.236 in**
		Cap Height	**0.079 in**
		Cap Width	**0.187 in**



Inspection Summary

No service induced flaw indications detected.

Inspector Signature [redacted]

Certified

Scan Area

Scan Start	**0.00 in**
Scan End	**62.20 in**
Scan Resolution	**0.04 in**

Inspection and Environment Context Notes

[Click/Tap to edit]

PA-1

Probe Characteristics

Probe Model	**5L16-A10**	Scan Offset	**0.000 in**
Serial	**_1**	Index Offset	**-0.375 in**
Frequency	**5.0 MHz**	Probe Skew	**90.0 °**
Probe Aperture	**16**		
Wedge Model	**SA10-N55S 5L1**		
Fill Angle	**36.1 °**		

Setup

Group: **GR-1**

Type	**PA**	Averaging Factor	**1**	Gain	**24.5 dB**
Beam Delay	**8.88 µs**	Compression	**3**	Mode	**PE (Pulse-Echo)**
Start True Depth	**0.100 in**	Effect. Digit. Frequency	**100 MHz**	Video Filter	**Off**
Wave Type	**Shear**	Net Digit. Frequency	**33 MHz**	Range True Depth	**0.700 in**
Rectification	**Absolute**	Velocity	**0.1276 in/µs**	Acq. Rate	**120.0 Hz**
Filter	**BP 5.25 MHz**	Pulse Width	**100.0 ns**	Voltage	**40.00 V**

Gates	Start	Width	Treshold	Synchro	Peak Selection
A	0.120 in	0.400 in	15 %	Pulse	Highest

TCG Point Number	Position True Depth	Gain	TCG Point Number	Position True Depth	Gain
1	0.000 in	0.0 dB			

Calculator

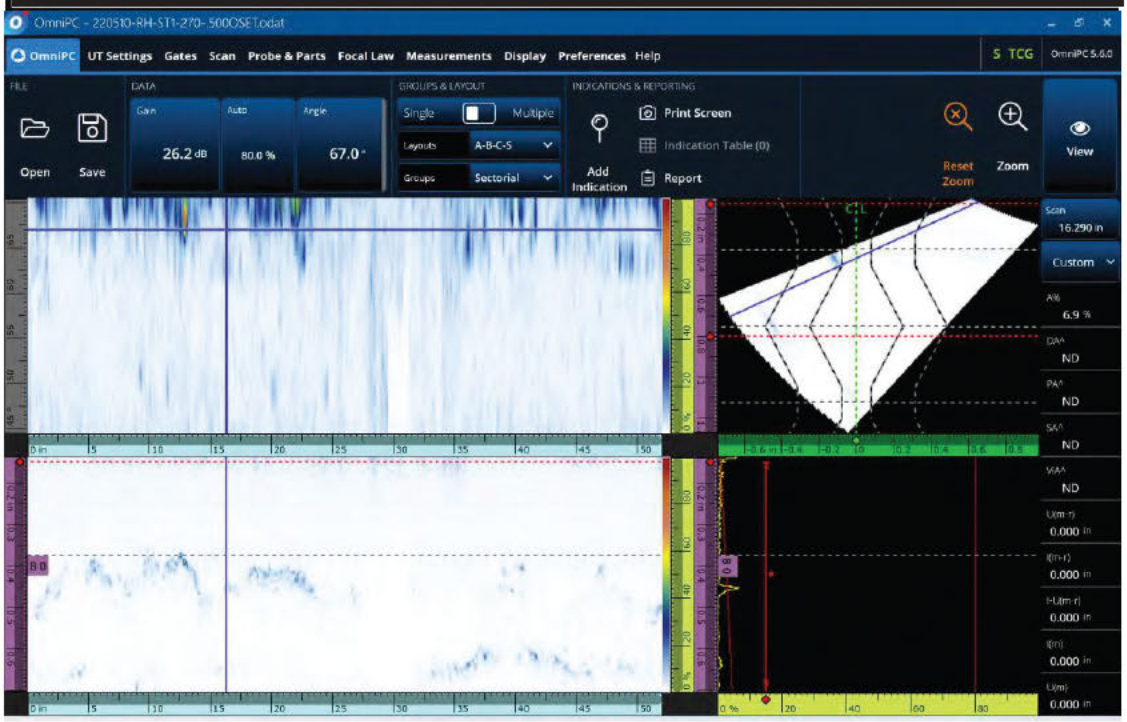
Law Configuration	**Sectorial**	Element Step	**-**	Angle Resolution	**1.0 °**
Element Qty Used	**16**	Start Angle	**43.0 °**	Focus	**0.250 in**
First Element	**1**	Stop Angle	**70.0 °**	Focusing Type	**True Depth**
Beam Skew	**0°**	Last Element	**16**		

[redacted]

ENGINEERING & INSPECTIONS HAWAII

ST1 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

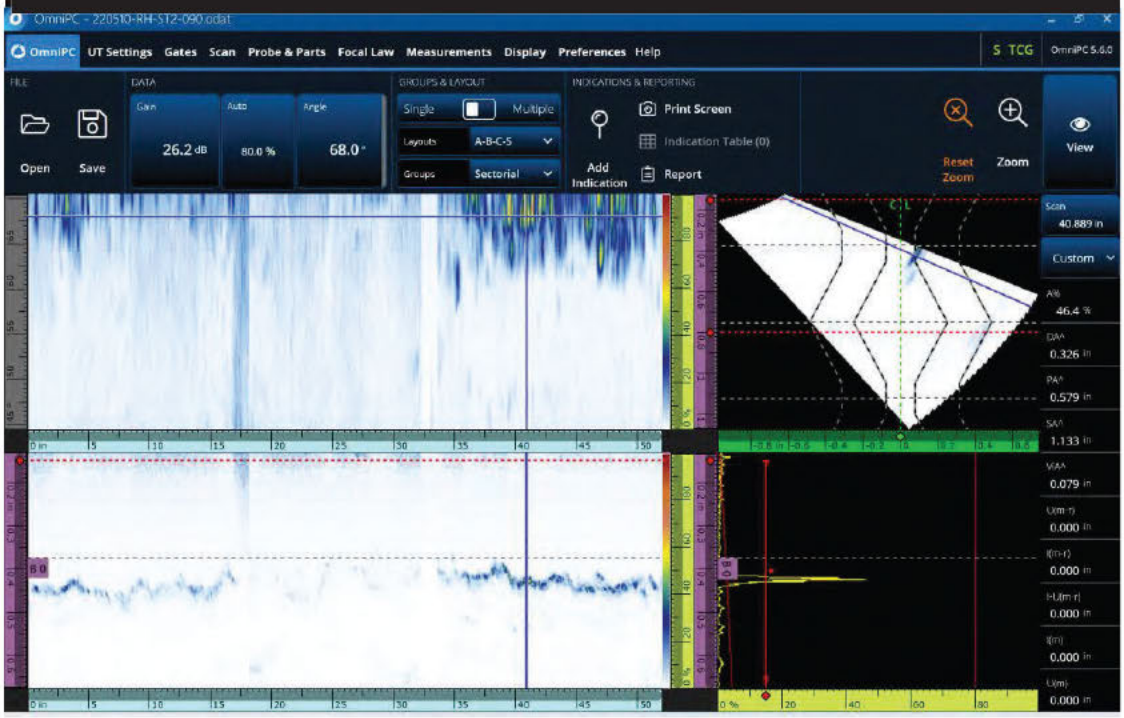
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

ST2 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

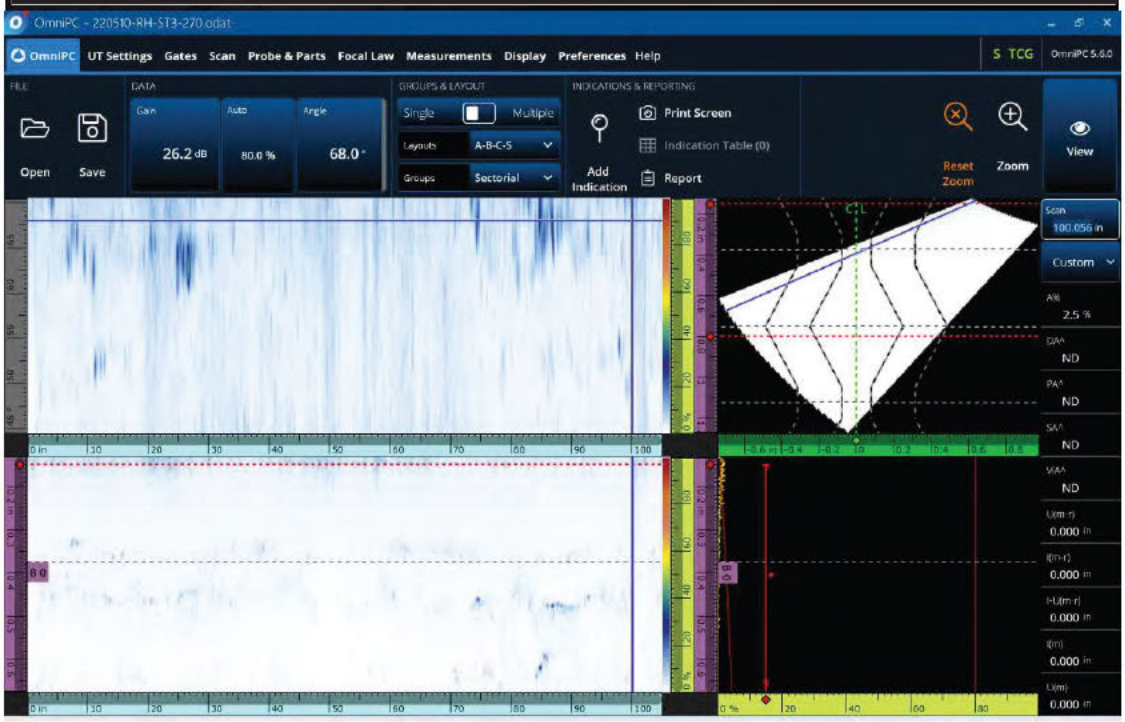
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

ST3 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

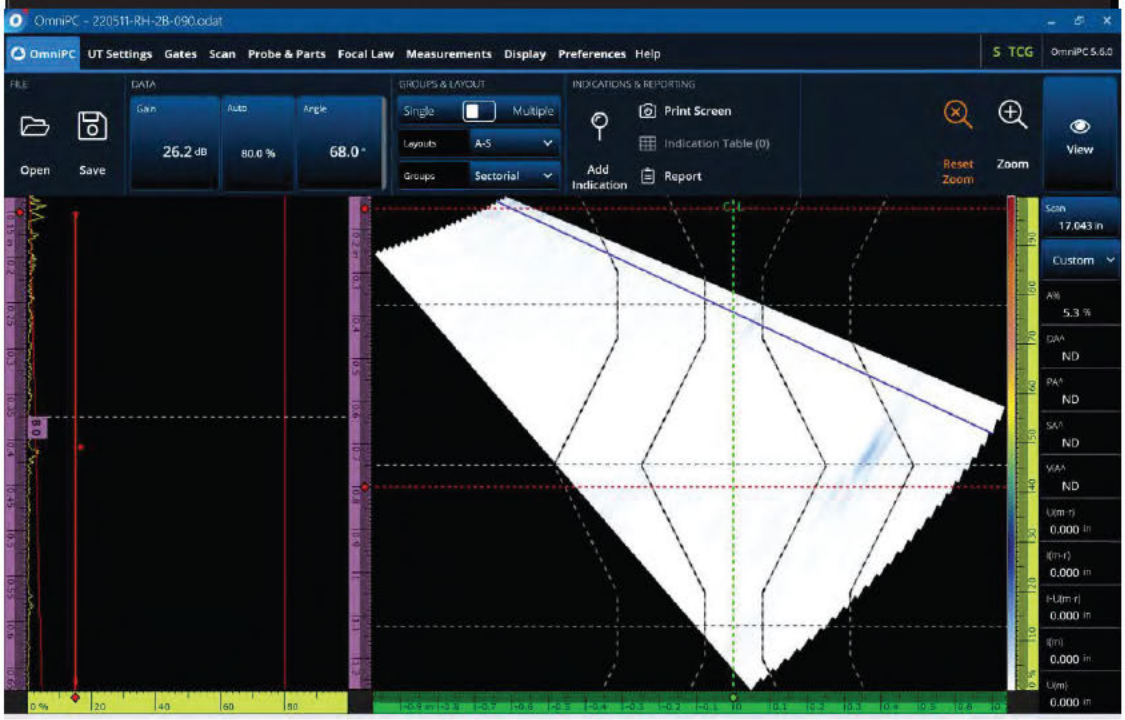
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

2B (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

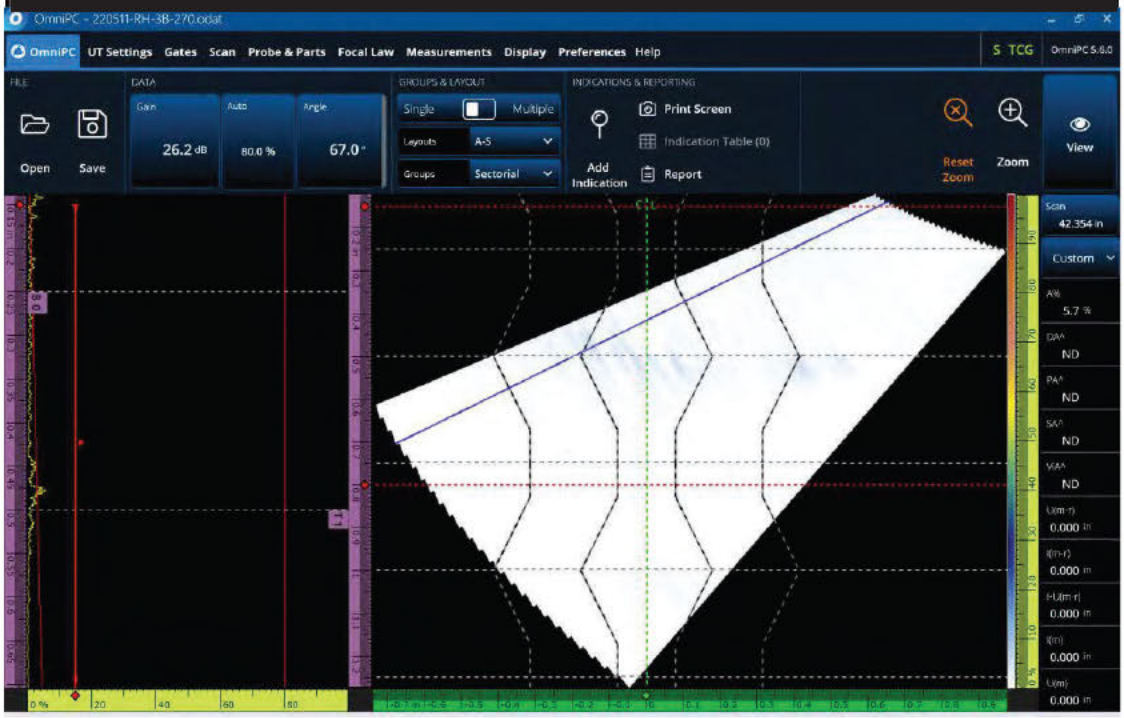
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

3B (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

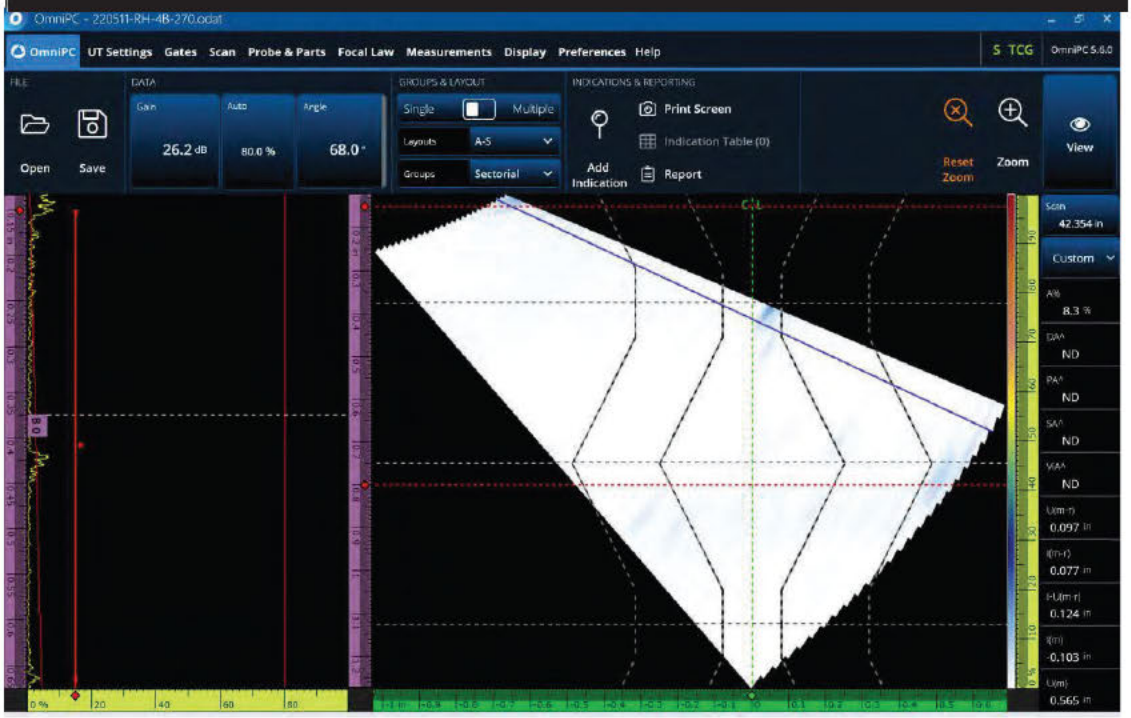
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

4B (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

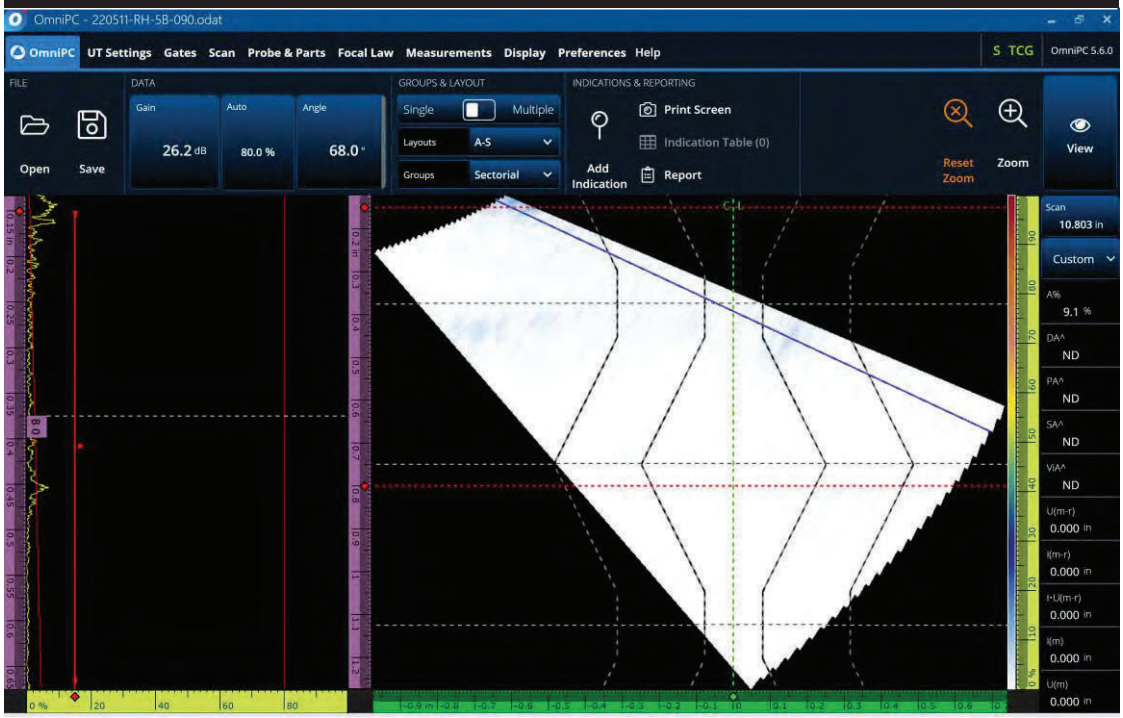
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

5B (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

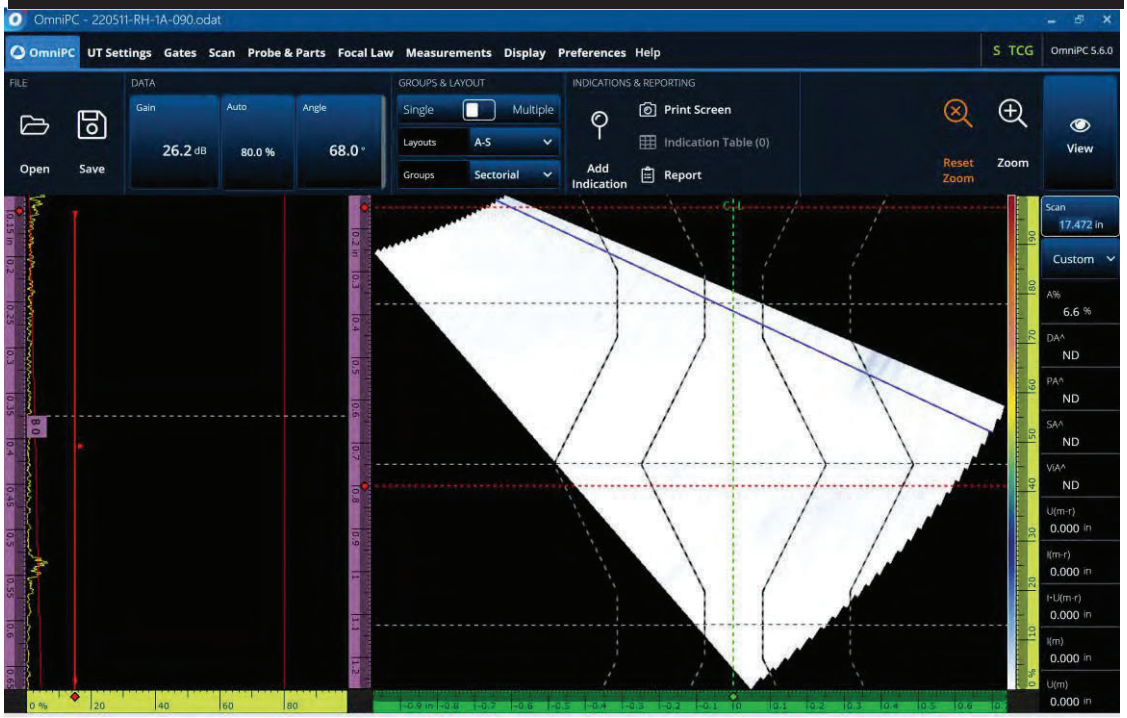
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

1A (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan. *Back side of pipe not accessible (long seam section included to make up for missed section of circ weld).

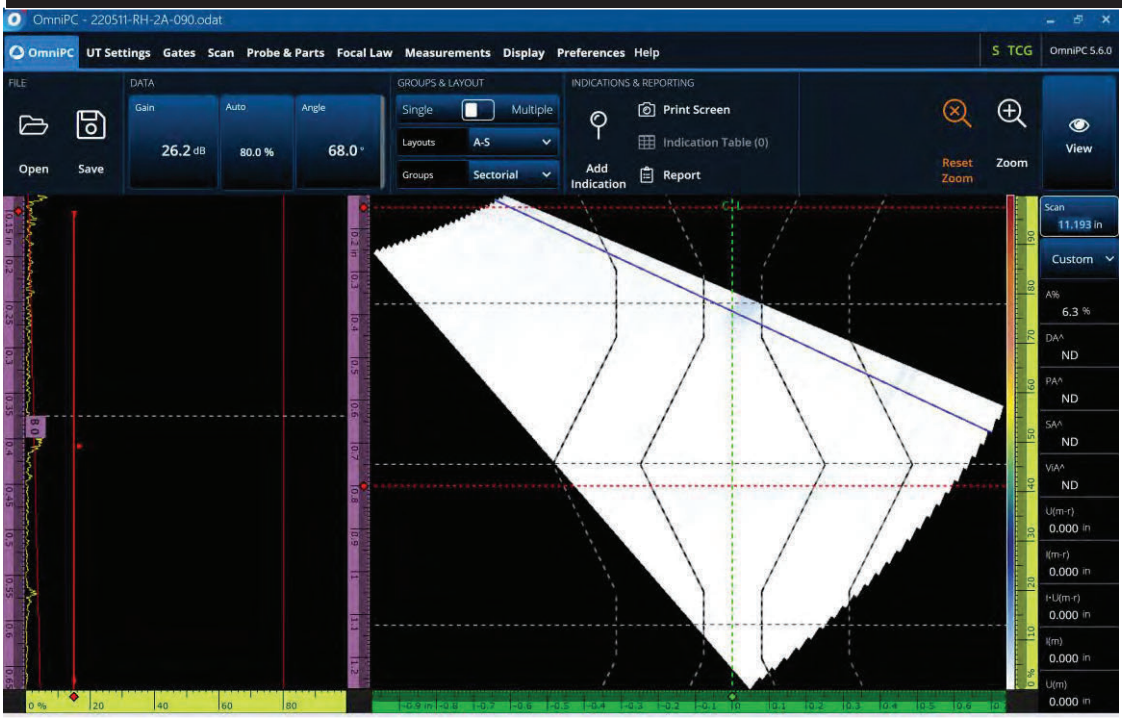
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

2A (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

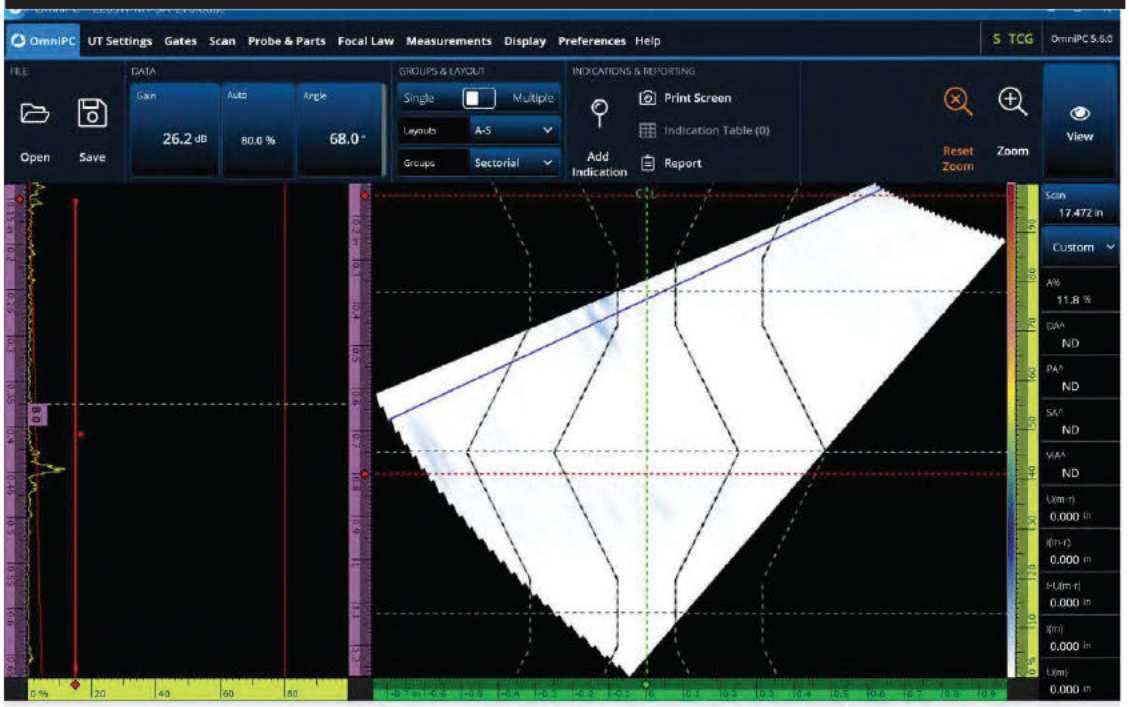
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

3A (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

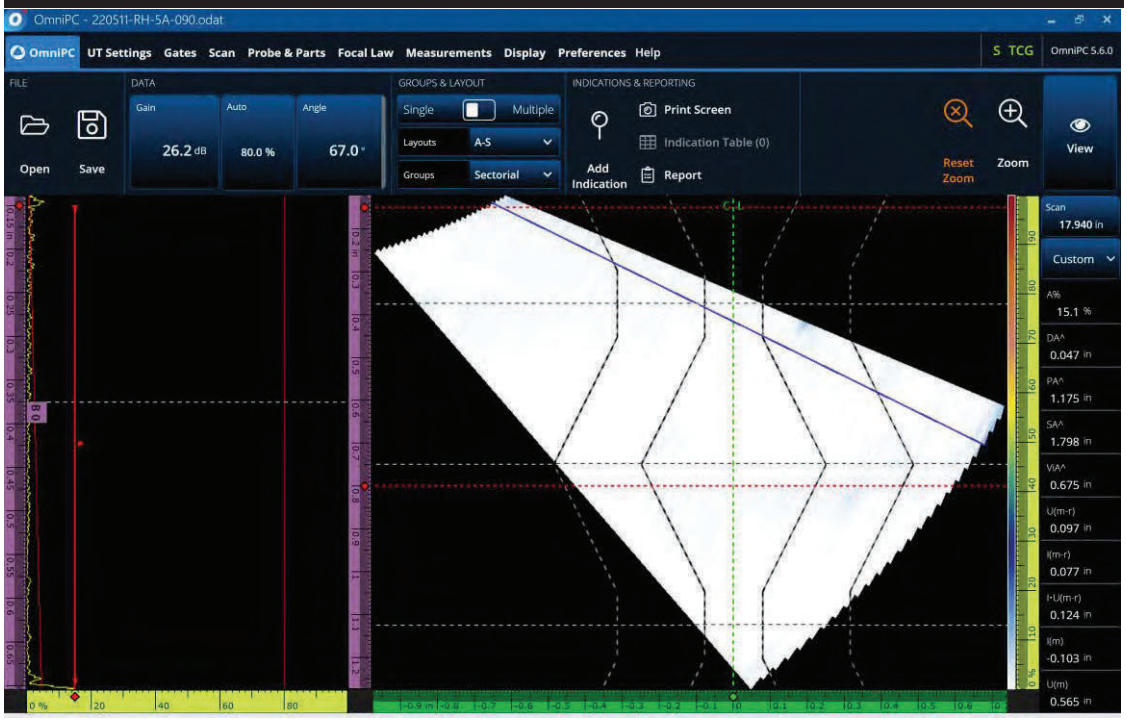
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

5A (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

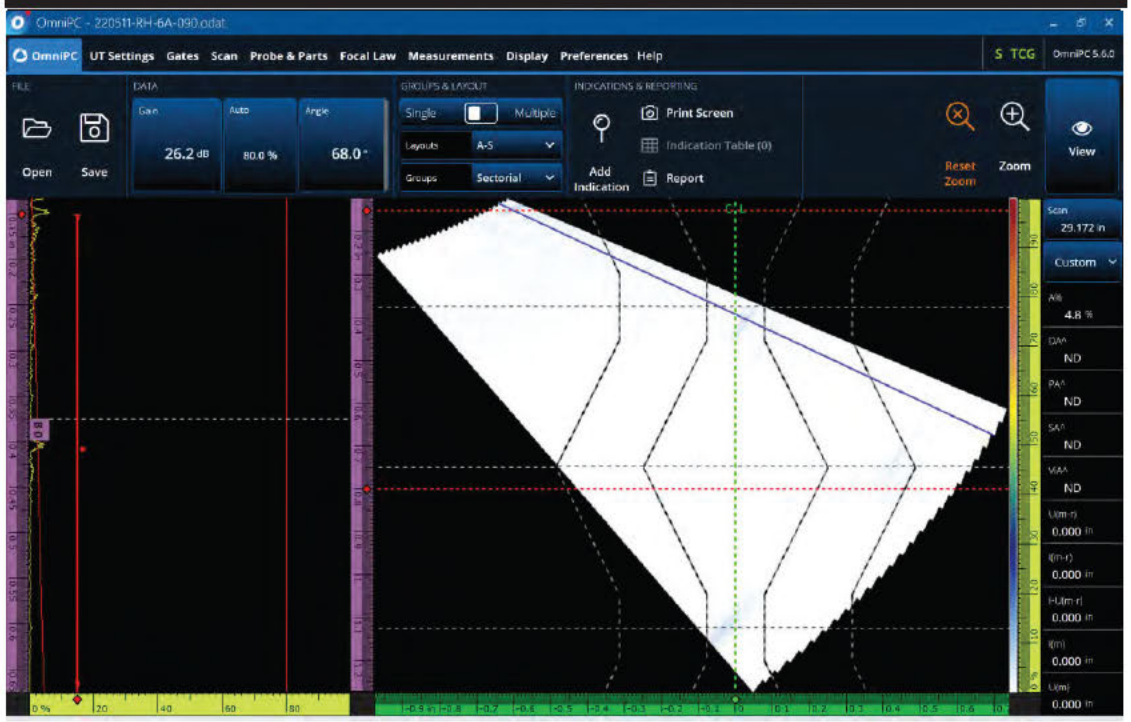
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

6A (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

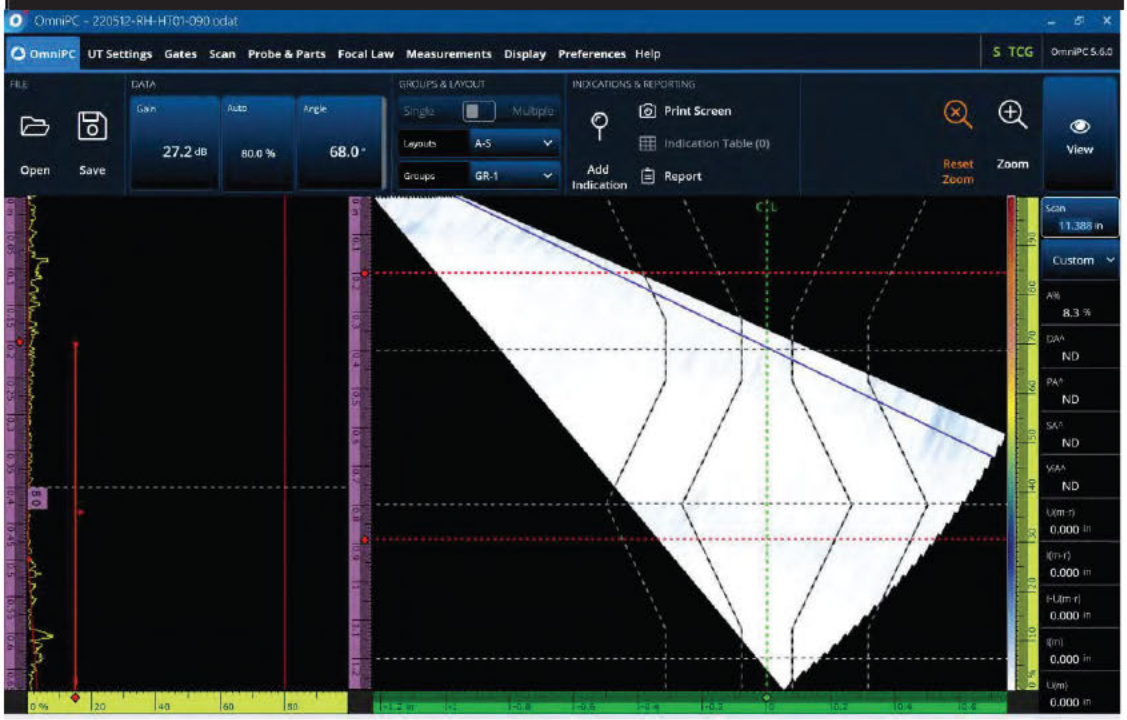
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT1 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

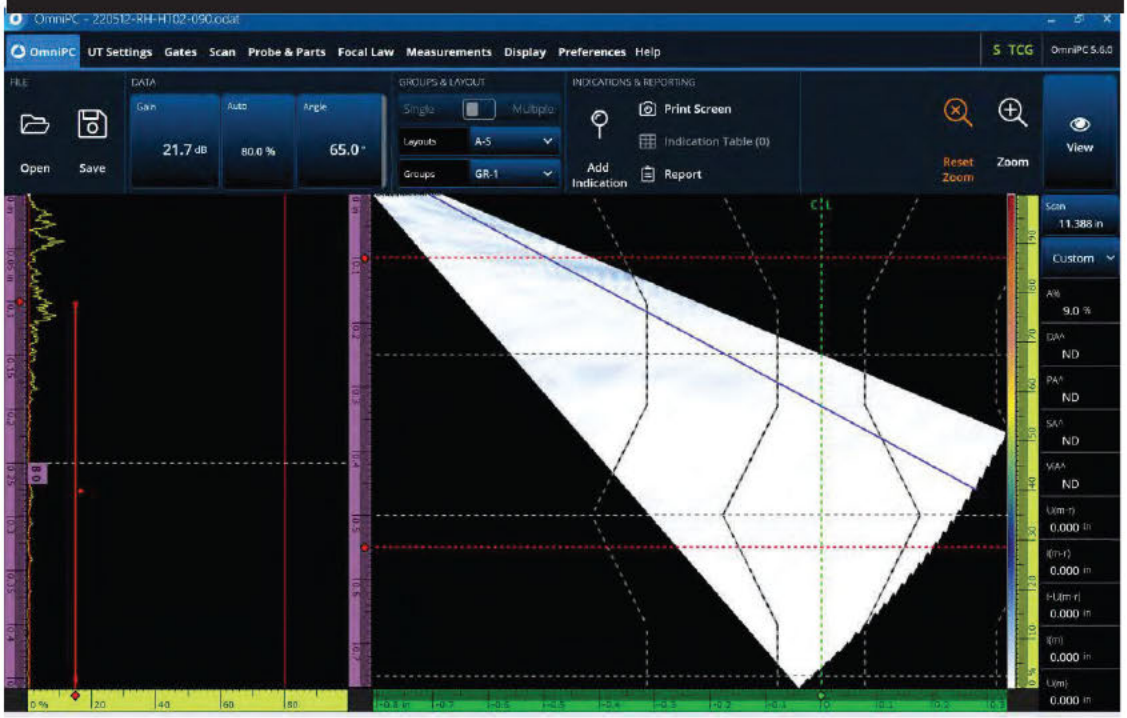
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT2 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

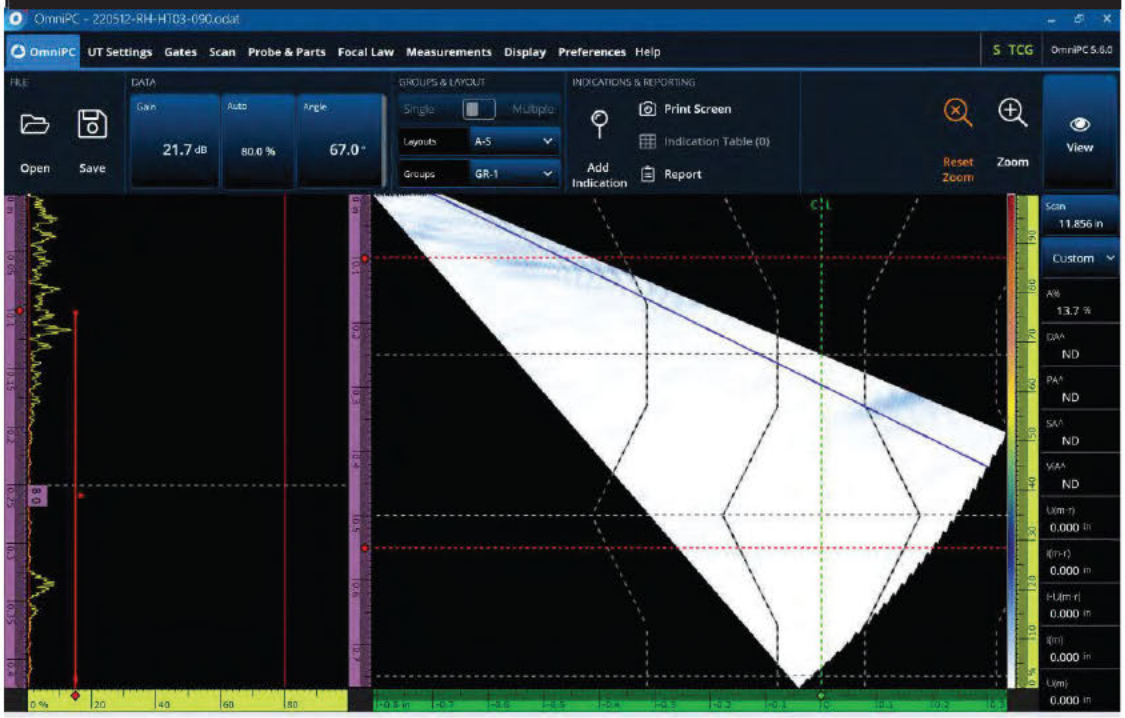
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT3 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

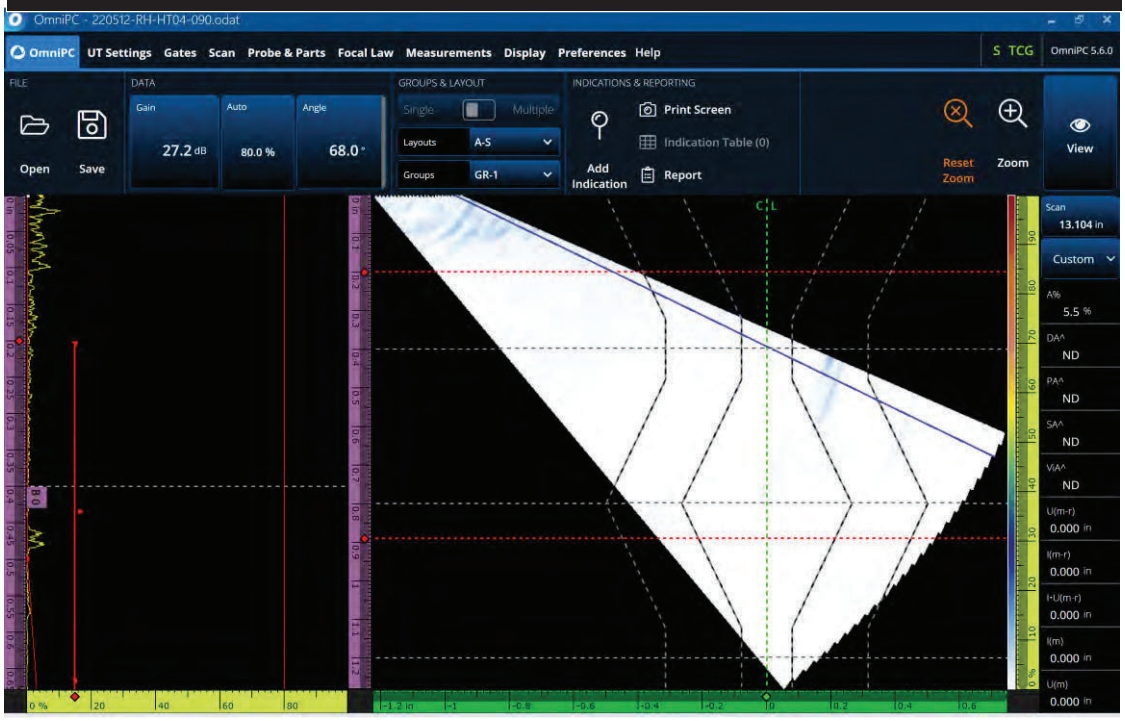
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT4 (Manual)

(b) (3) (A)



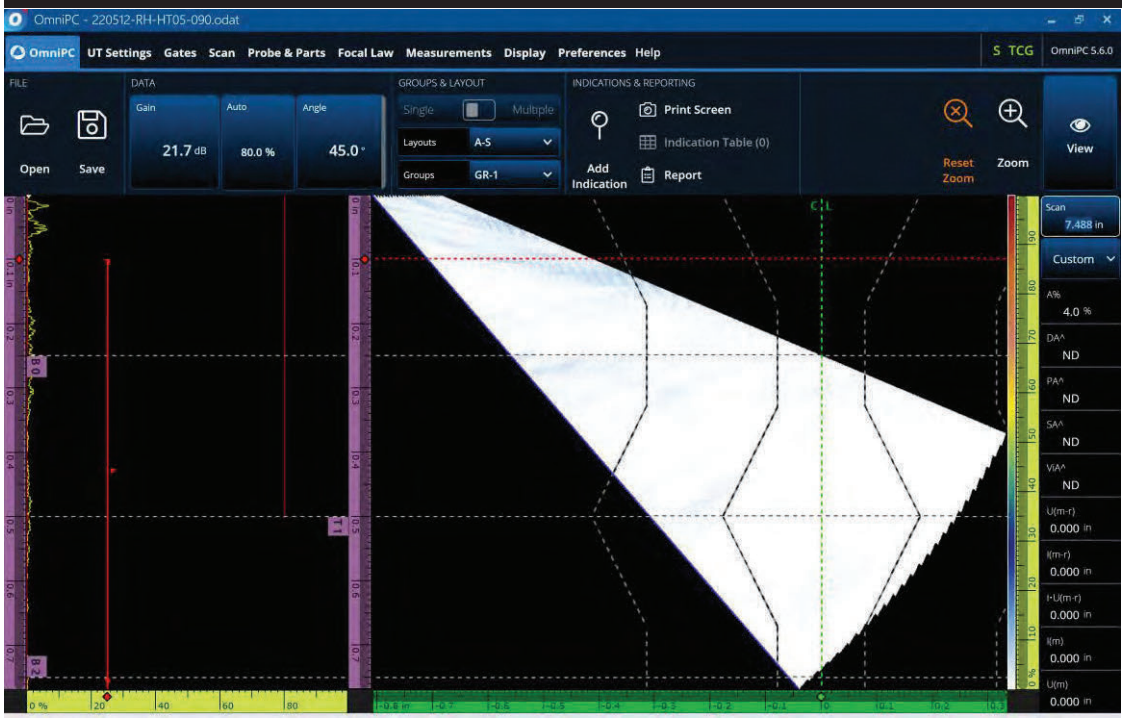
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT5 (Manual)

(b) (3) (A)



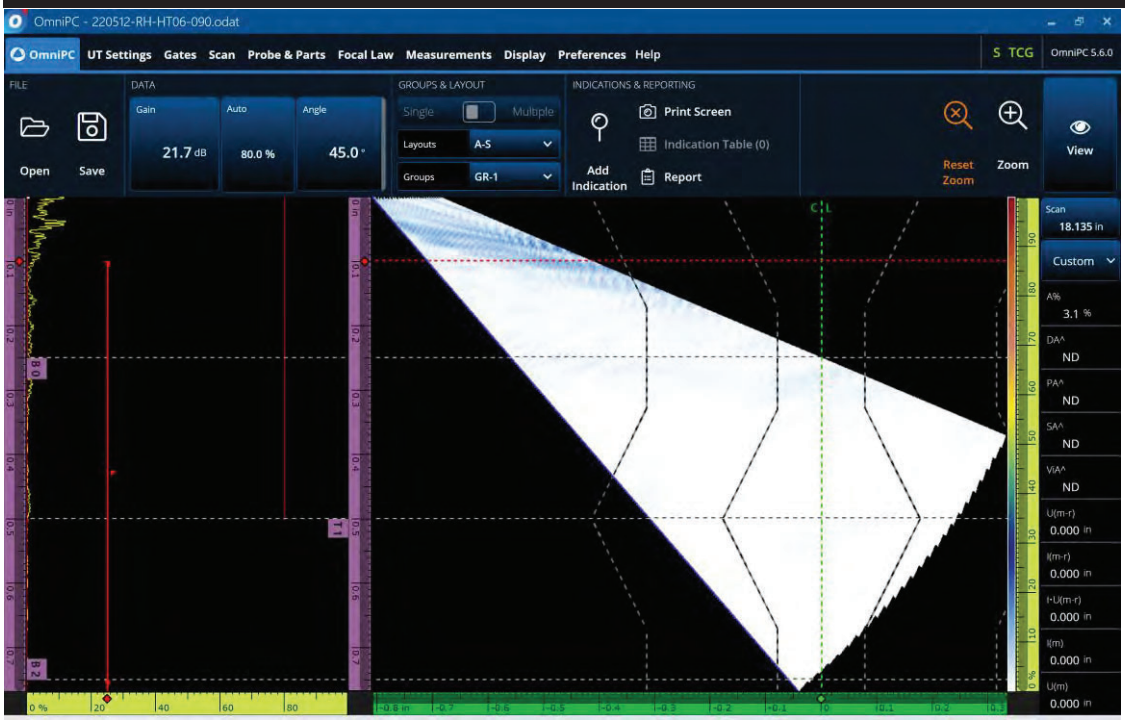
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT6 (Manual)

(b) (3) (A)



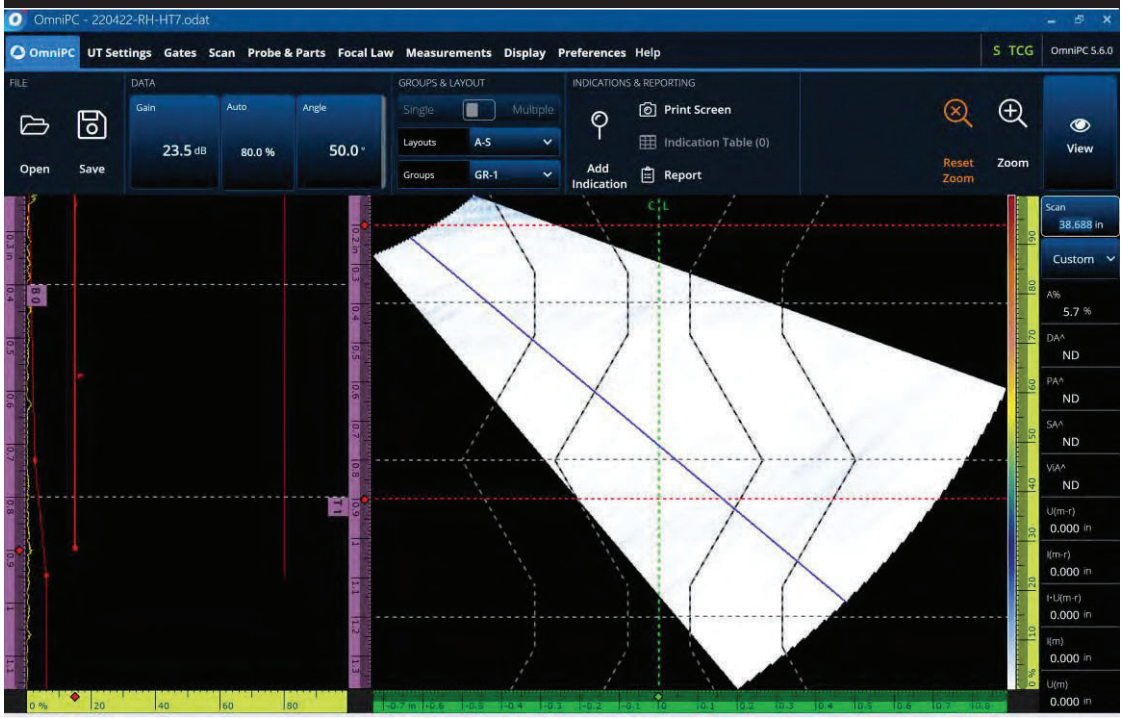
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT7 (Manual)

(b) (3) (A)

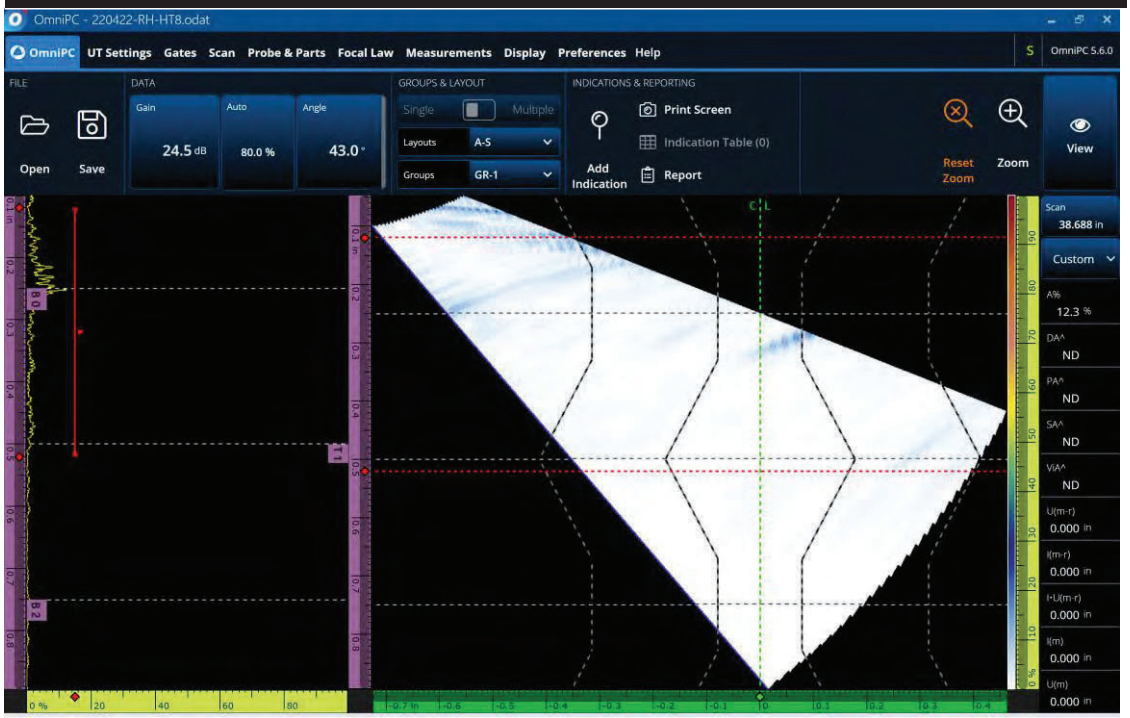


No service induced defect indications were detected in this scan.

ENGINEERING & INSPECTIONS HAWAII

HT8 (Manual)

(b) (3) (A)

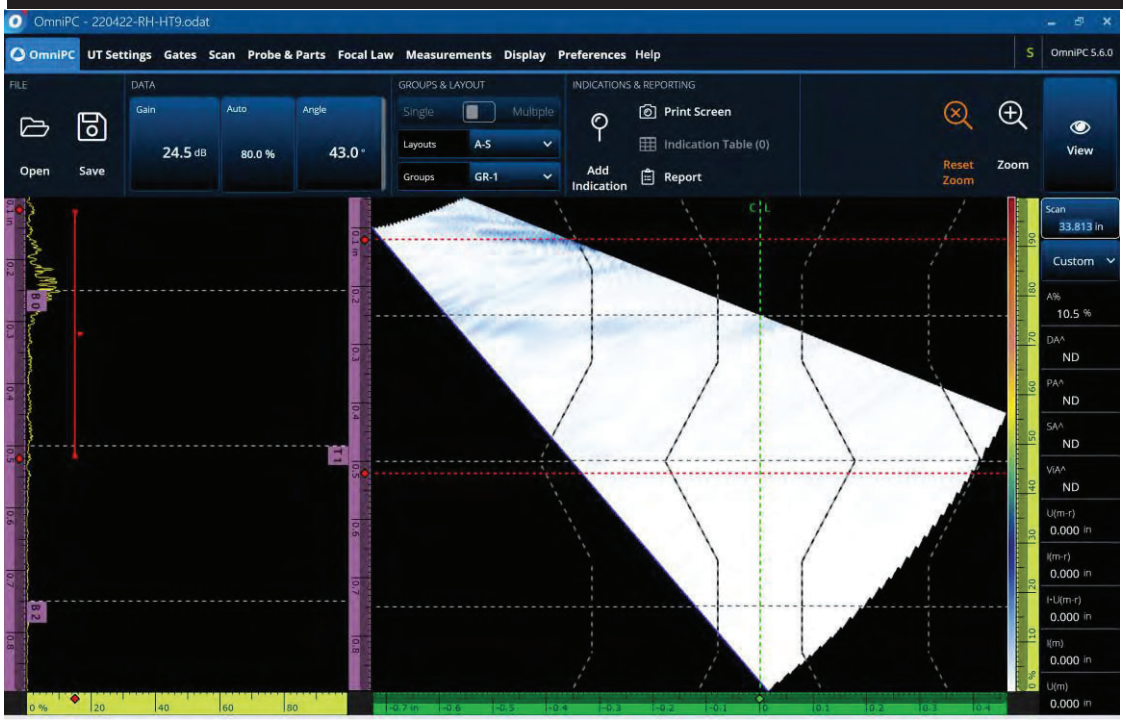


No service induced defect indications were detected in this scan.

ENGINEERING & INSPECTIONS HAWAII

HT9 (Manual)

(b) (3) (A)



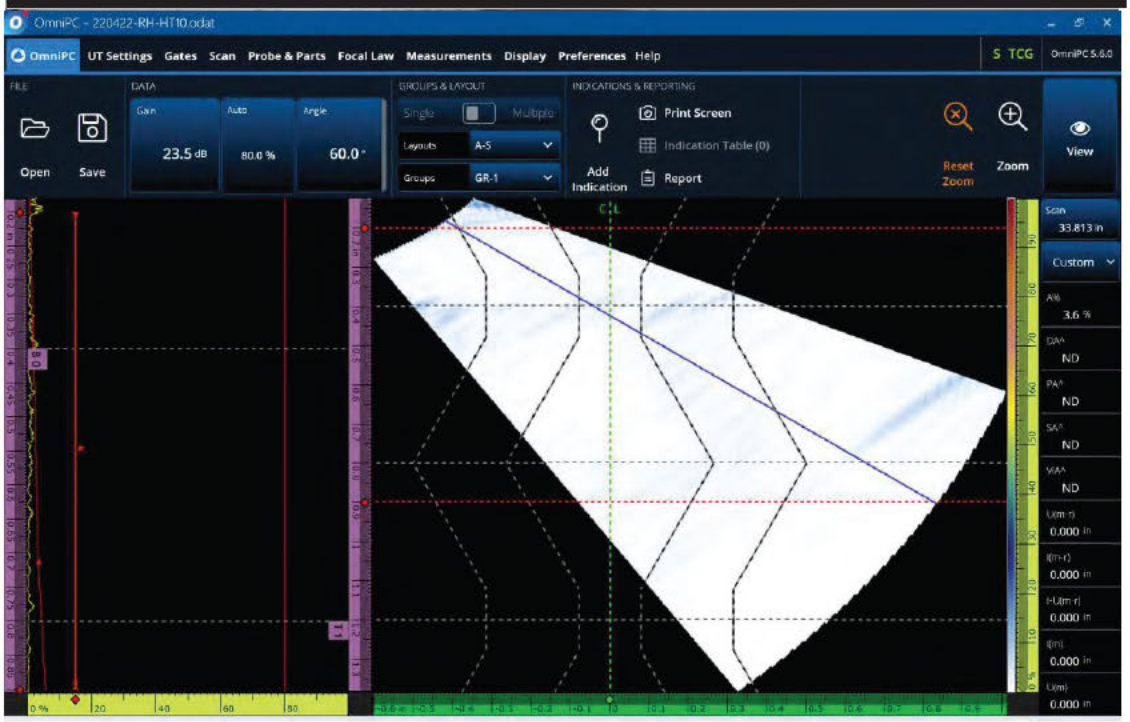
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT10 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

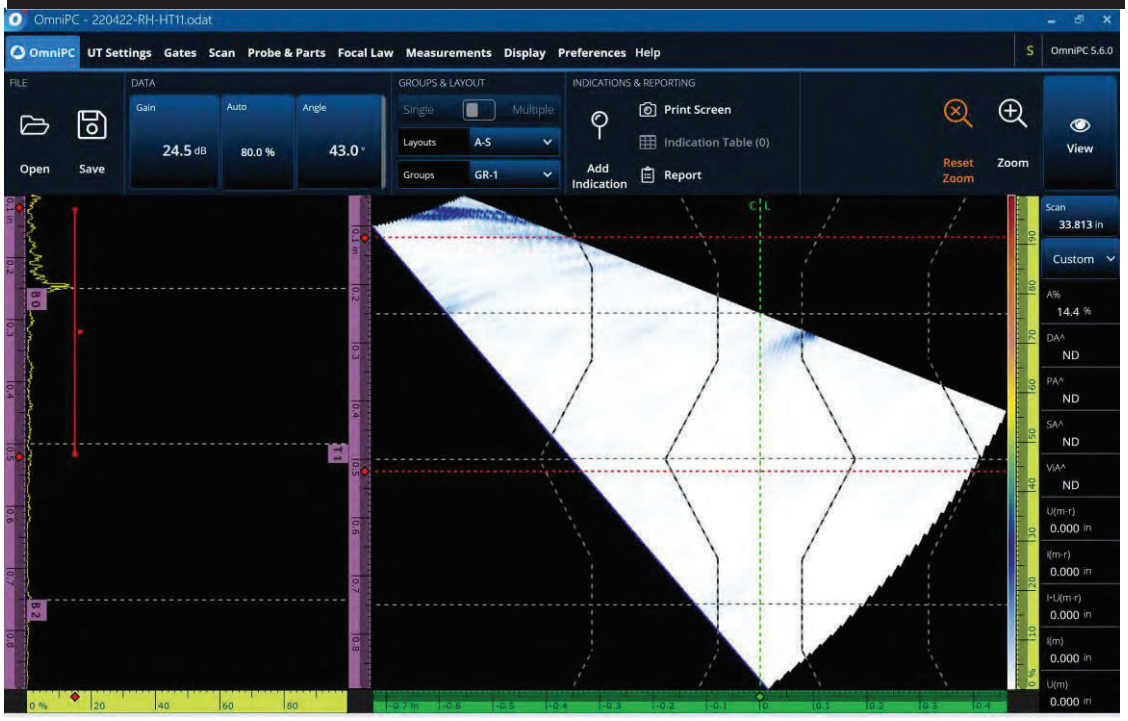
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT11 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

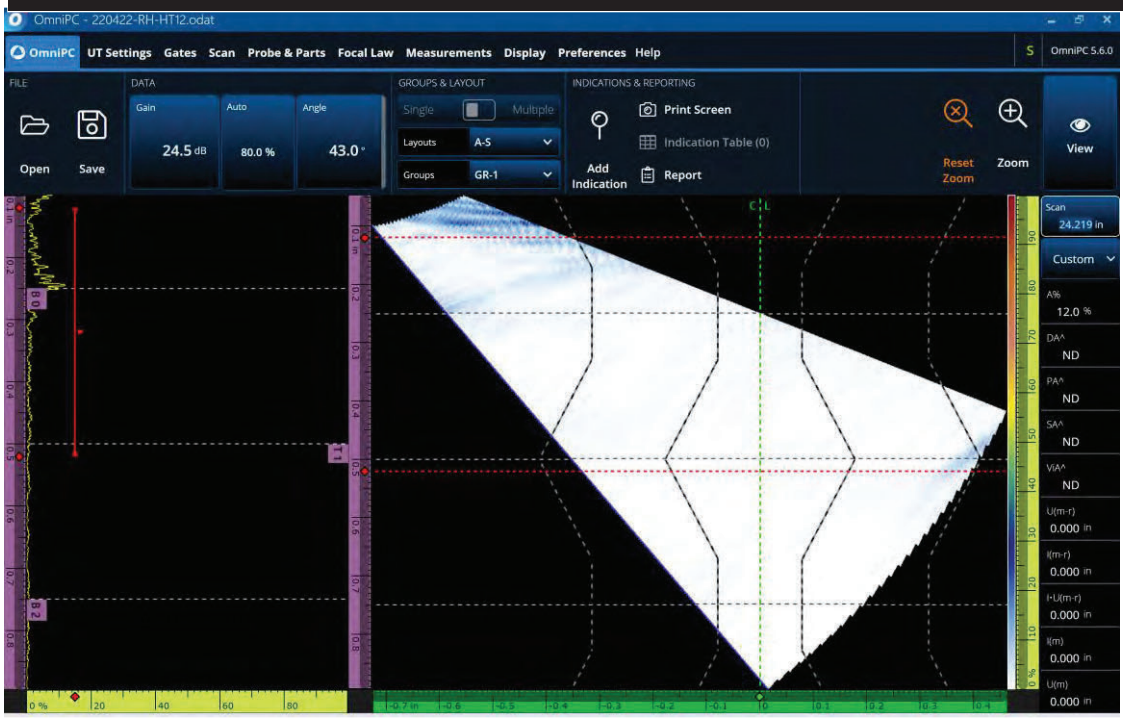
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT12 (Manual)

(b) (3) (A)



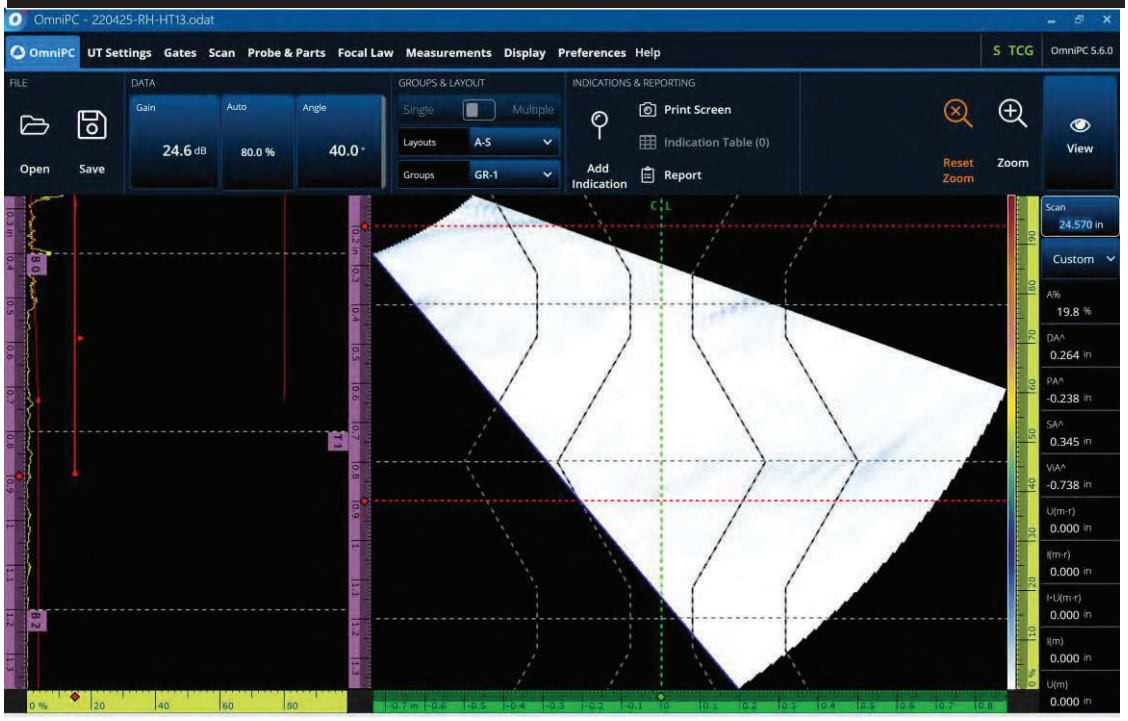
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT13 (Manual)

(b) (3) (A)



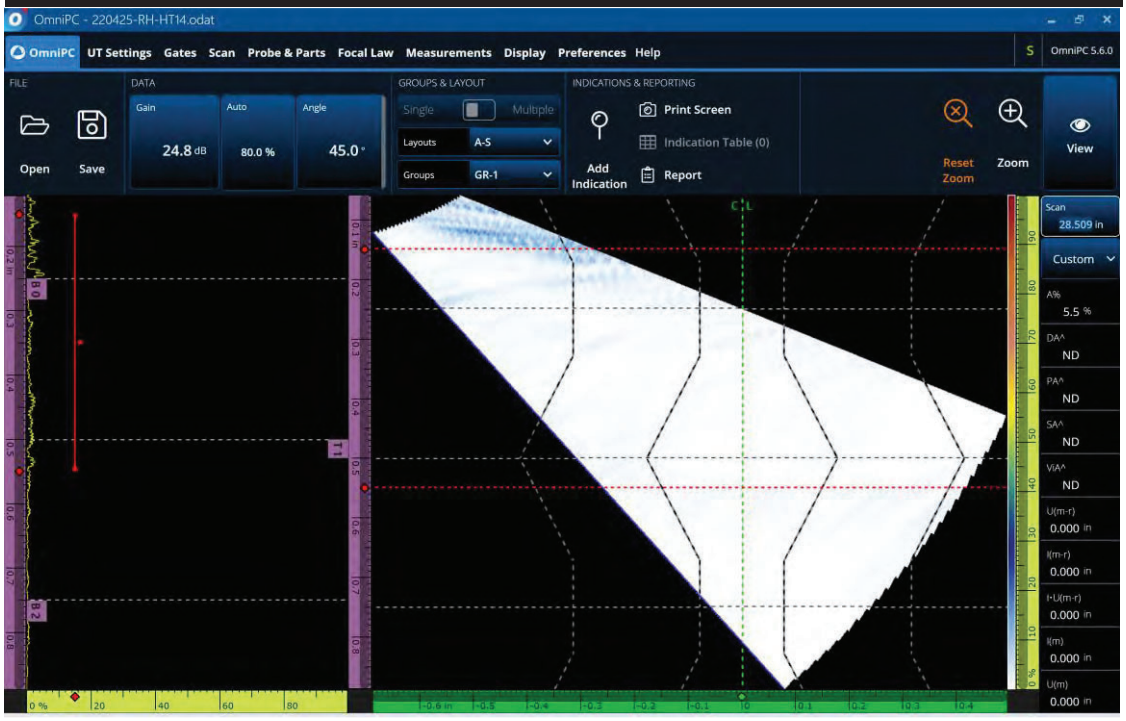
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT14 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

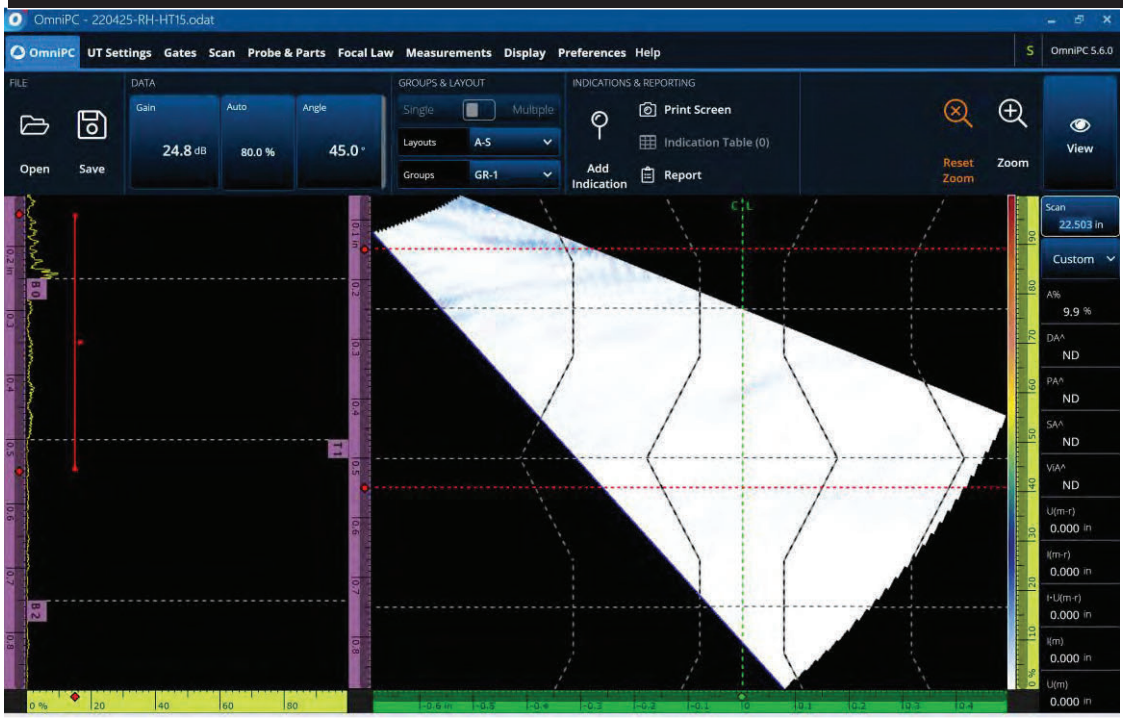
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT15 (Manual)

(b) (3) (A)



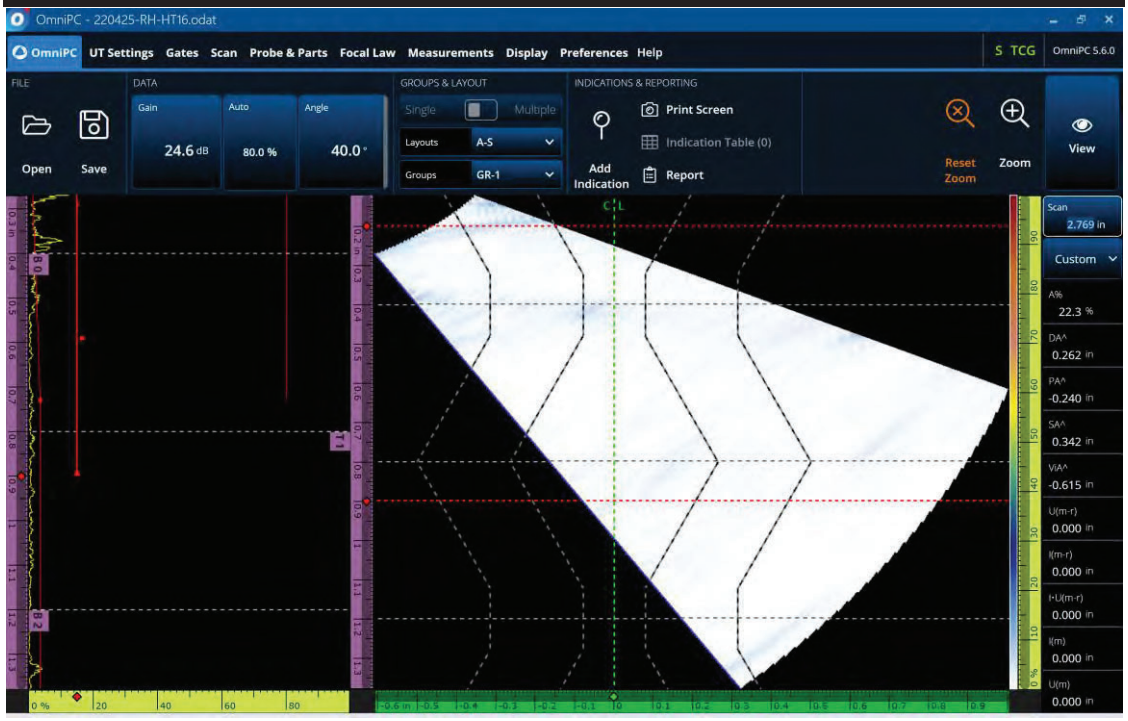
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT16 (Manual)

(b) (3) (A)

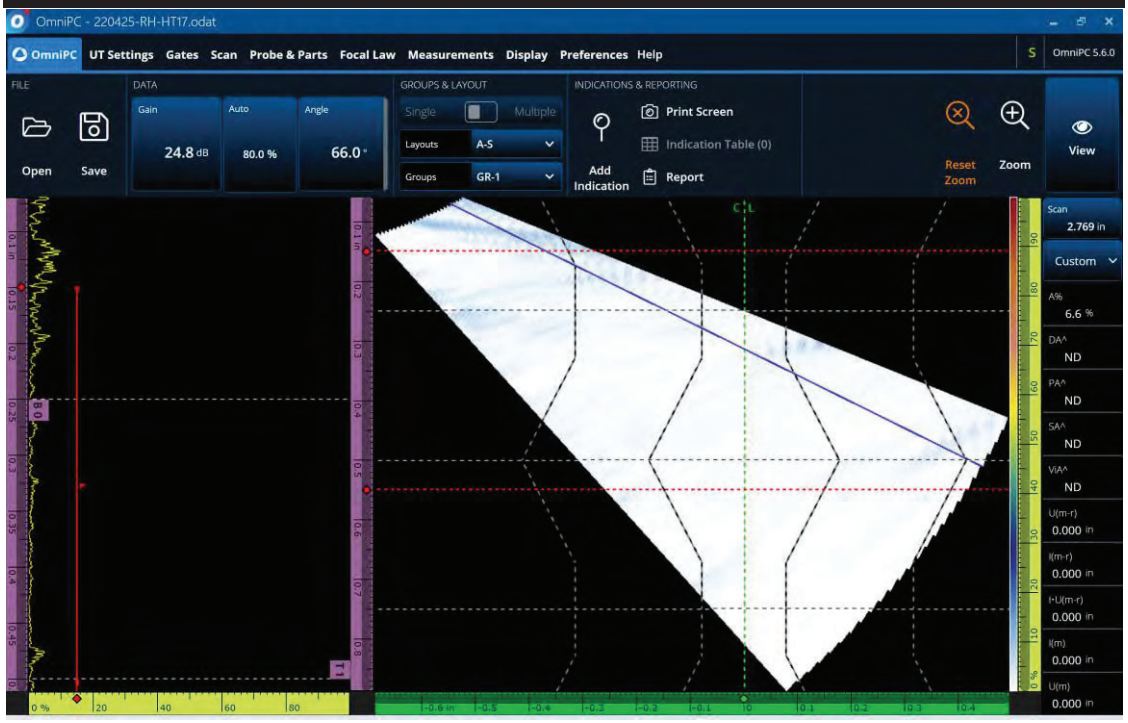


No service induced defect indications were detected in this scan.

ENGINEERING & INSPECTIONS HAWAII

HT17 (Manual)

(b) (3) (A)



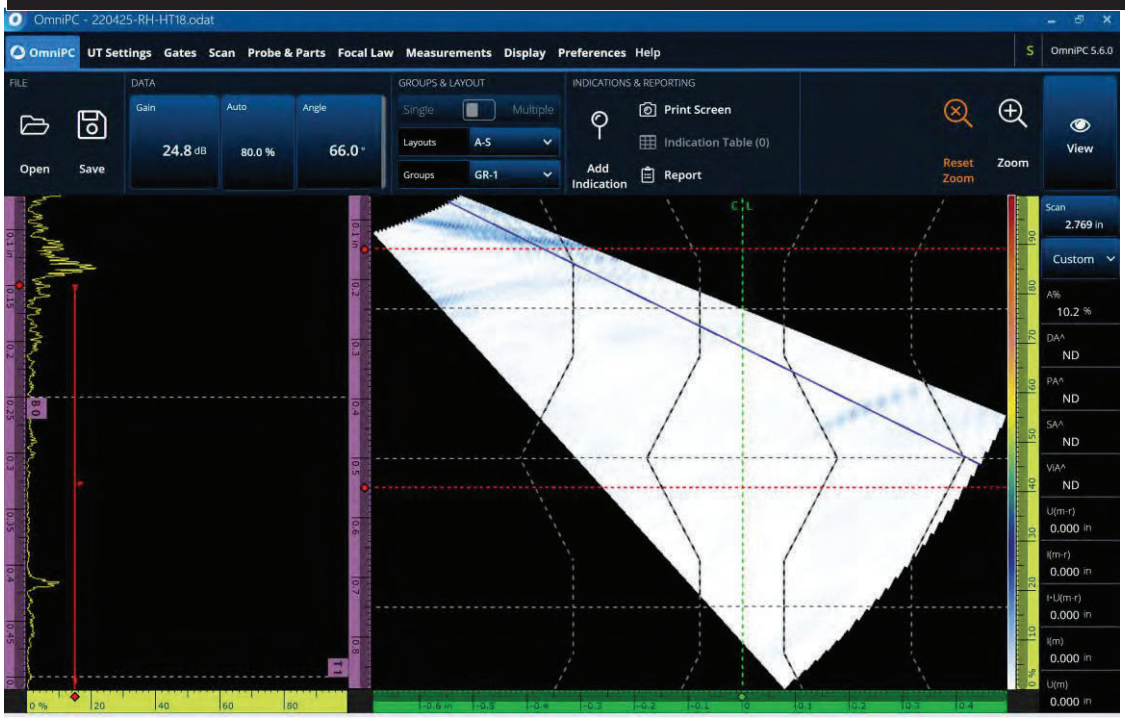
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT18 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

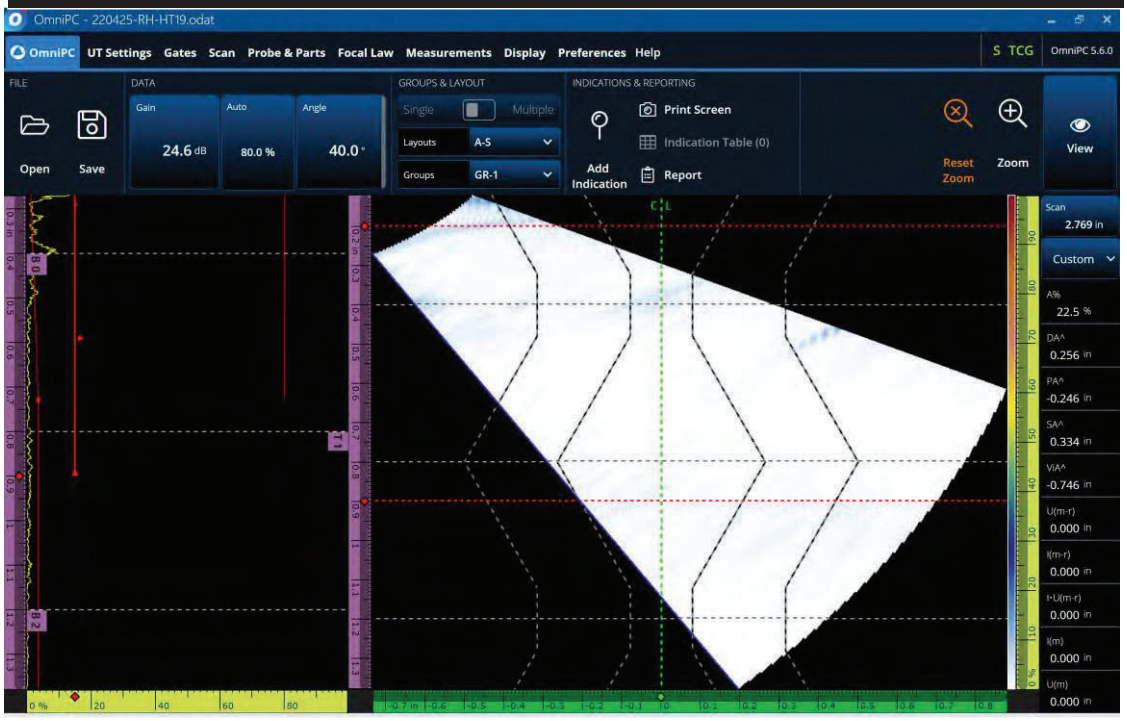
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT19 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

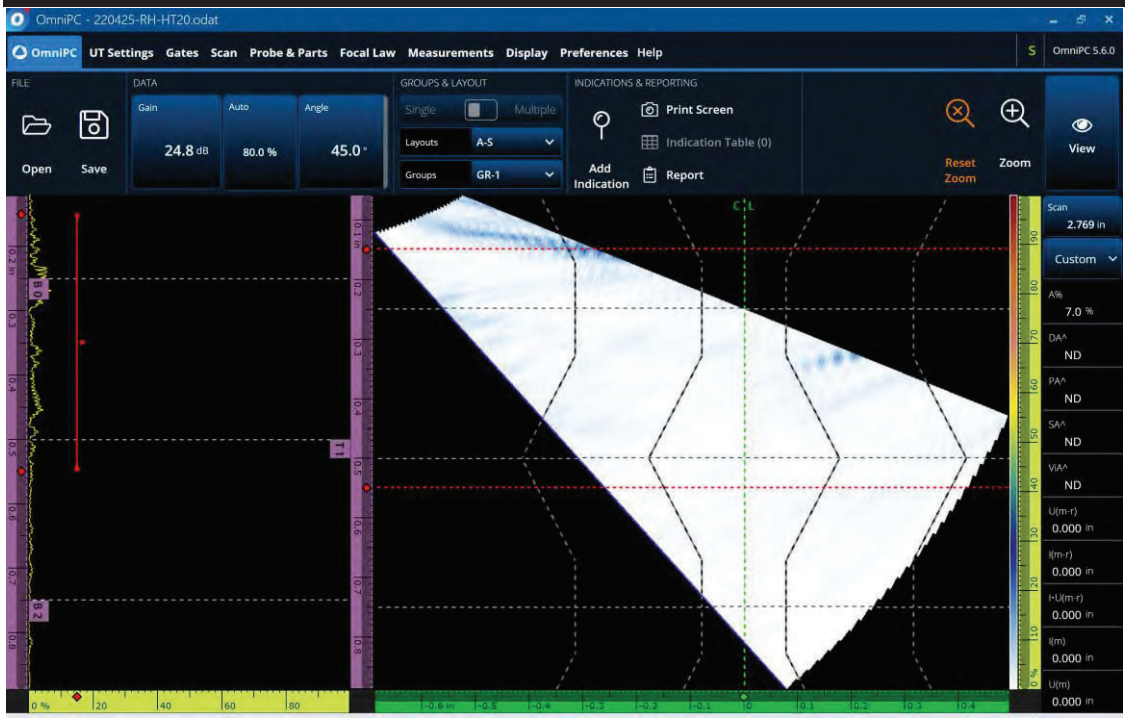
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT20 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

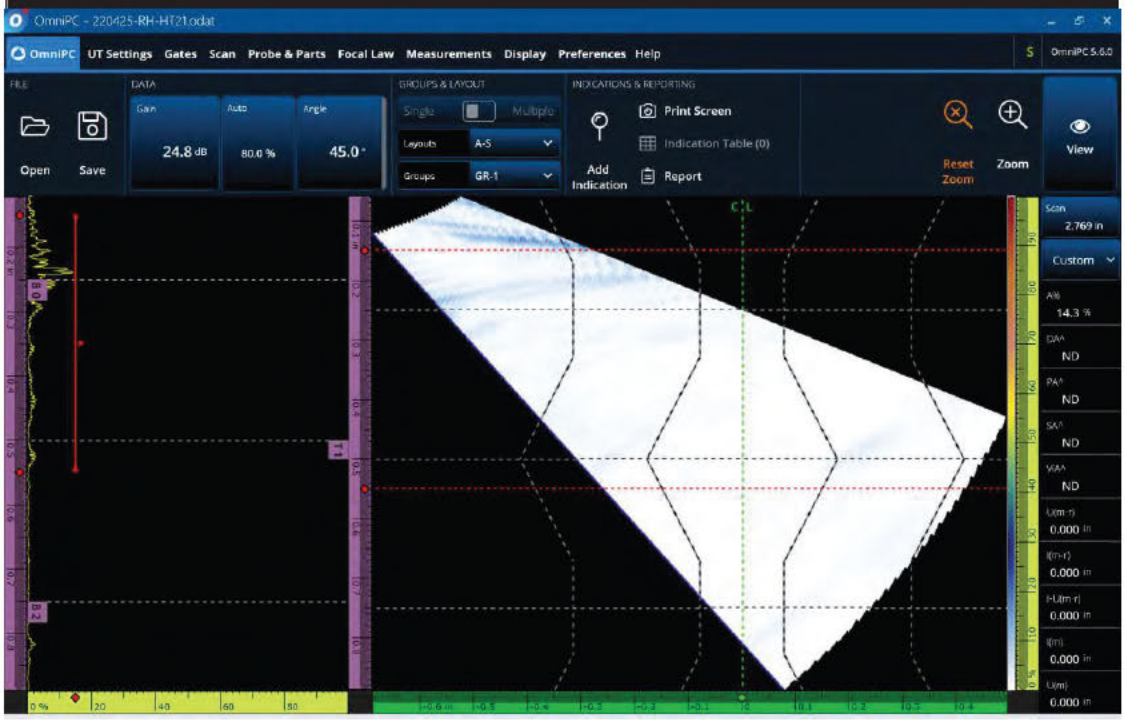
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT21 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

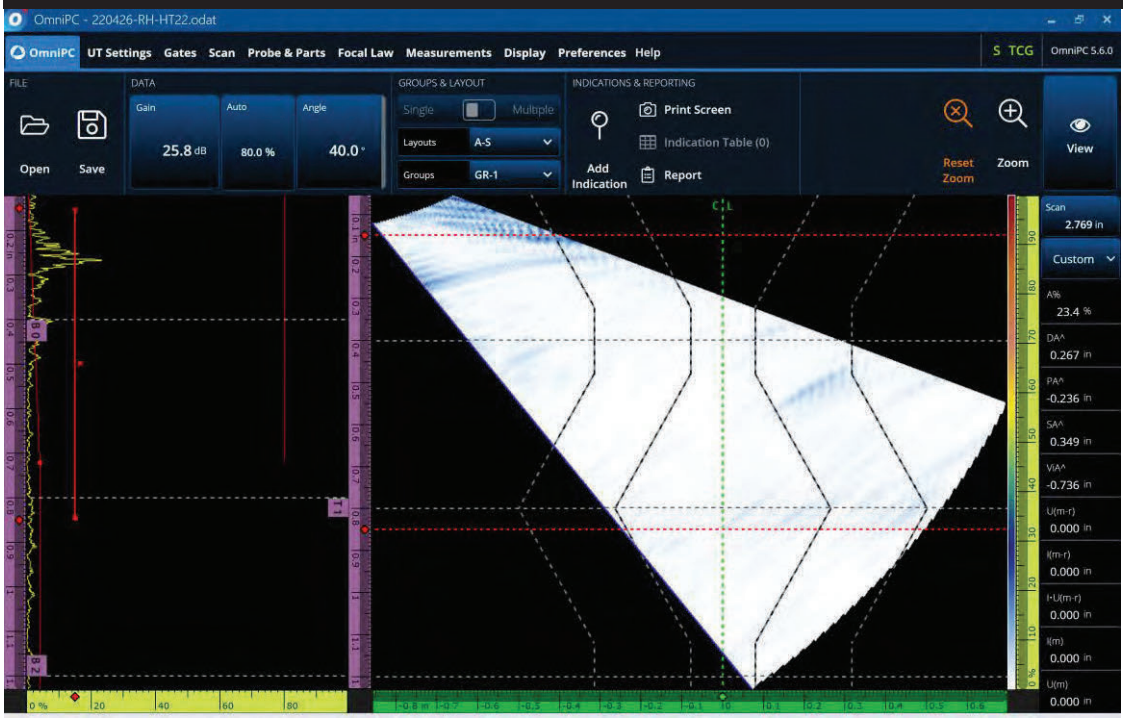
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT22 (Manual)

(b) (3) (A)

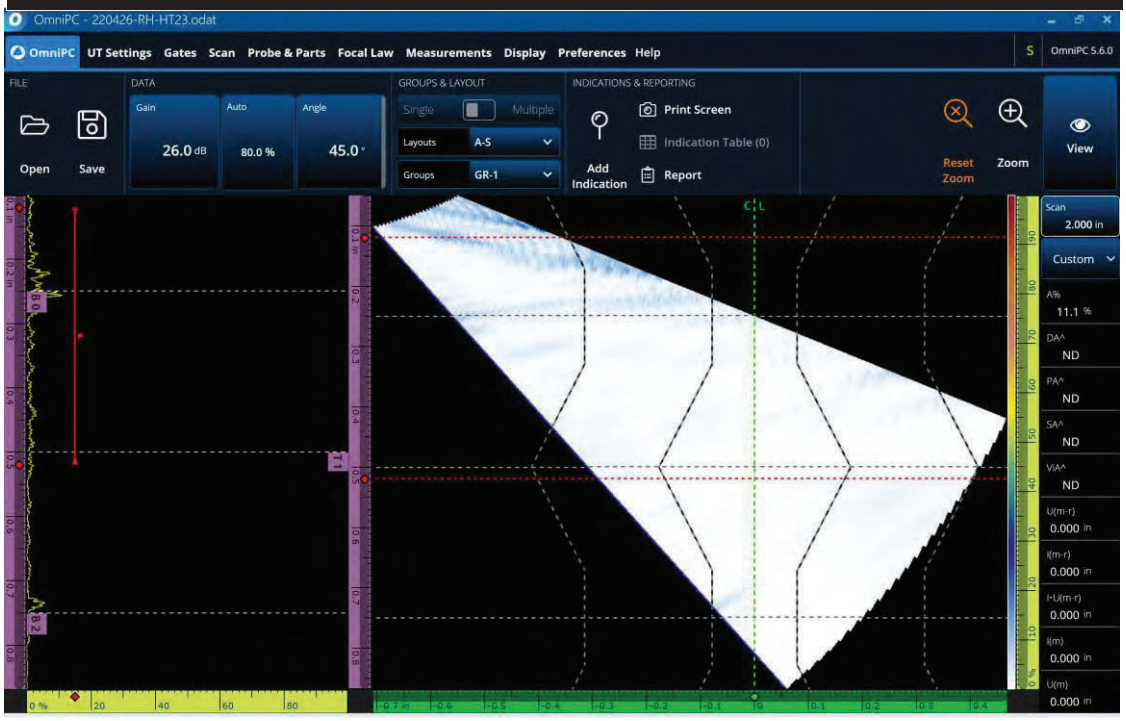


No service induced defect indications were detected in this scan.

[redacted]

HT23 (Manual)

(b) (3) (A)



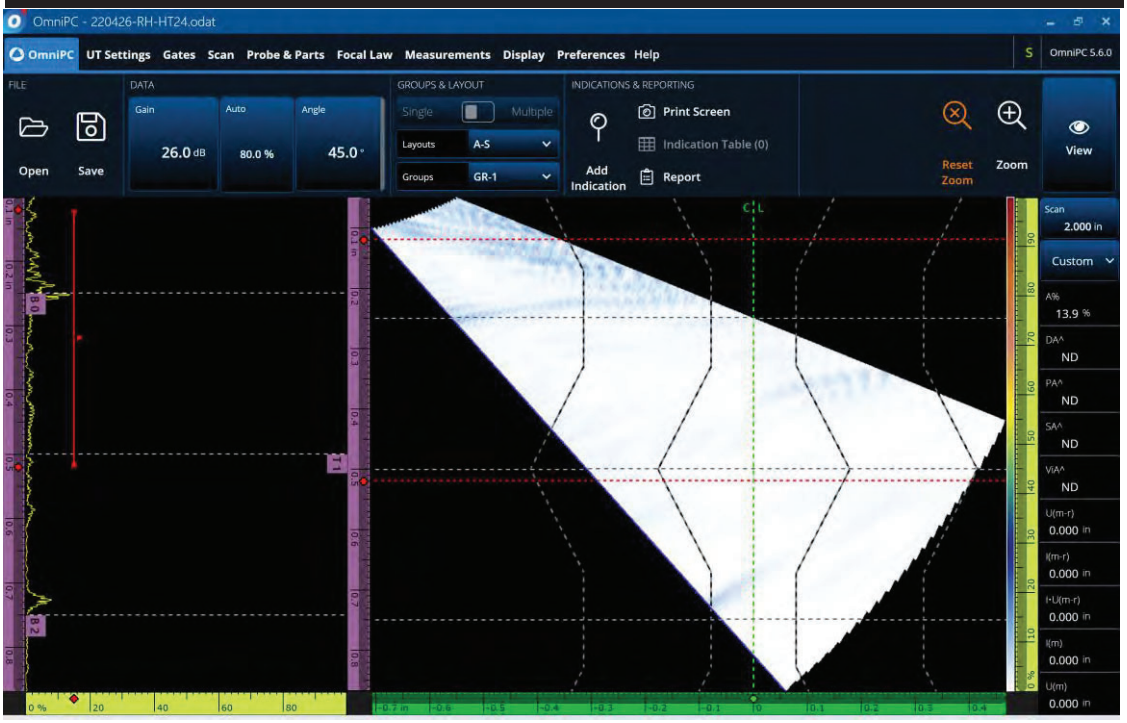
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT24 (Manual)

(b) (3) (A)



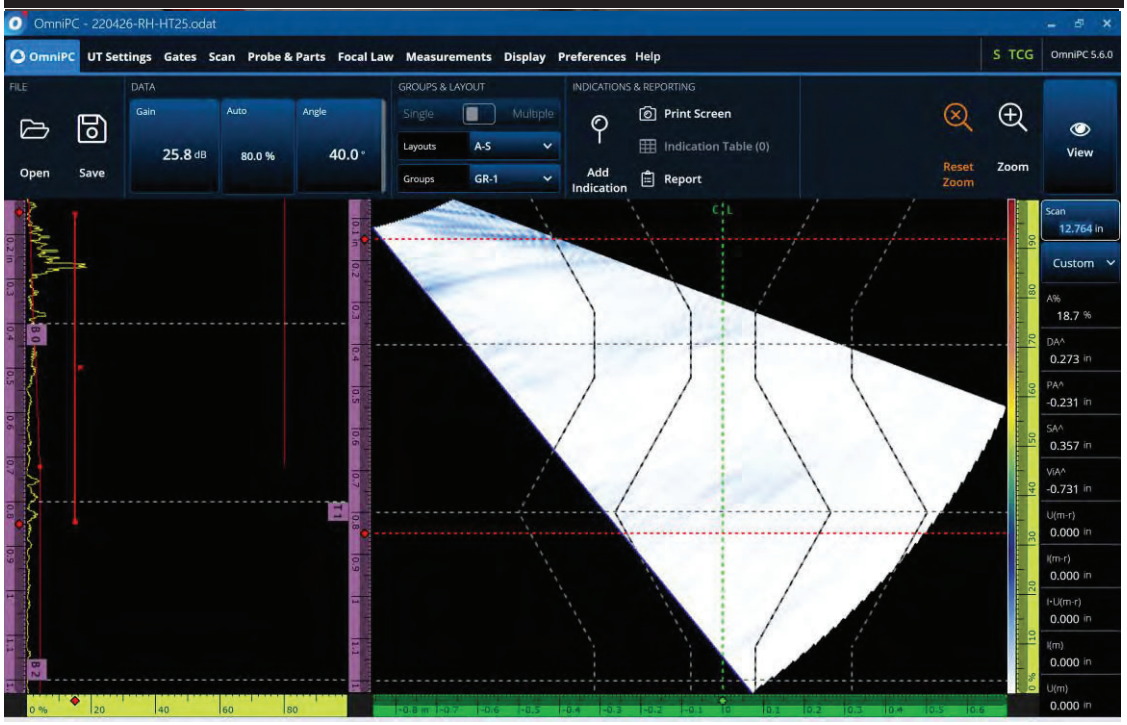
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT25 (Manual)

(b) (3) (A)



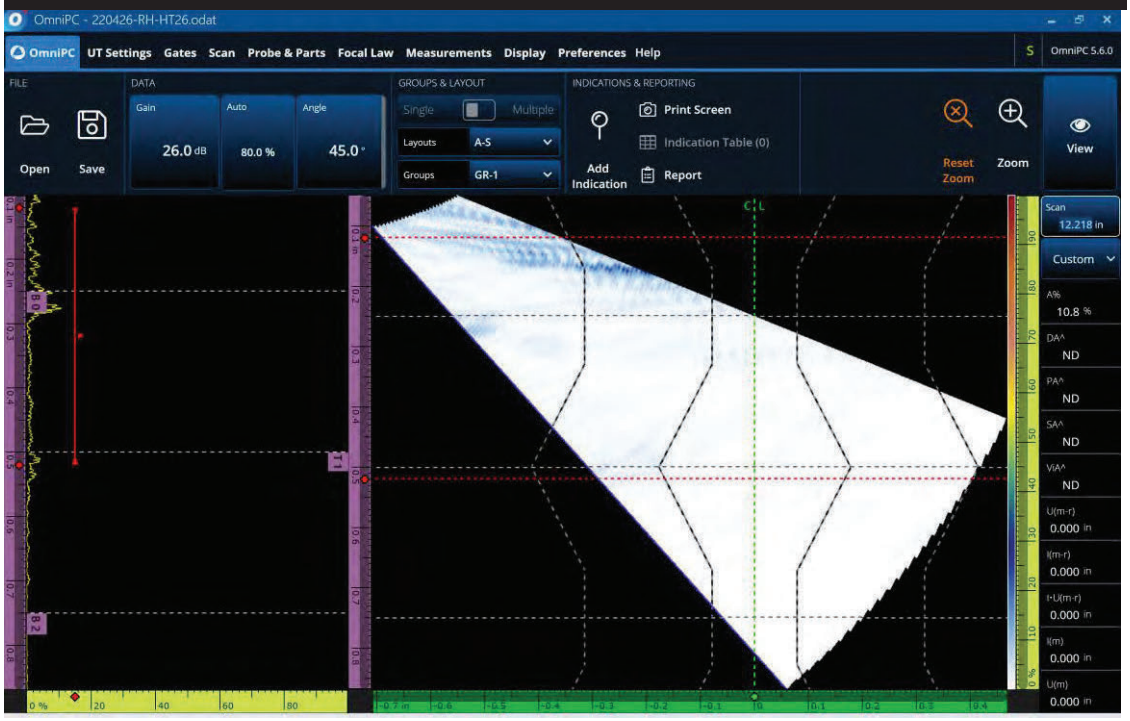
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT26 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

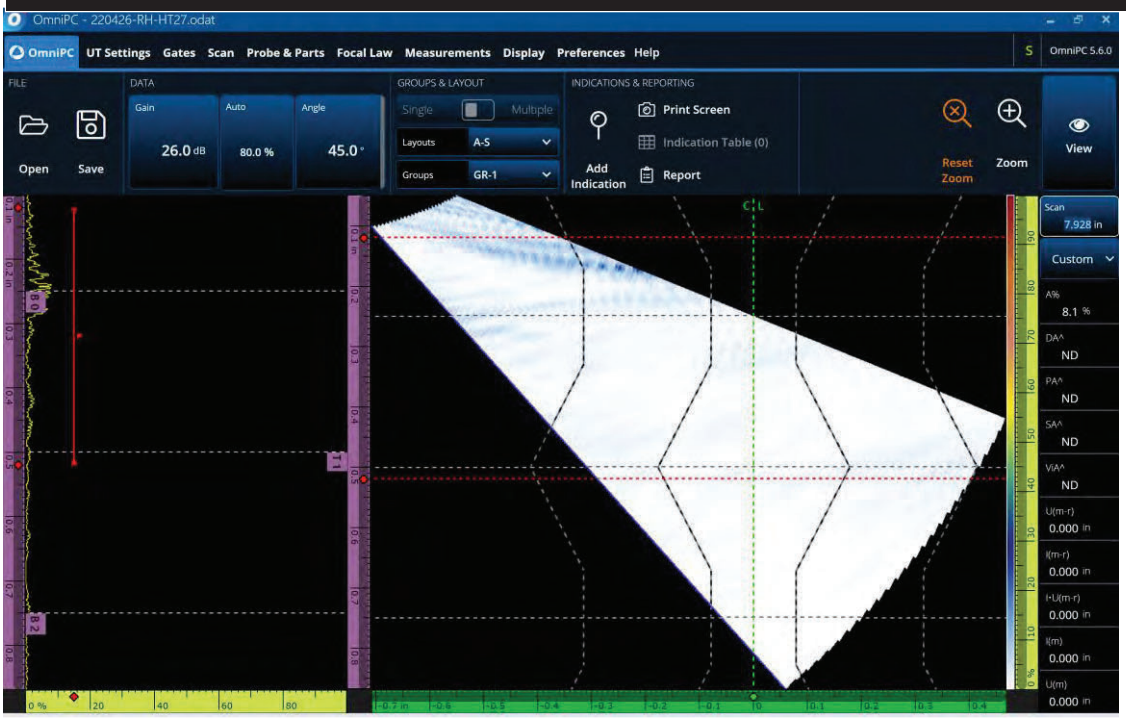
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT27 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

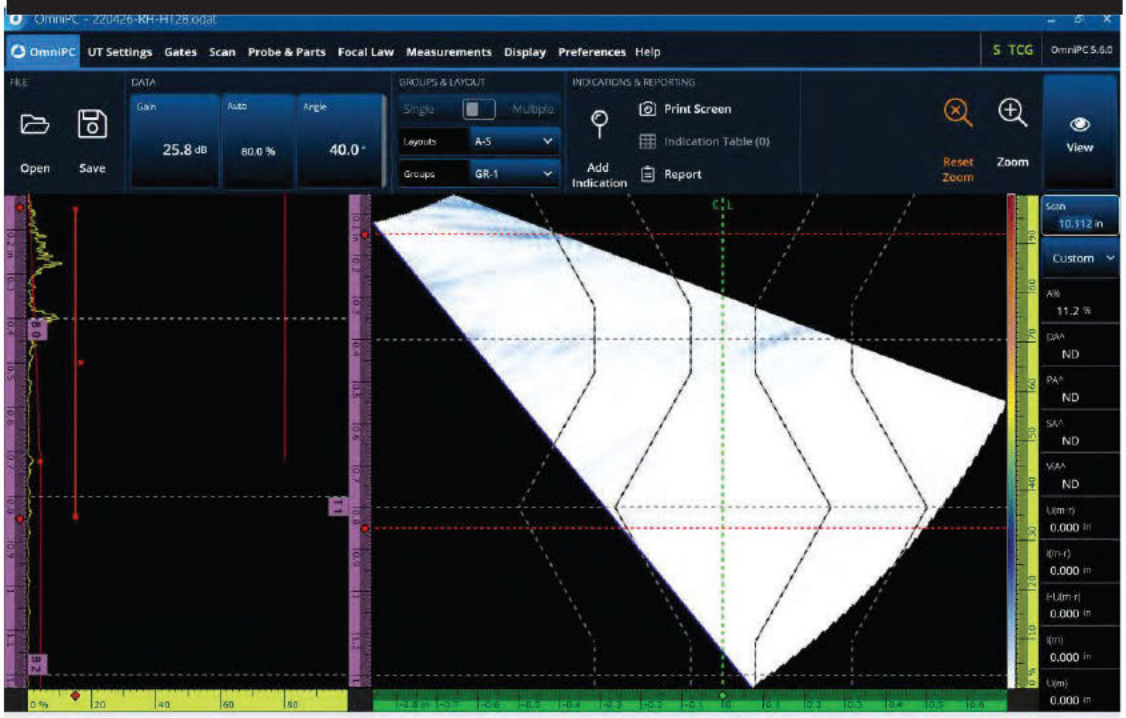
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT28 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

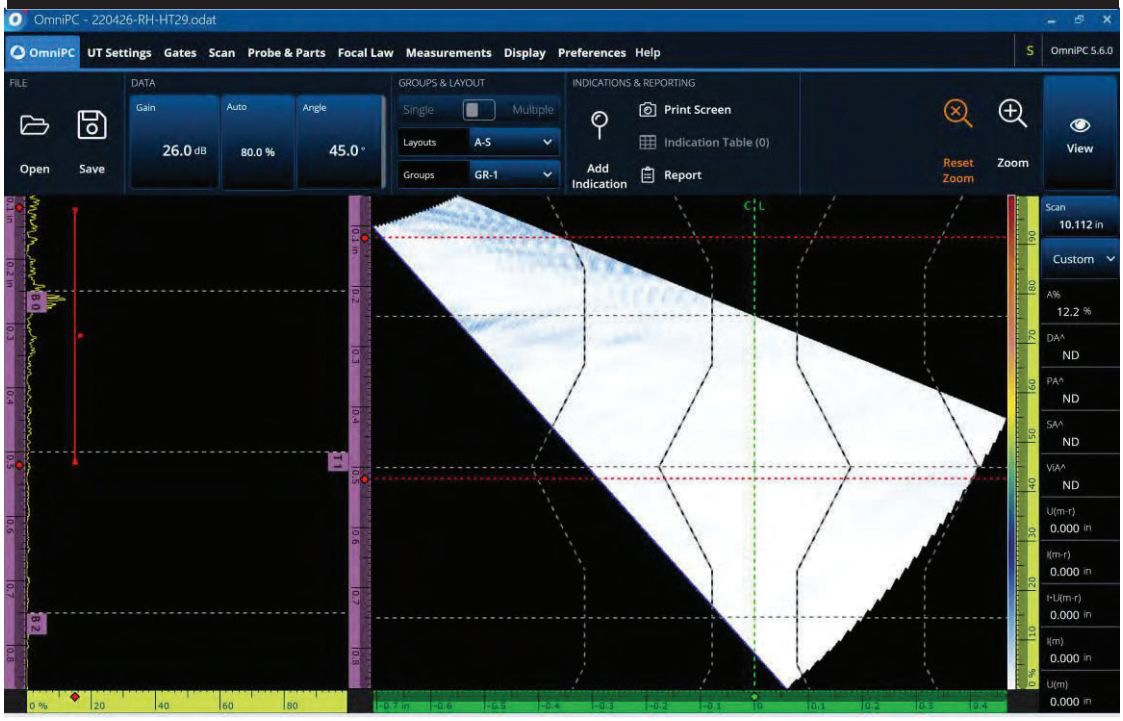
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT29 (Manual)

(b) (3) (A)



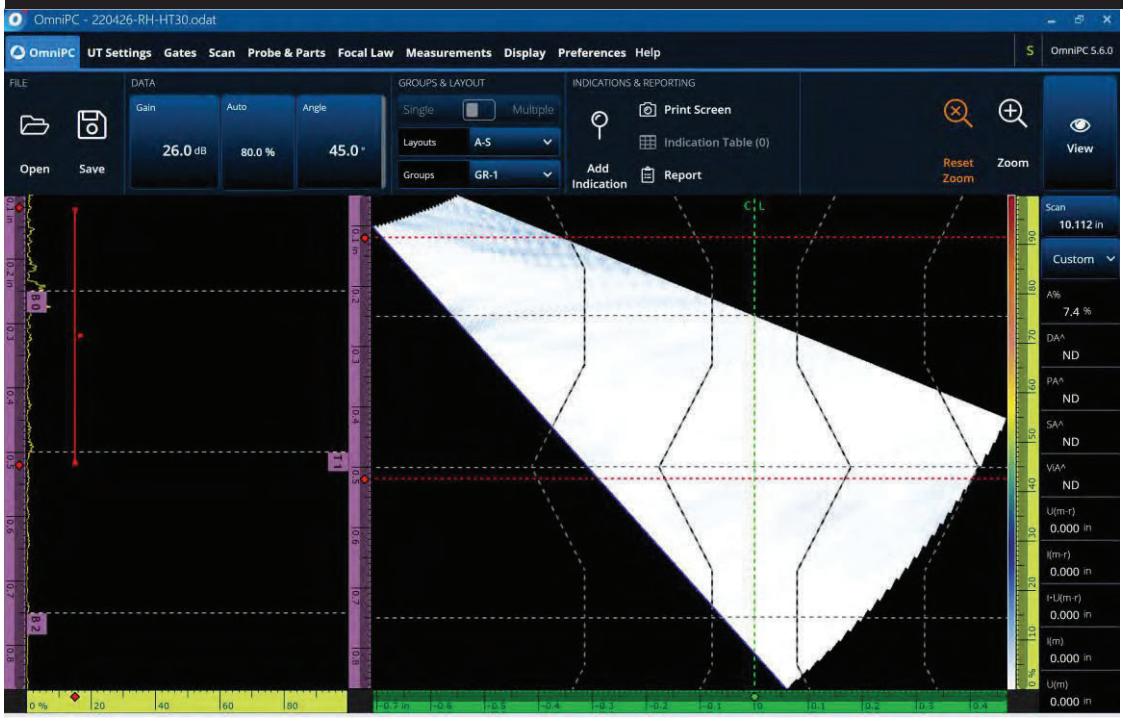
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT30 (Manual)

(b) (3) (A)

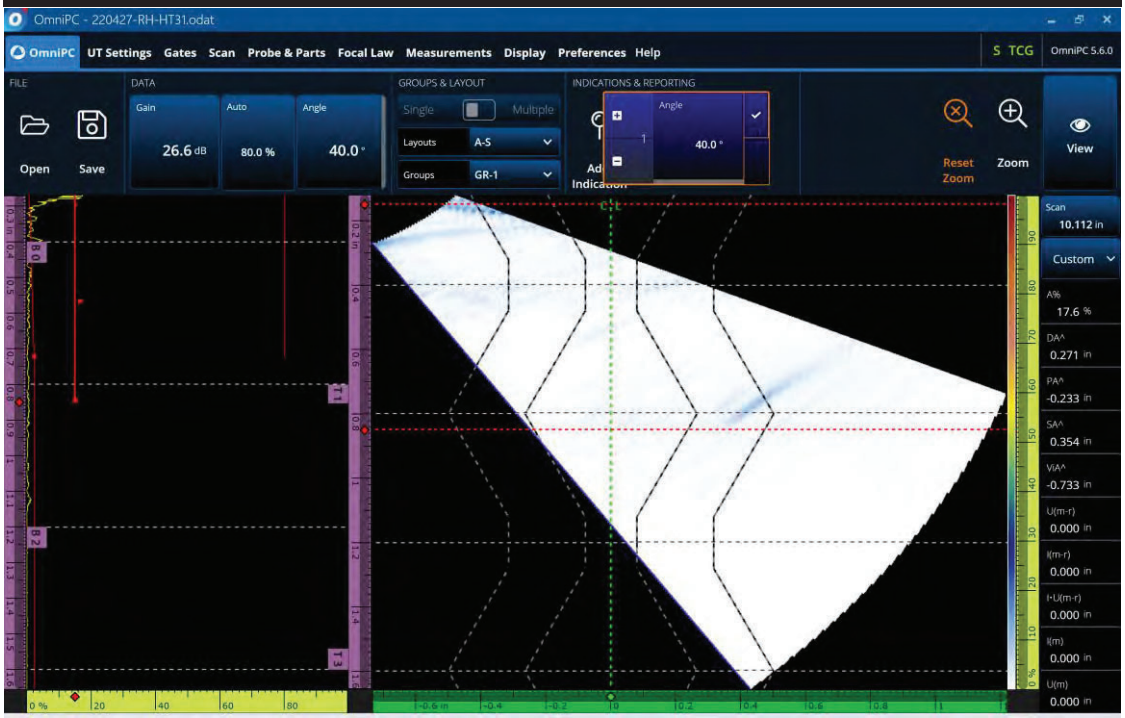


No service induced defect indications were detected in this scan.

ENGINEERING & INSPECTIONS HAWAII

HT31 (Manual)

(b) (3) (A)



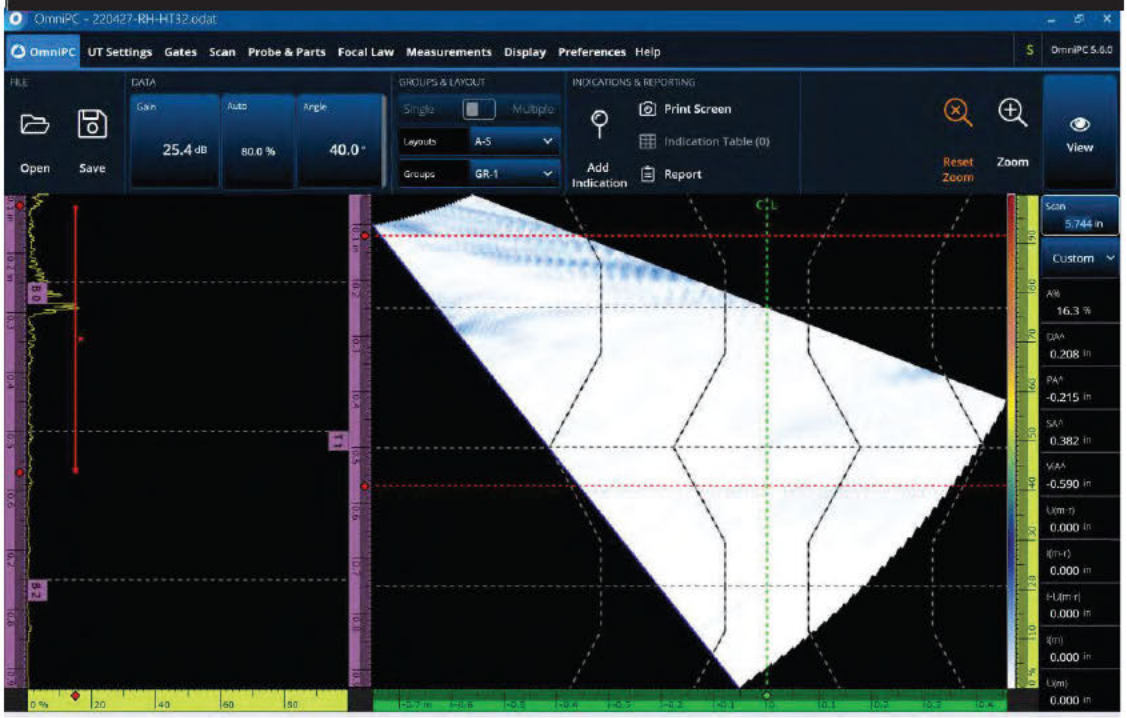
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT32 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

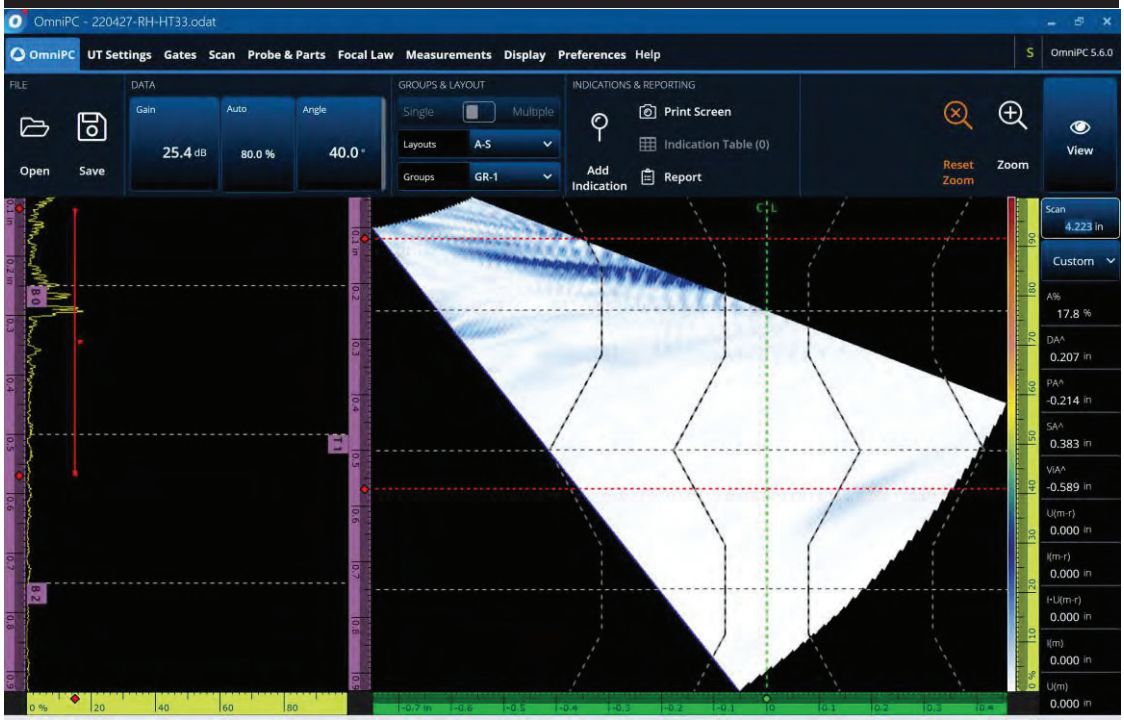
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT33 (Manual)

(b) (3) (A)



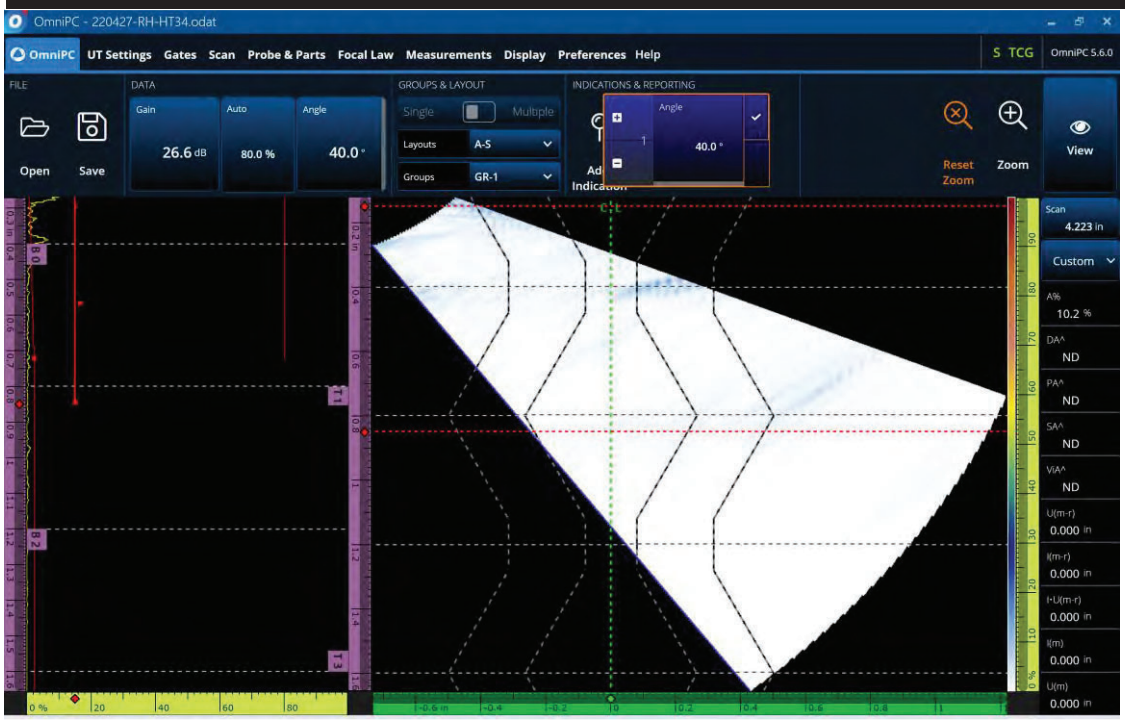
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT34 (Manual)

(b) (3) (A)



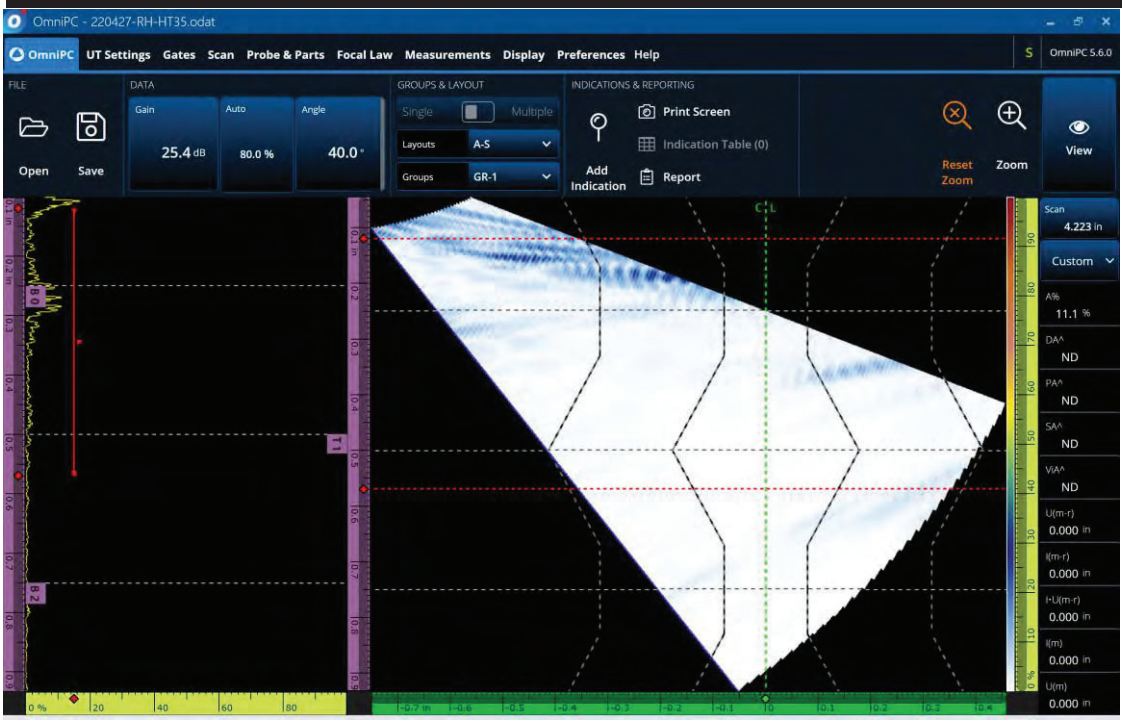
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT35 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

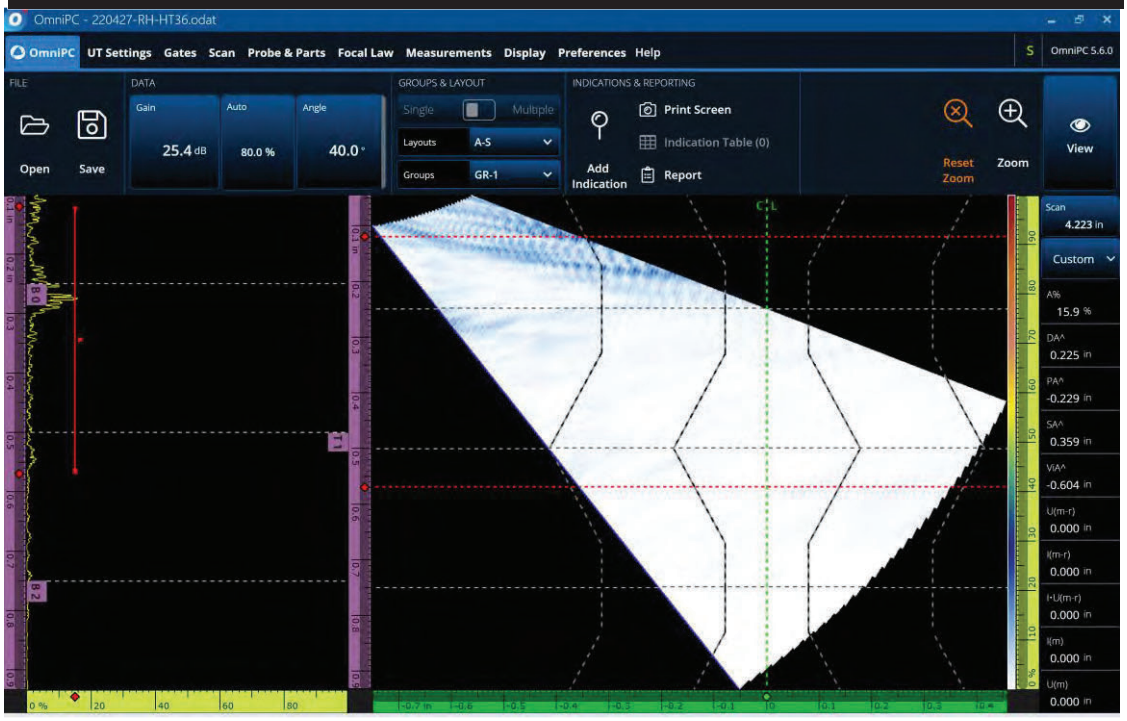
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT36 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

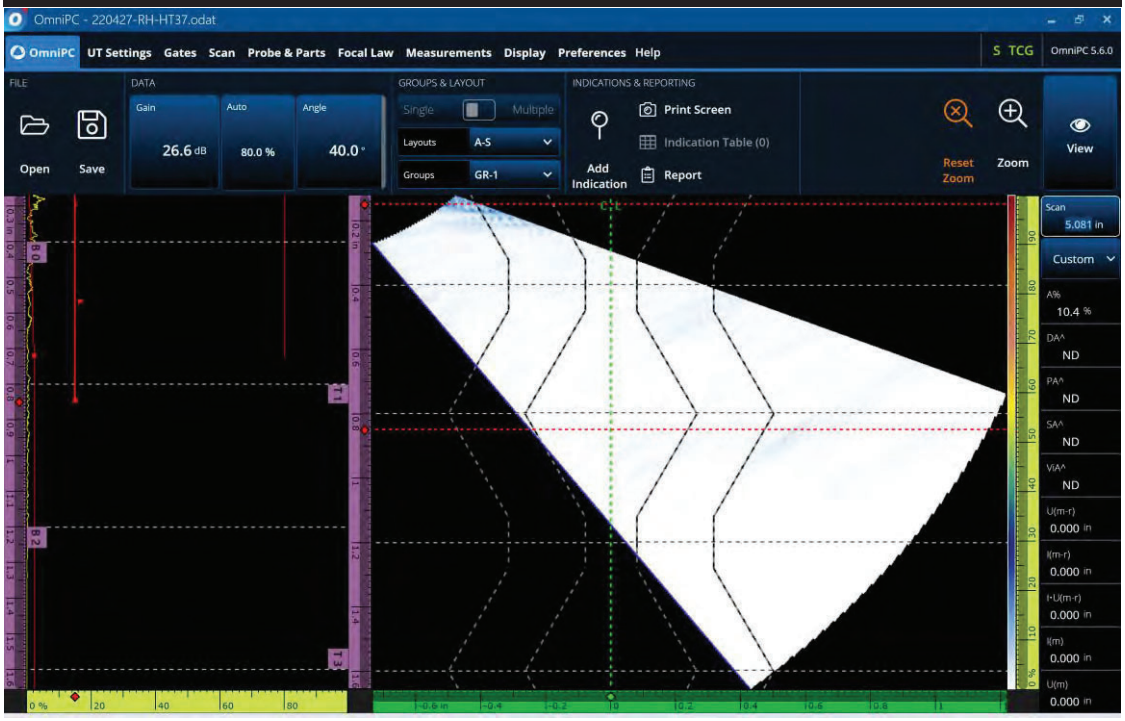
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT37 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

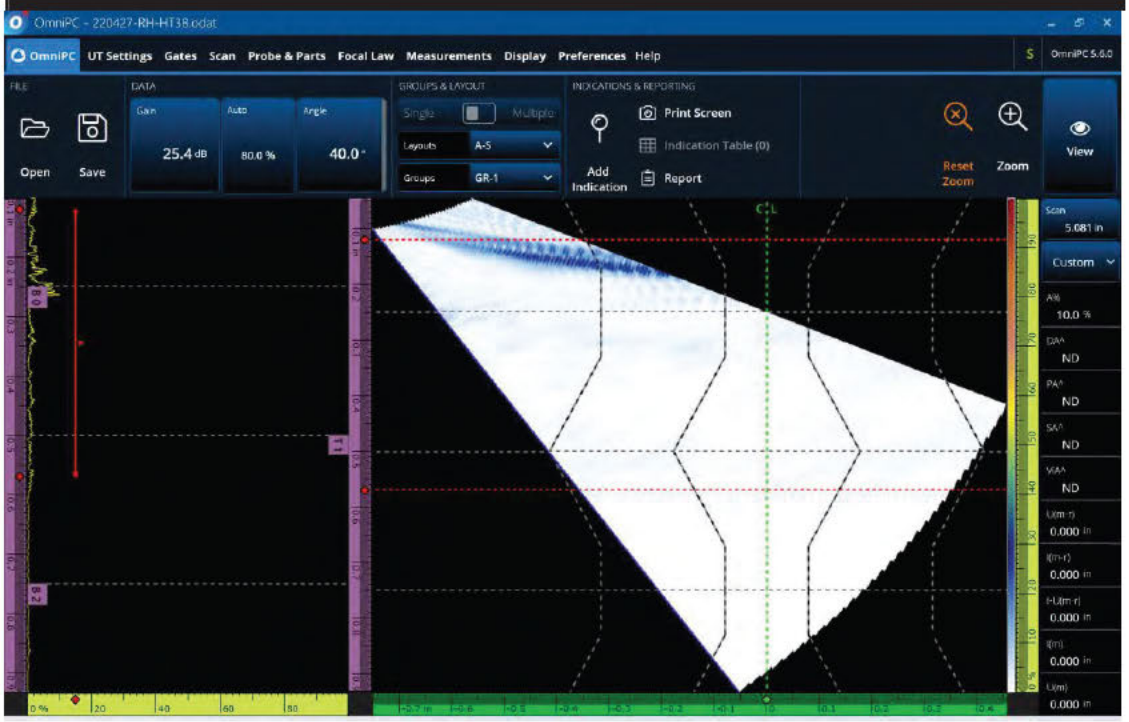
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT38 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

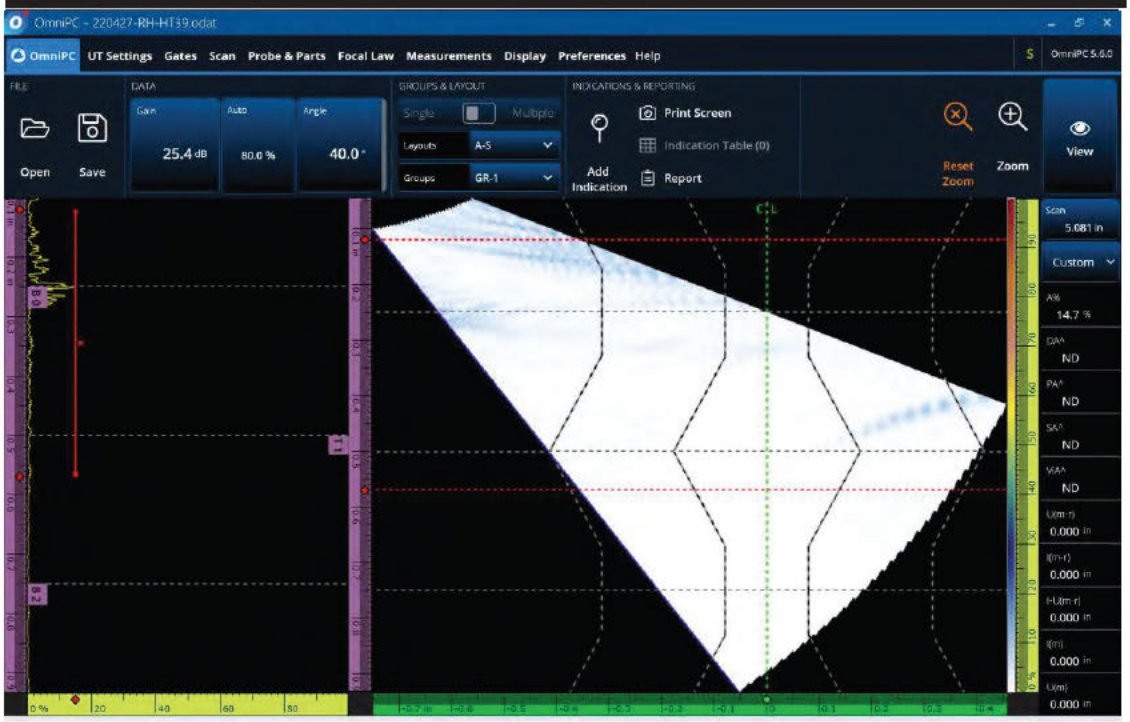
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

HT39 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

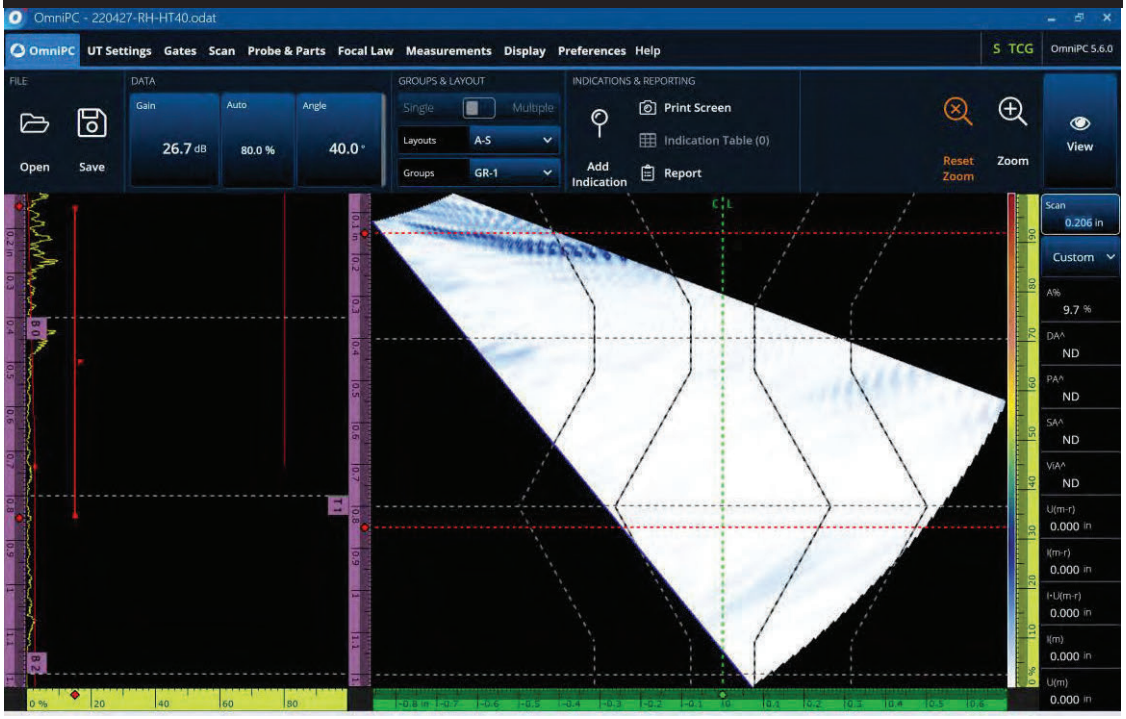
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT40 (Manual)

(b) (3) (A)



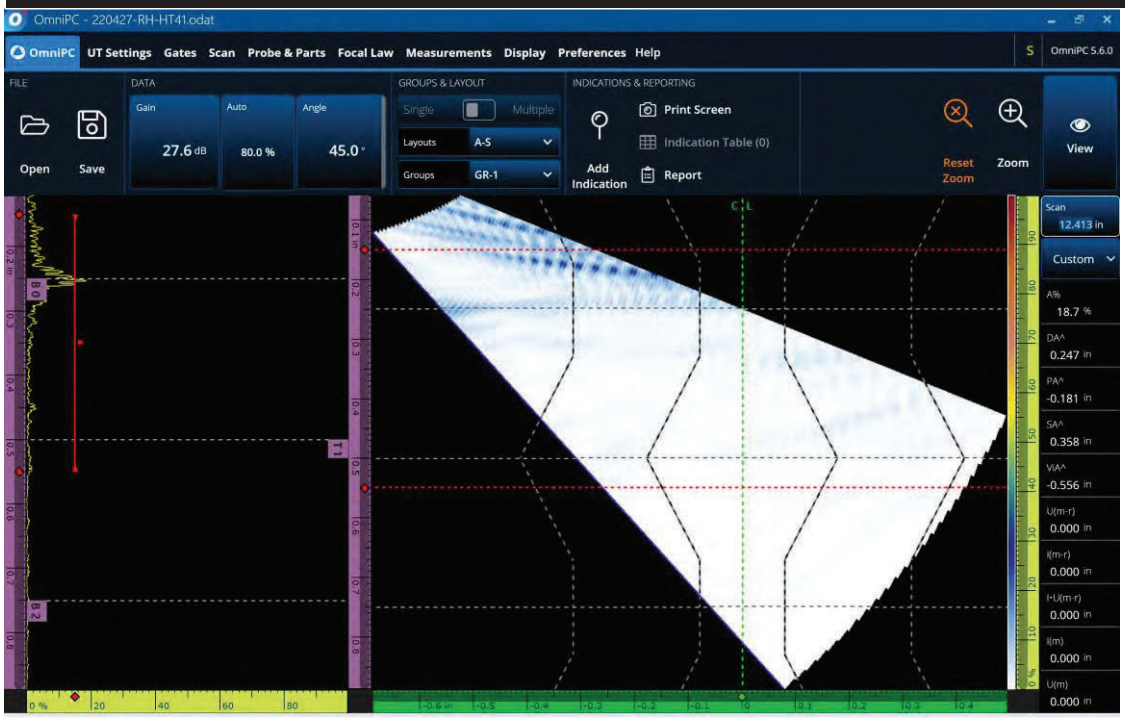
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT41 (Manual)

(b) (3) (A)



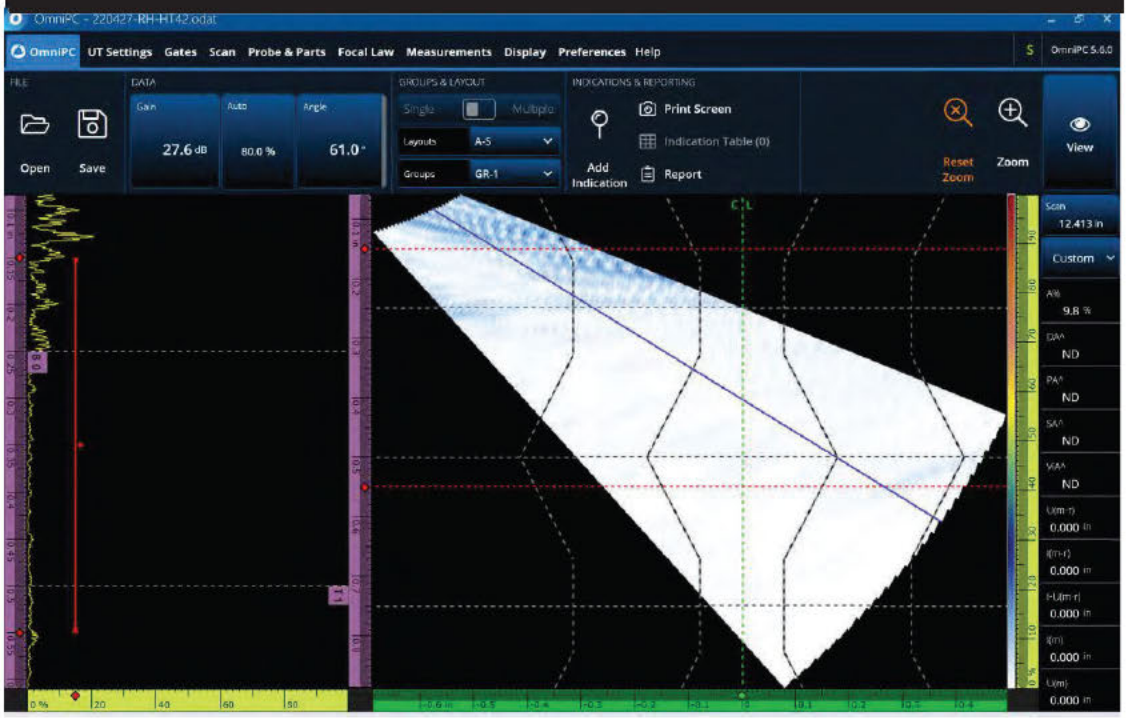
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT42 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

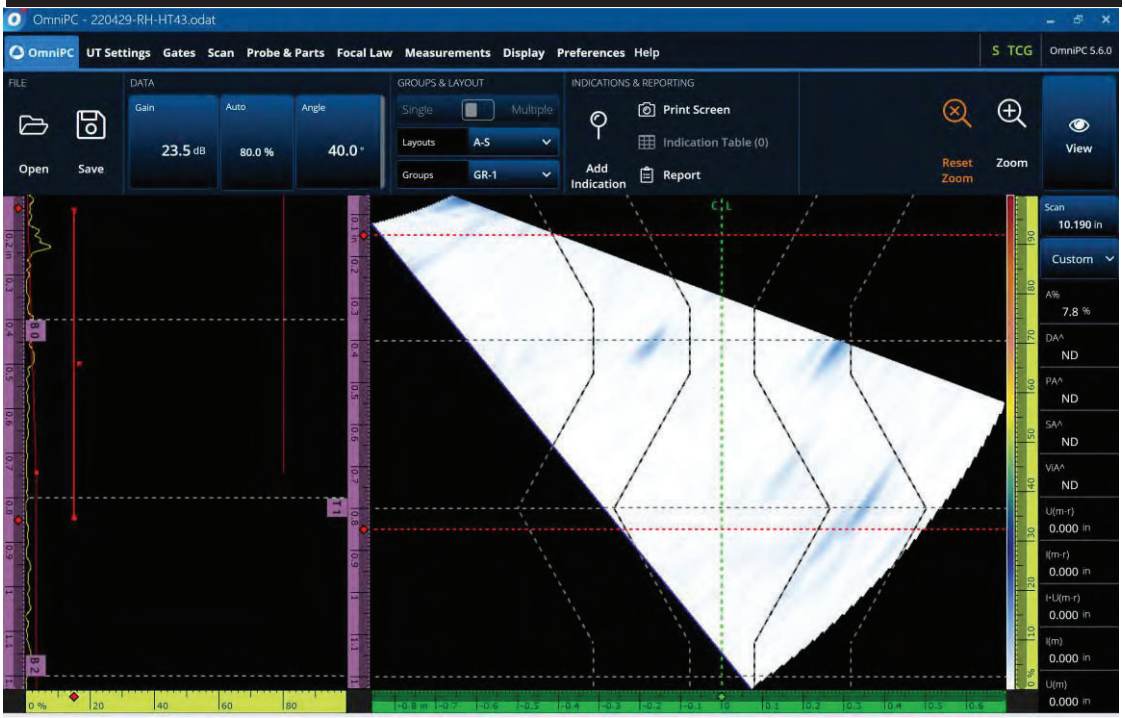
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT43 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

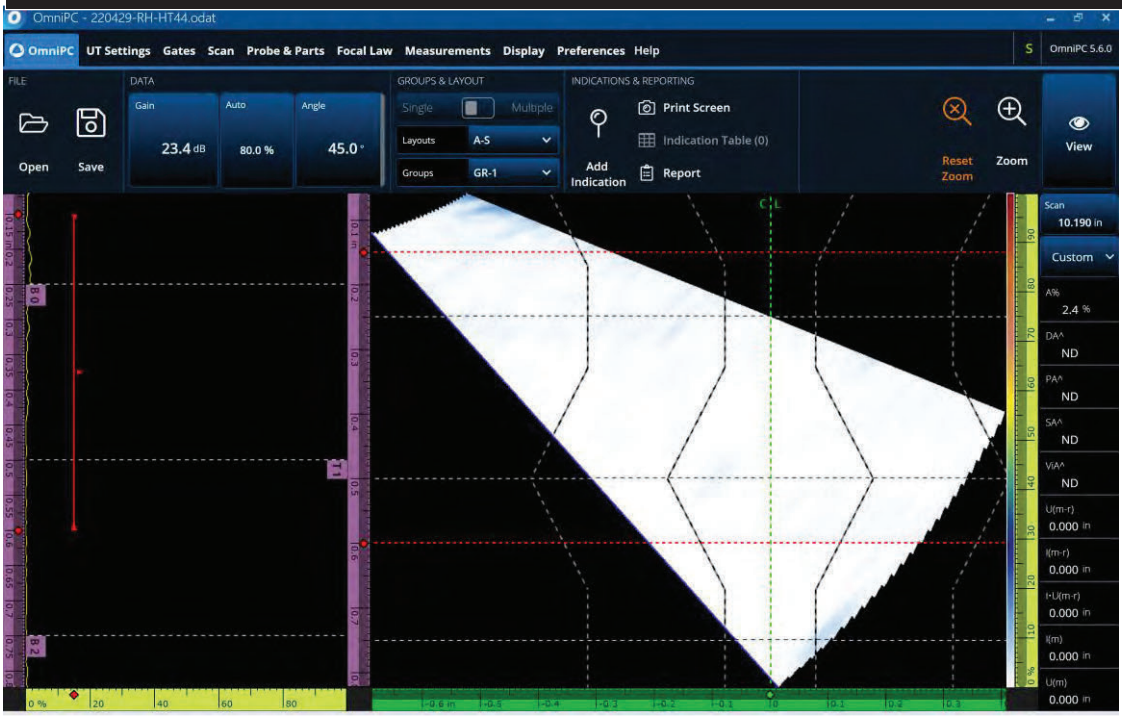
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT44 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

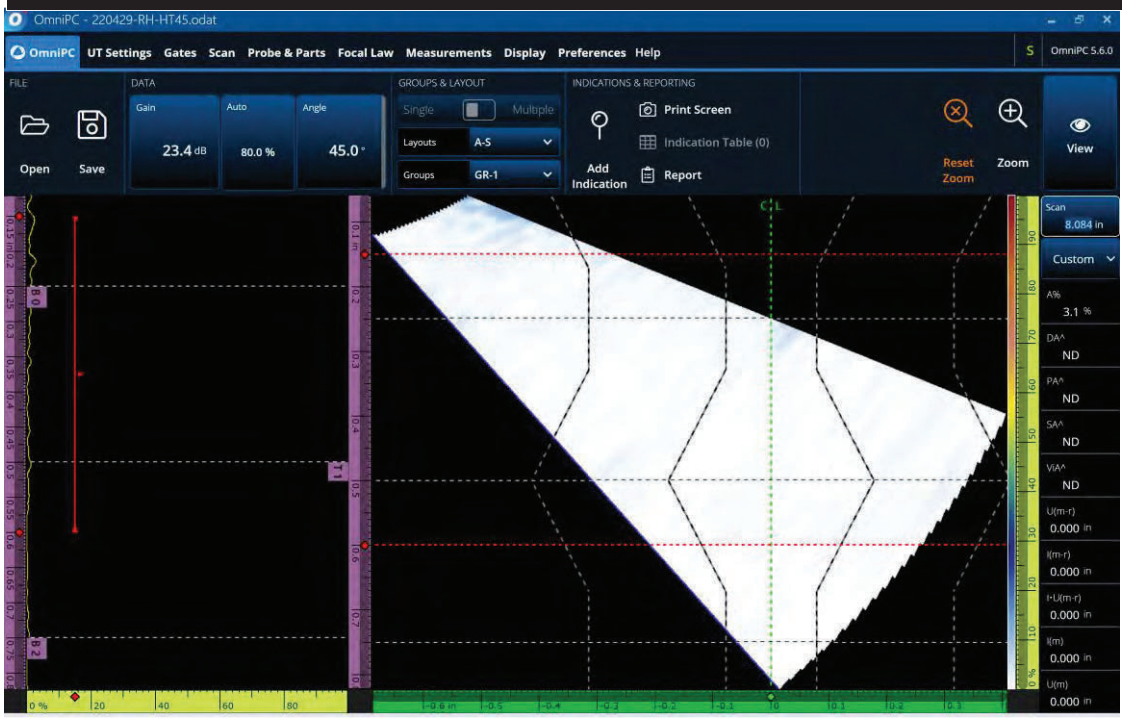
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT45 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

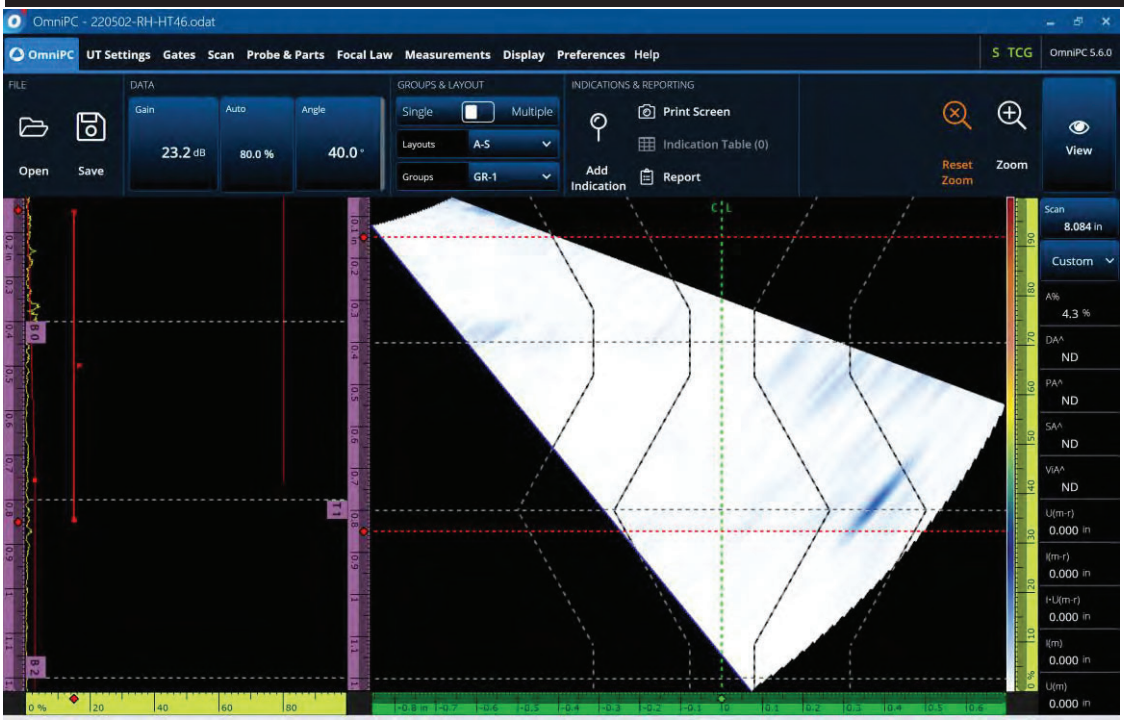
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT46 (Manual)

(b) (3) (A)



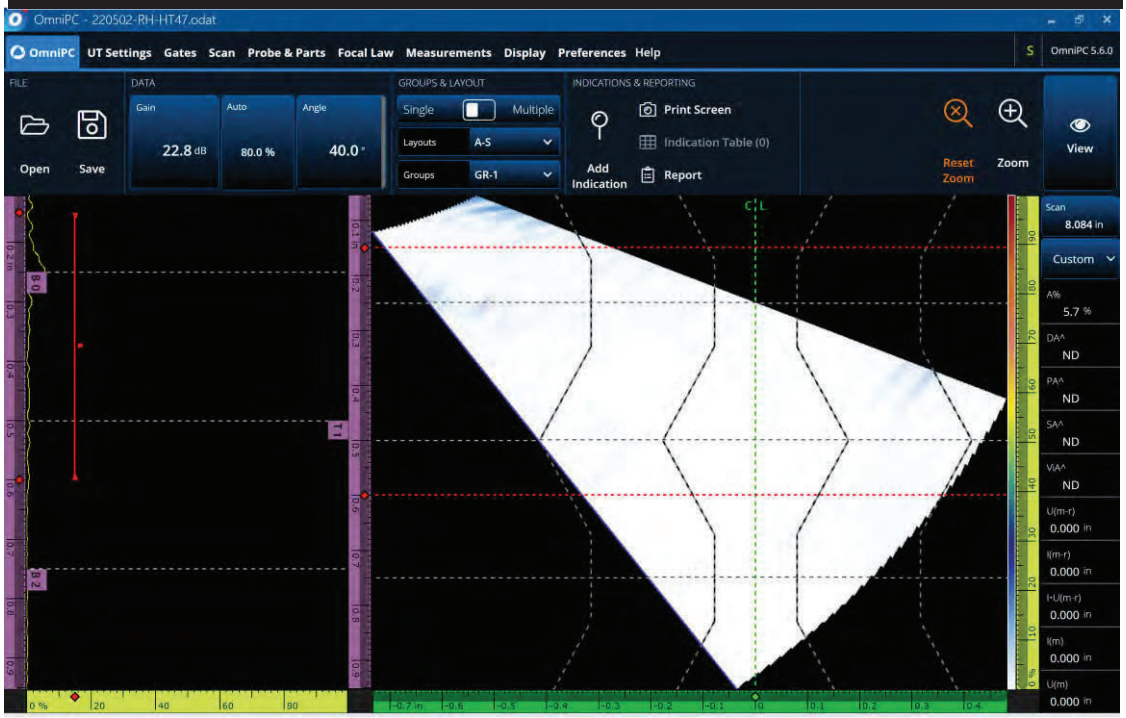
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT47 (Manual)

(b) (3) (A)



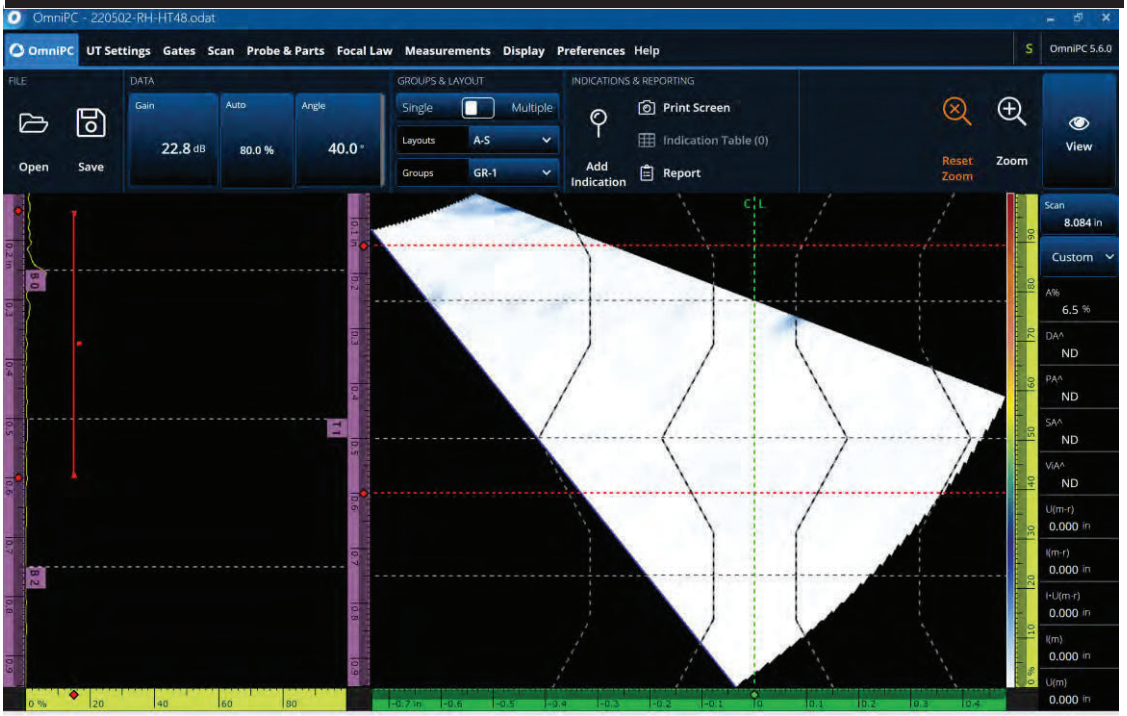
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT48 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

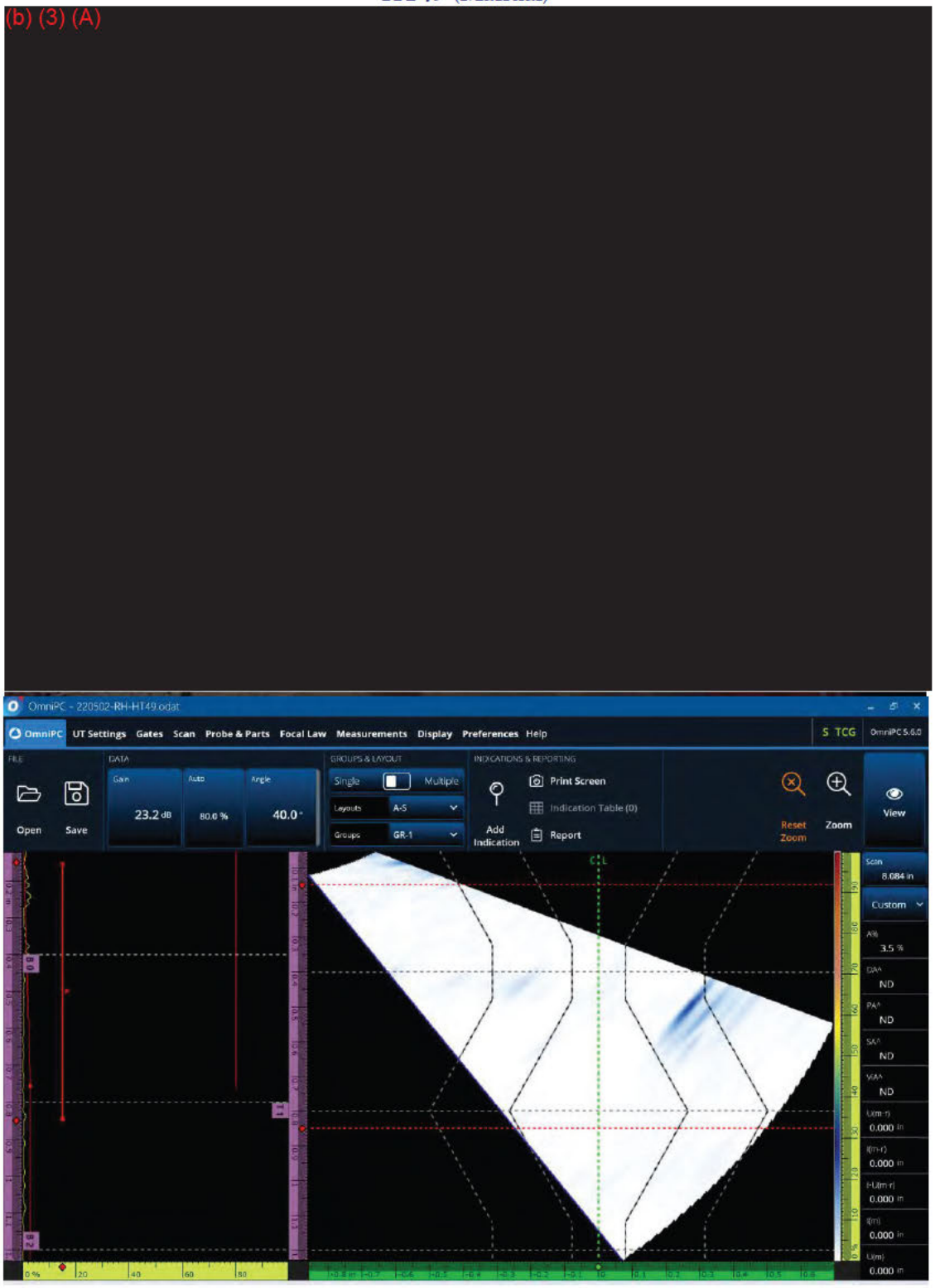
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT49 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

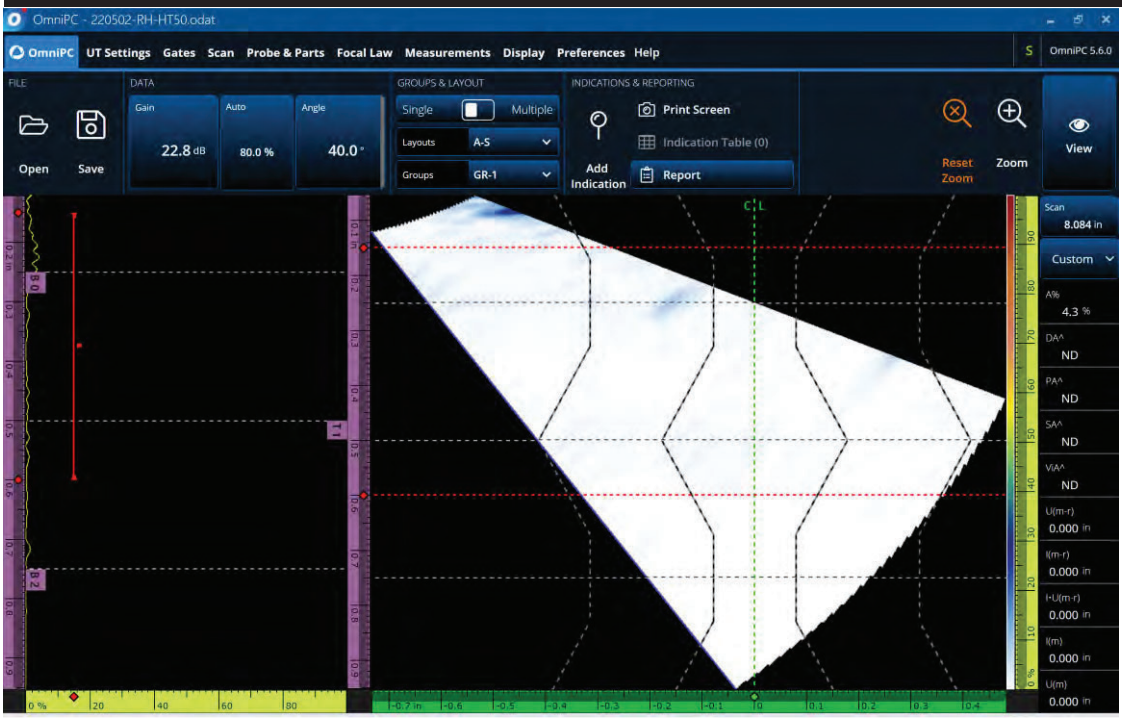
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT50 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

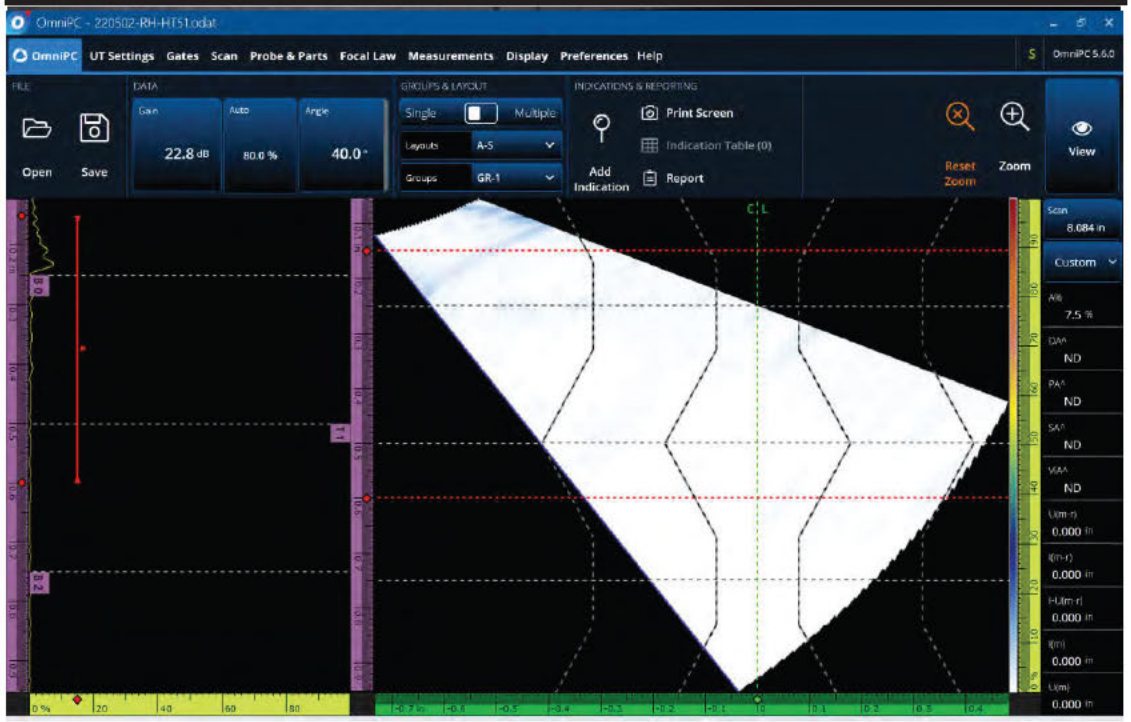
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT51 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

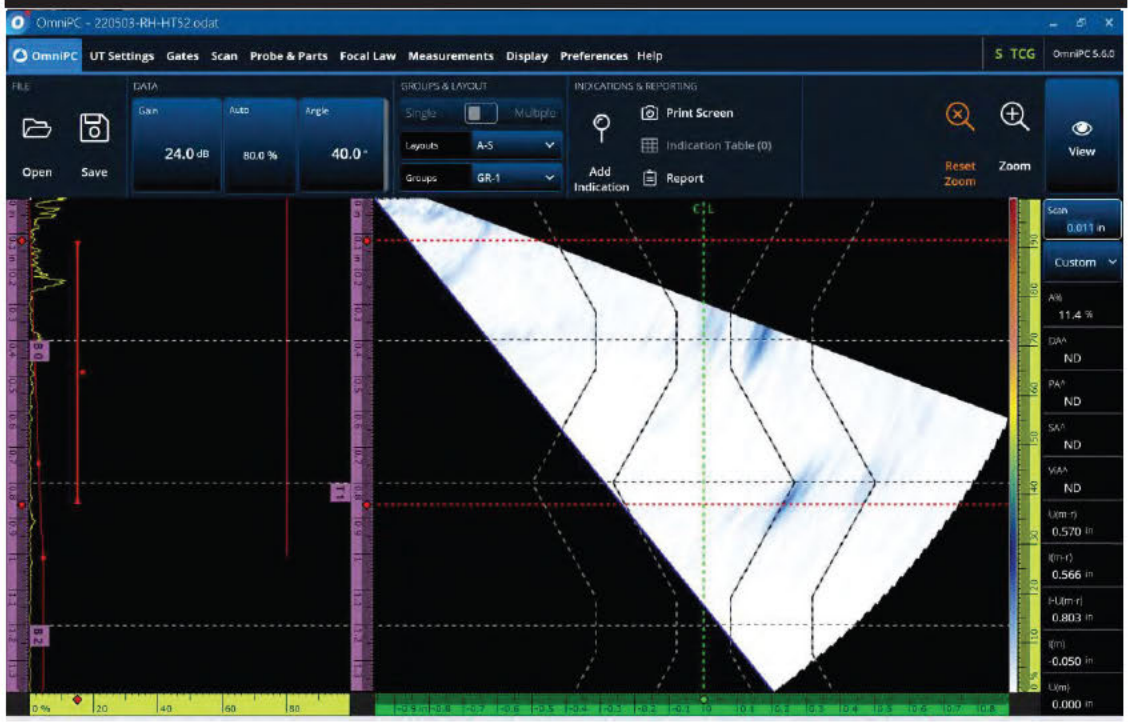
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT52 (Manual)

(b) (3) (A)



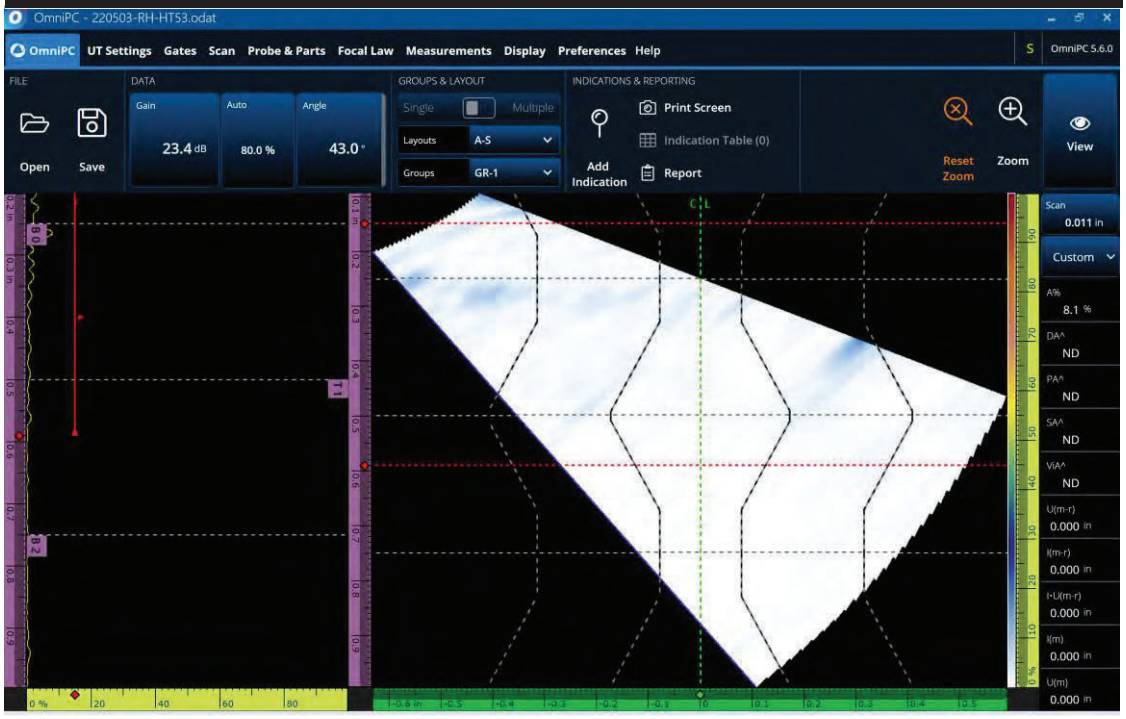
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT53 (Manual)

(b) (3) (A)

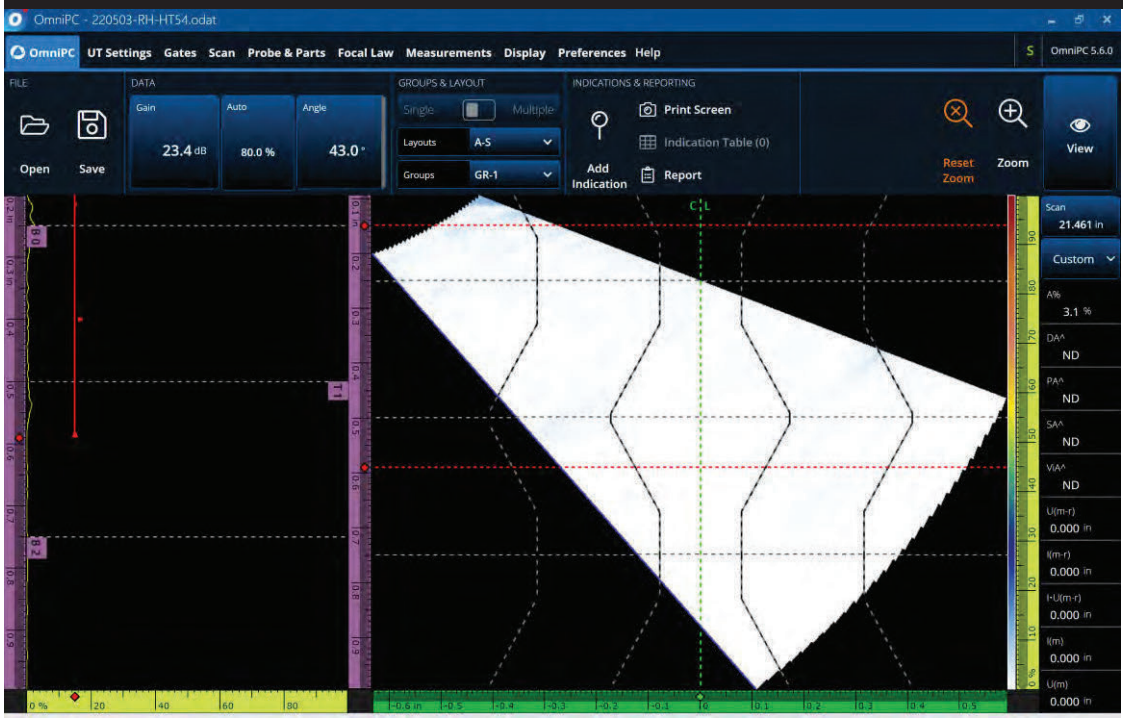


No service induced defect indications were detected in this scan.

ENGINEERING & INSPECTIONS HAWAII

HT54 (Manual)

(b) (3) (A)



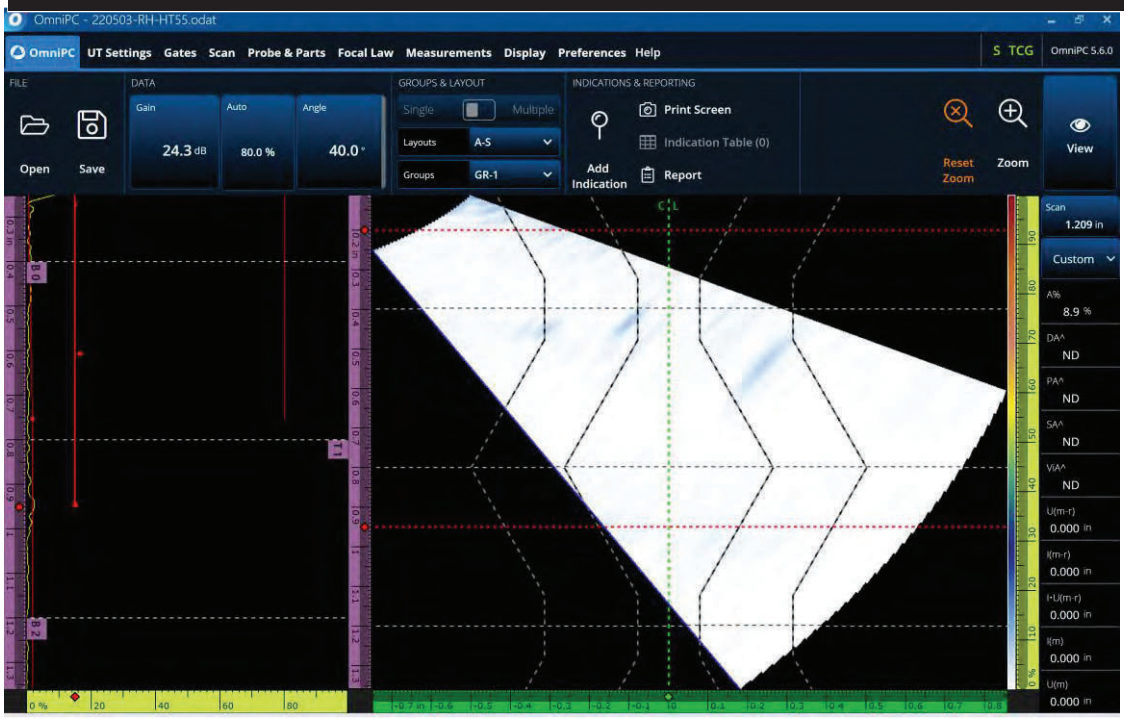
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT55 (Manual)

(b) (3) (A)



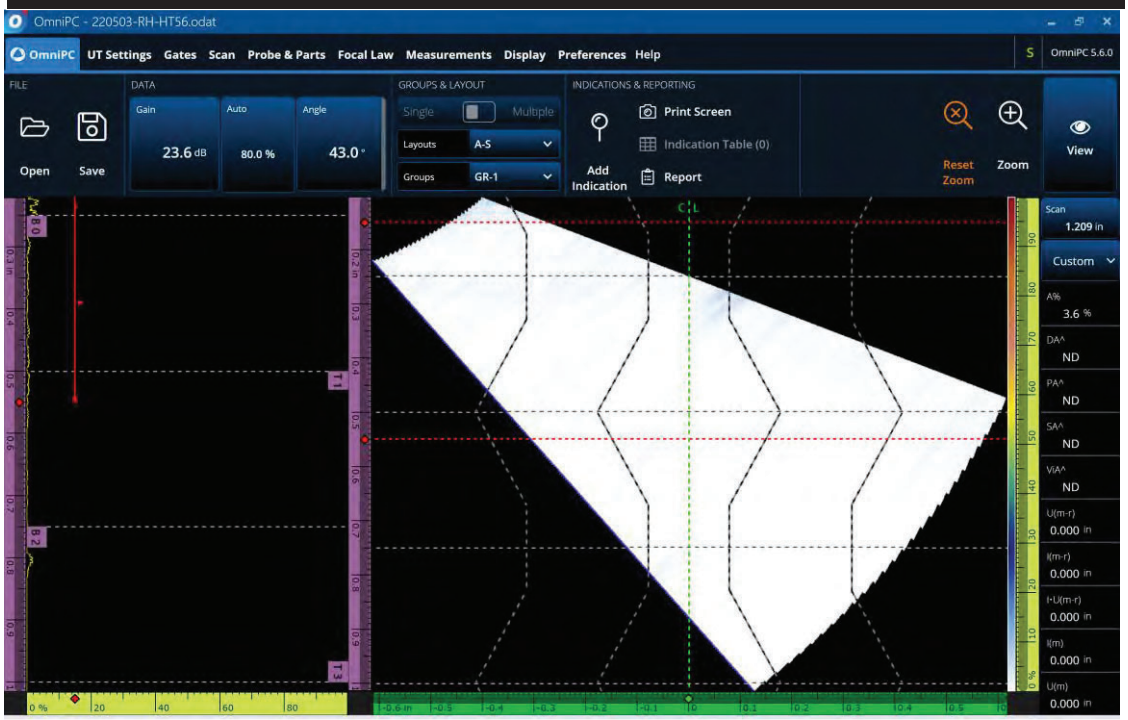
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT56 (Manual)

(b) (3) (A)



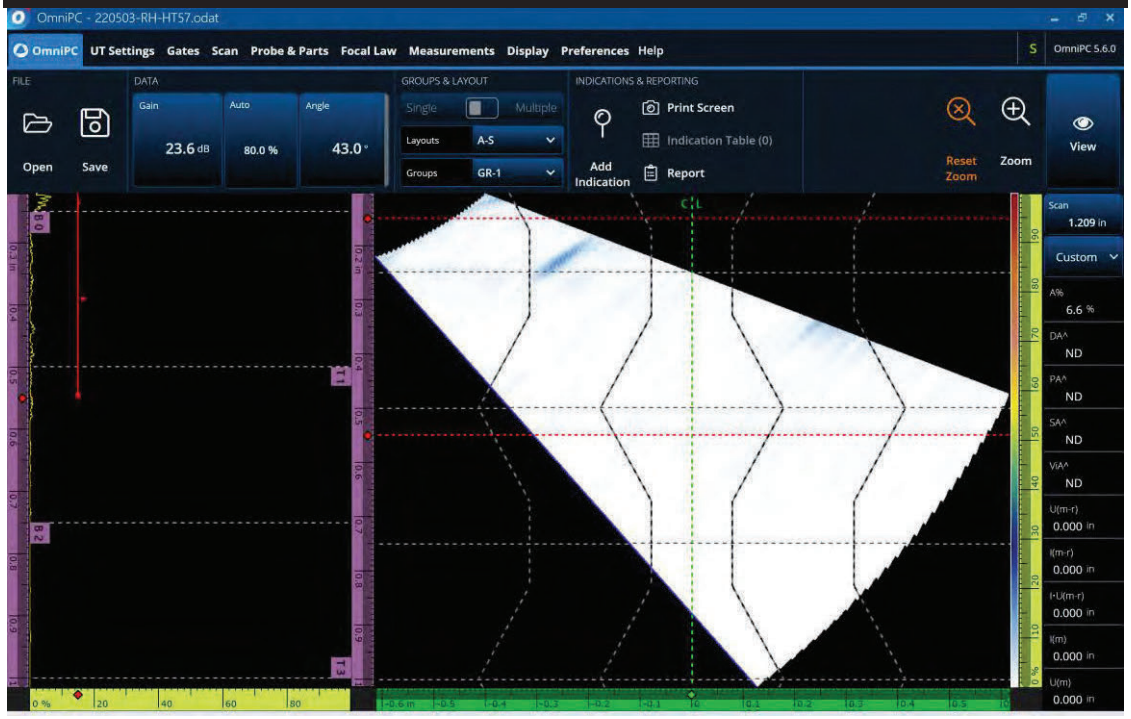
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

HT57 (Manual)

(b) (3) (A)



No service induced defect indications were detected in this scan.

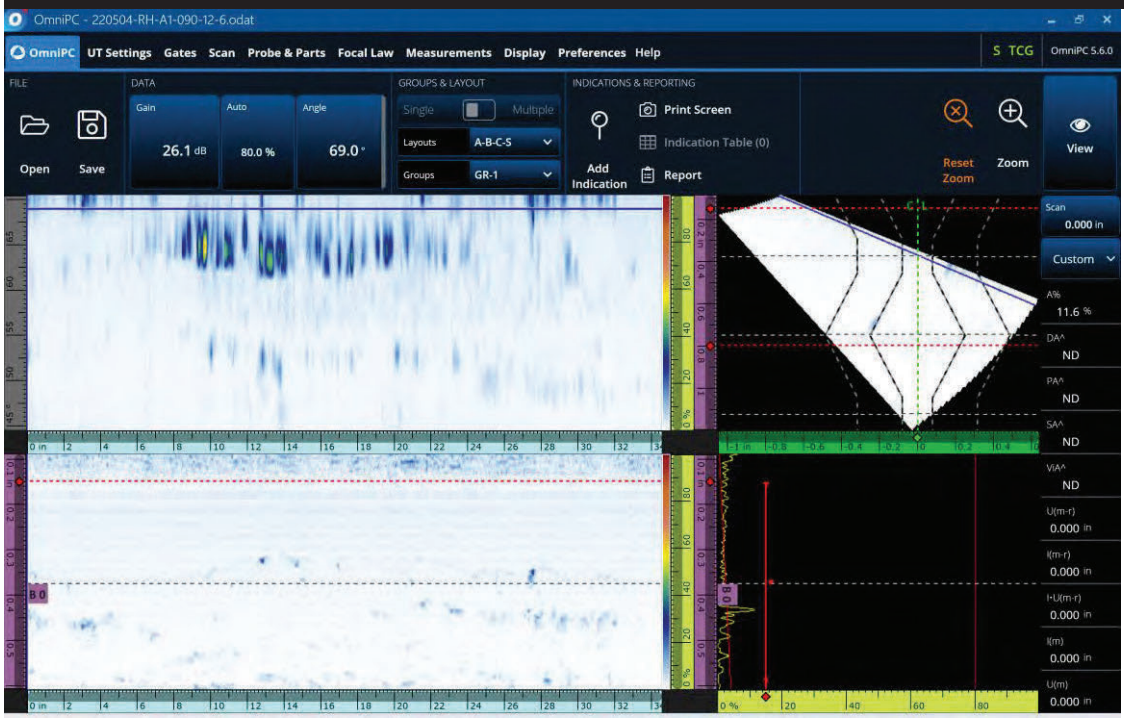
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

A1 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

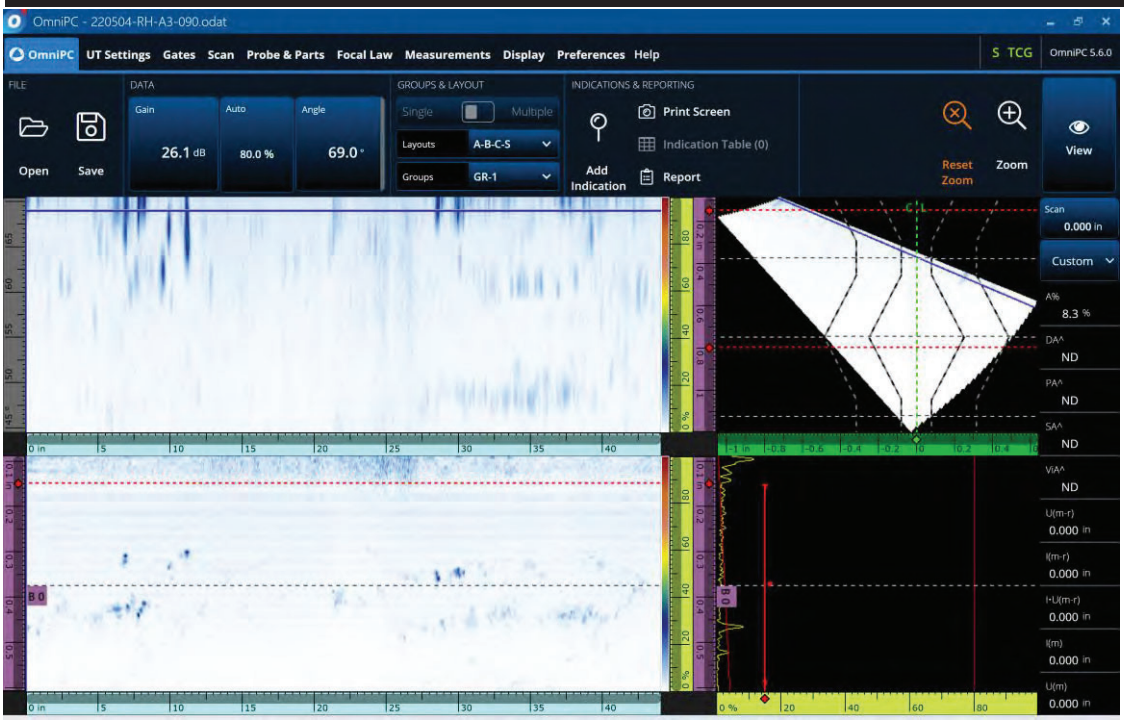
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

A3 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

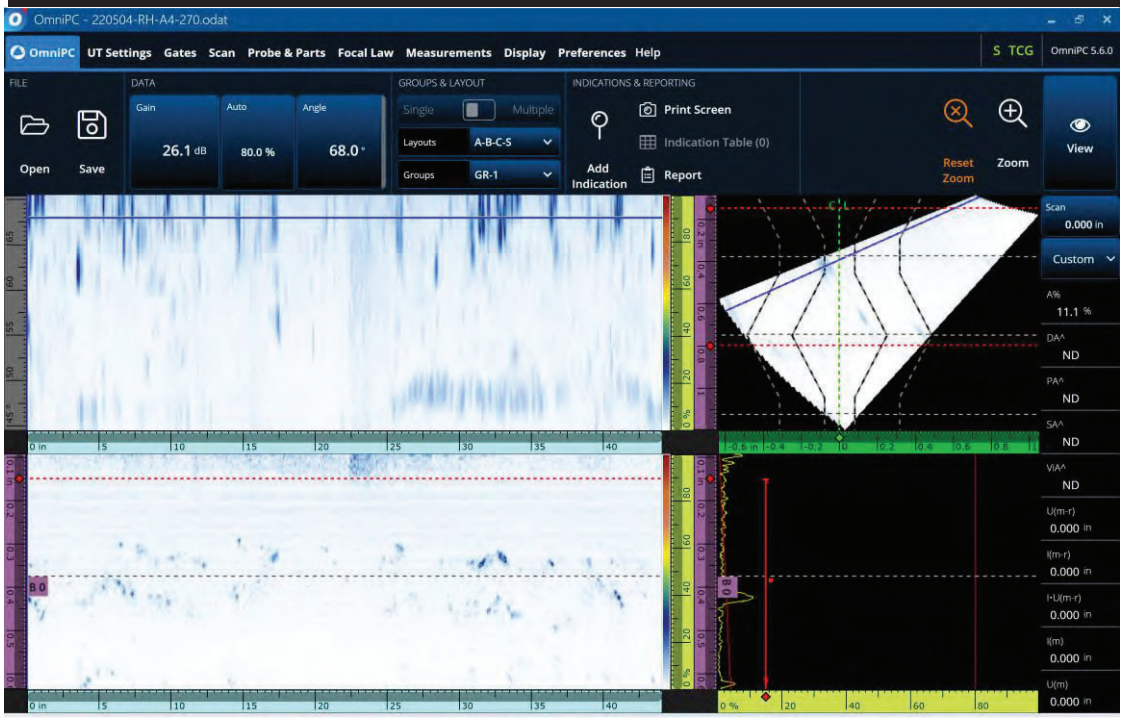
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

A4 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

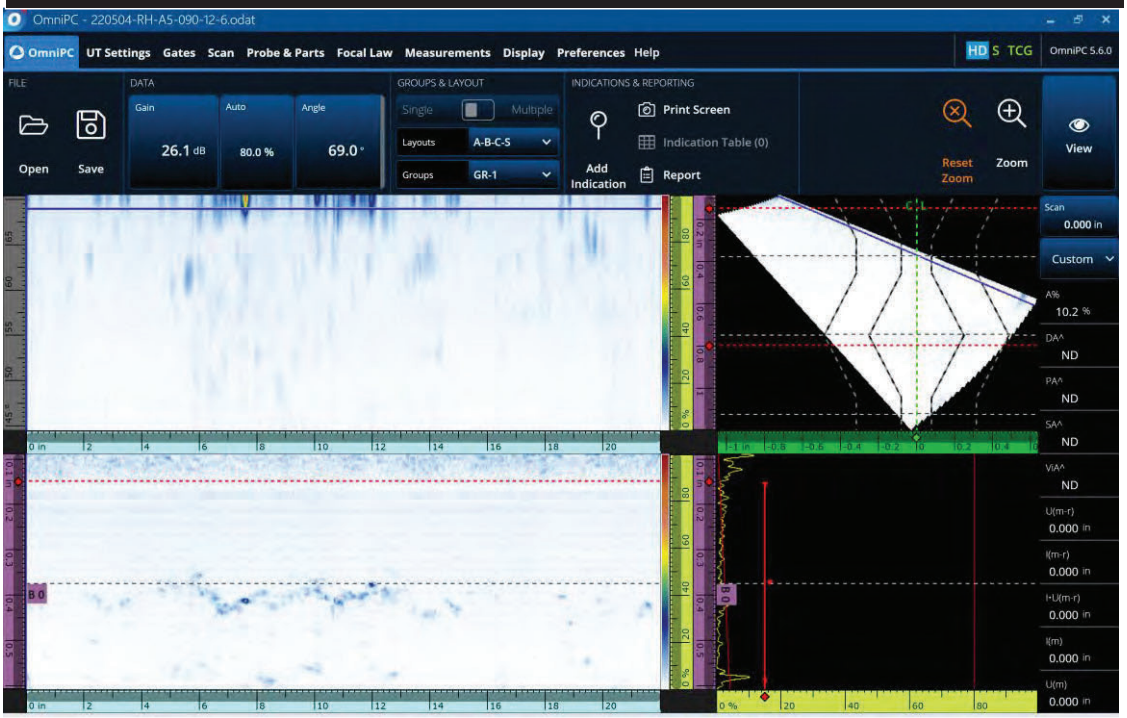
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

A5 (Encoded)

(b) (3) (A)



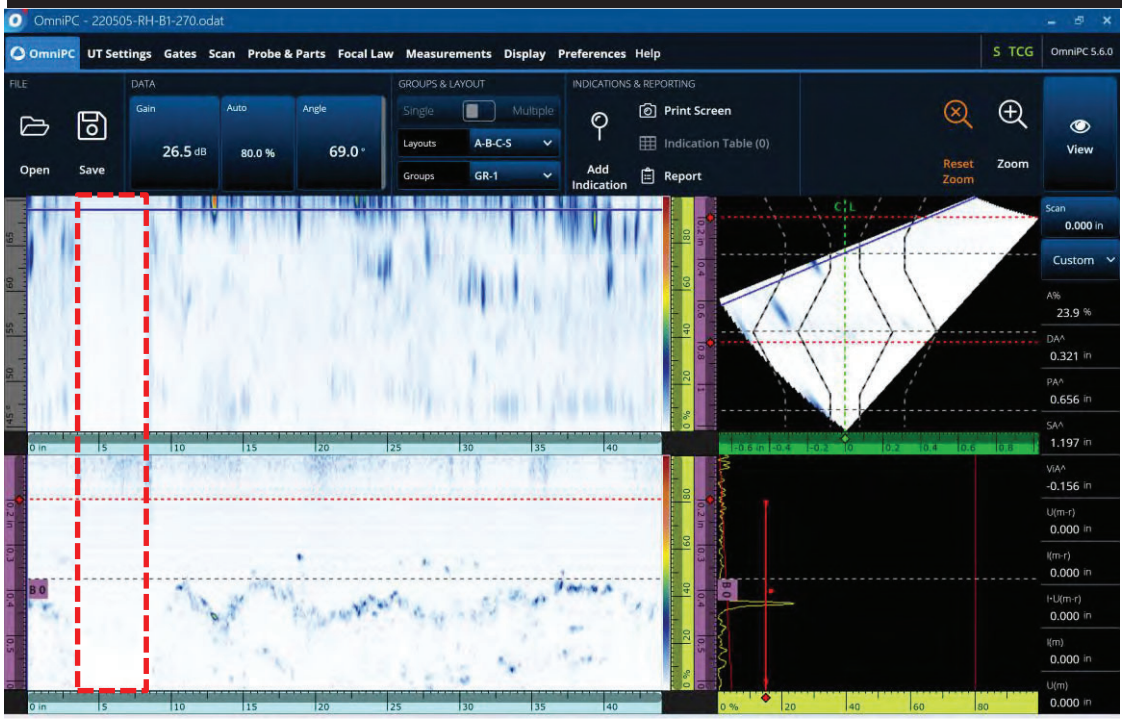
No service induced defect indications were detected in this scan.

[redacted]

ENGINEERING & INSPECTIONS HAWAII

B1 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan. *4.6" of missed data due to coating section unable to be removed on backside of pipe.

[redacted]

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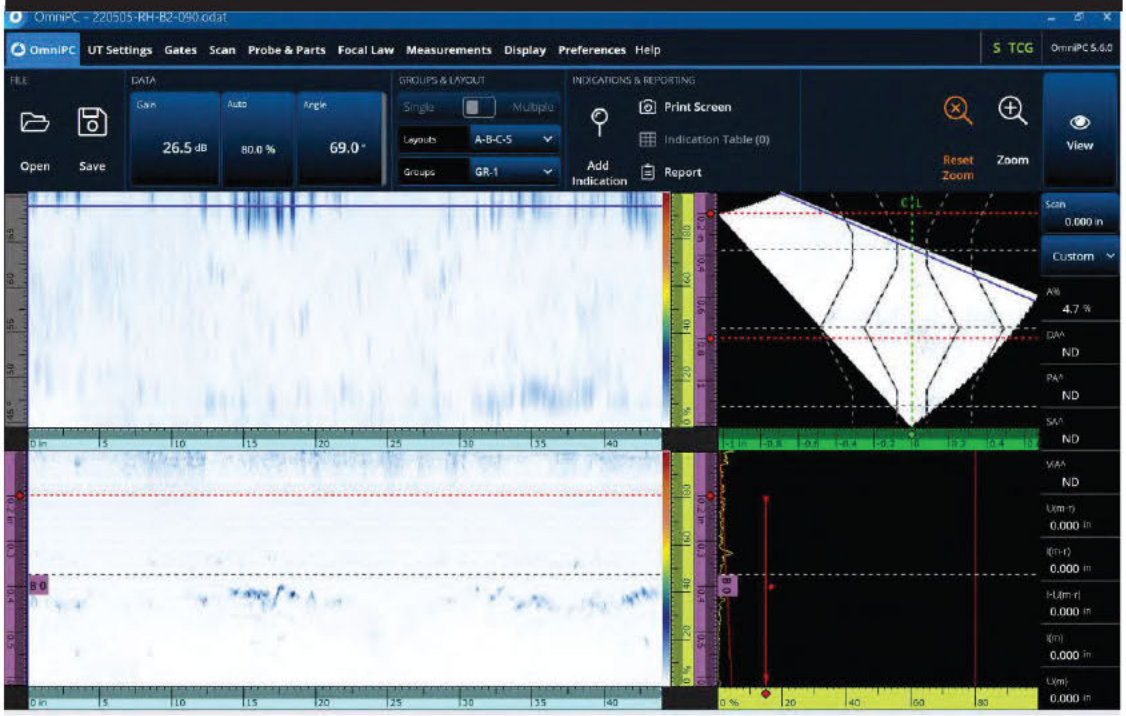
HAWAII

B2 (Encoded)

(b) (3) (A)



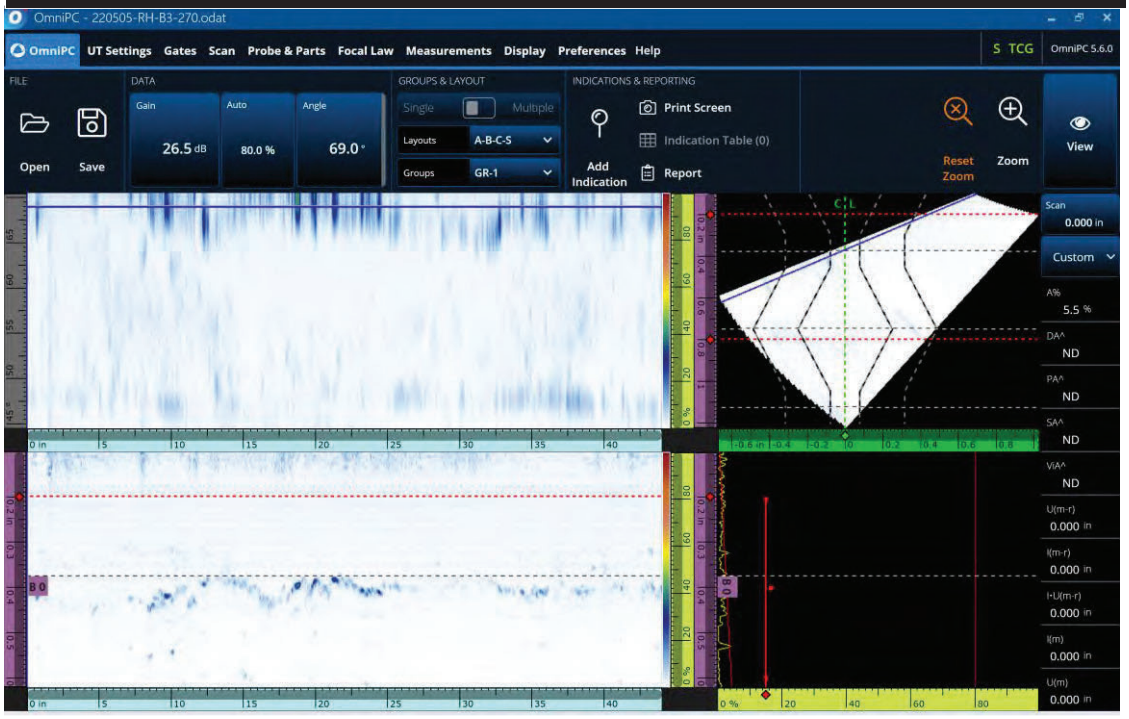
No service induced defect indications were detected in this scan.

[redacted]

[redacted]

B3 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

B4 (Encoded)

(b) (3) (A)

[redacted]

No service induced defect indications were detected in this scan.

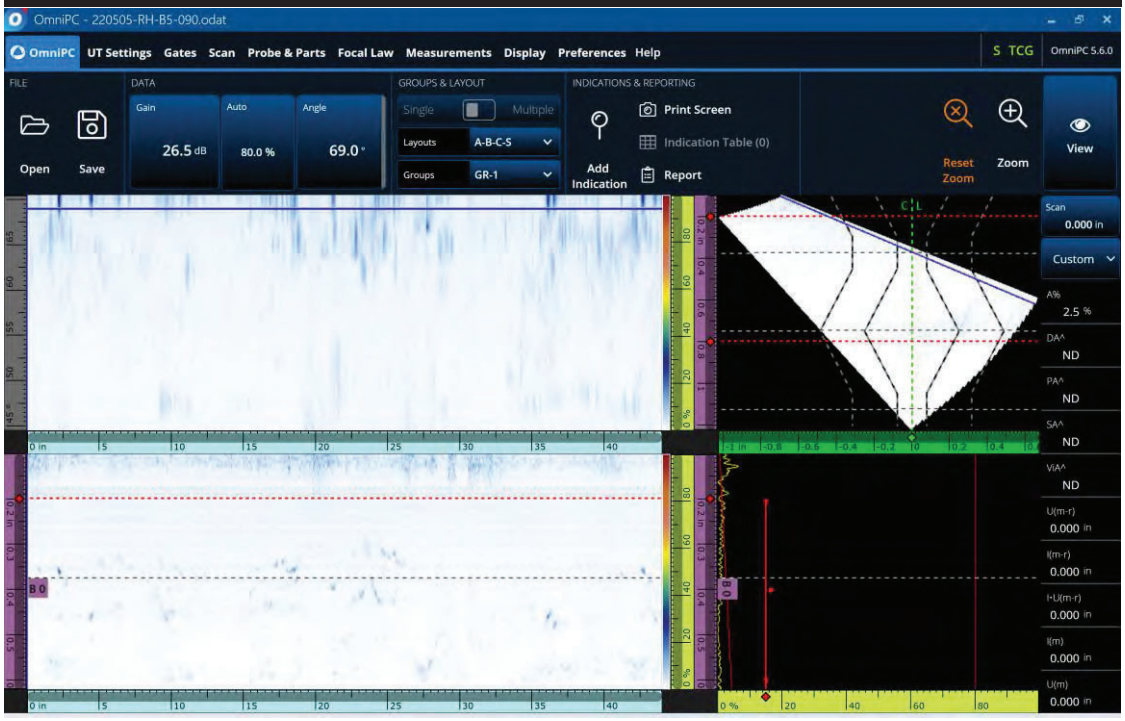
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

B5 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

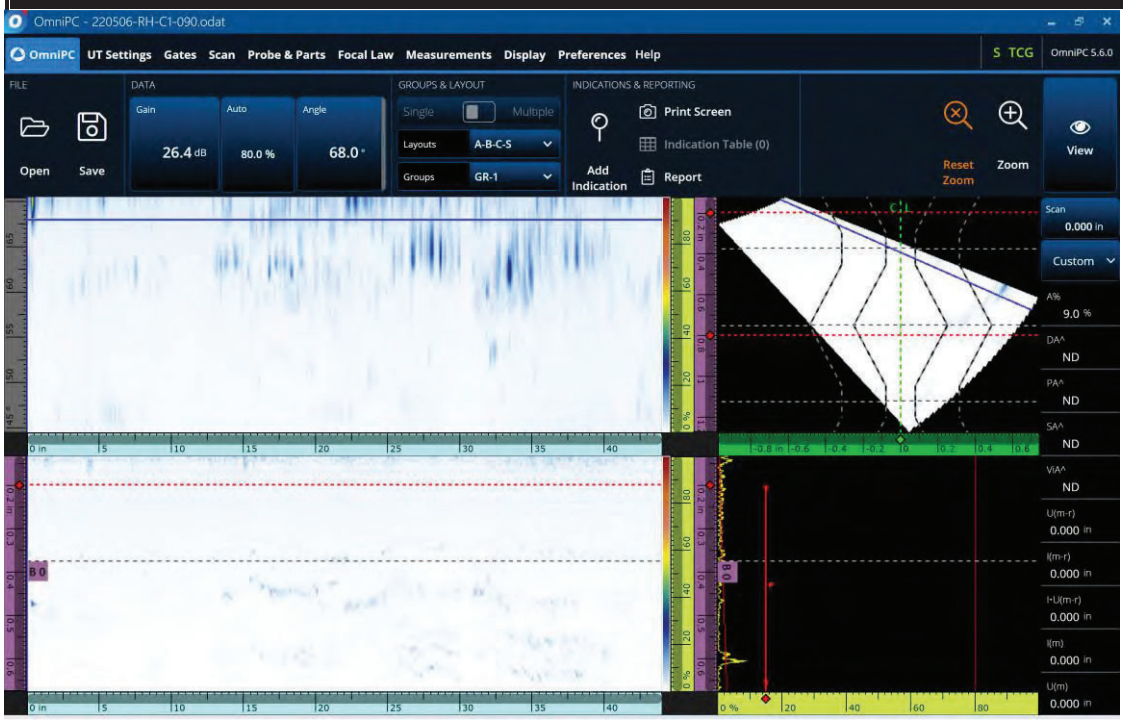
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

C1 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

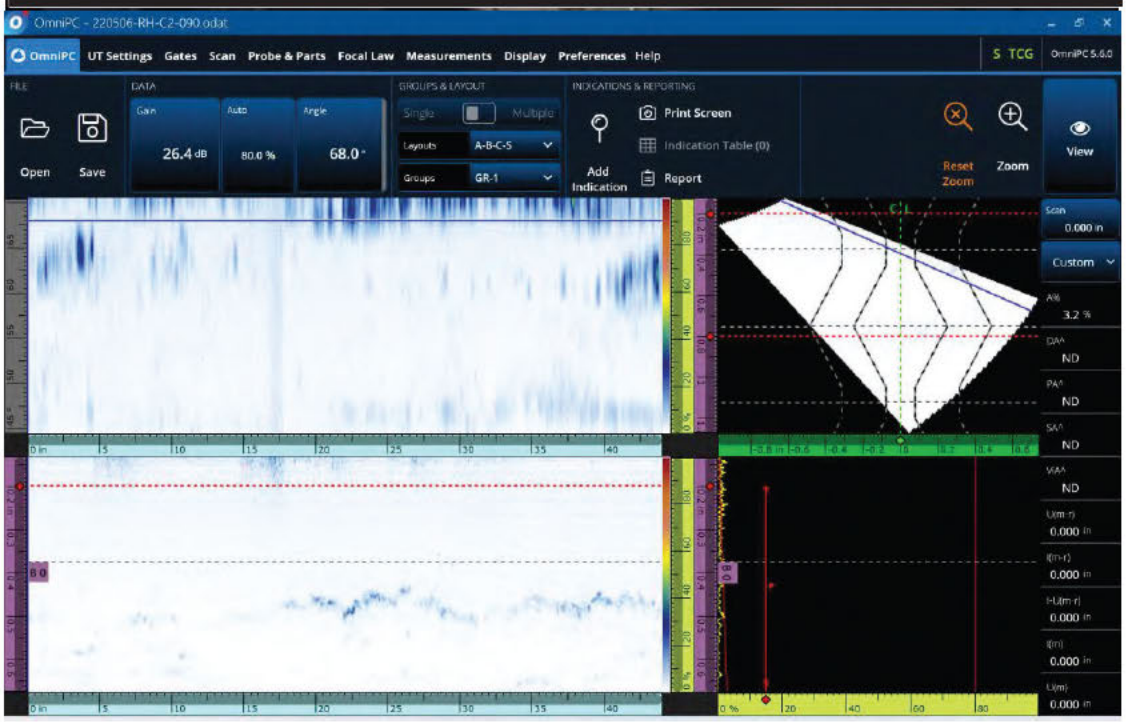
[redacted]

[redacted]

E&I ENGINEERING & INSPECTIONS HAWAII

C2 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

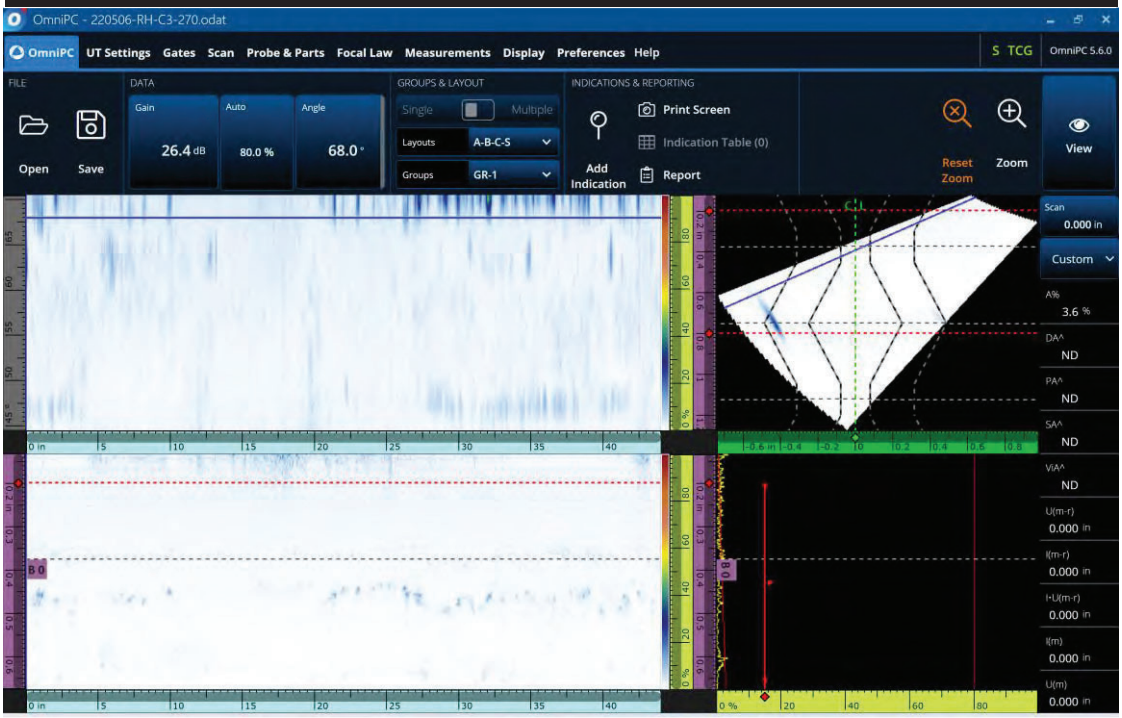
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

C3 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

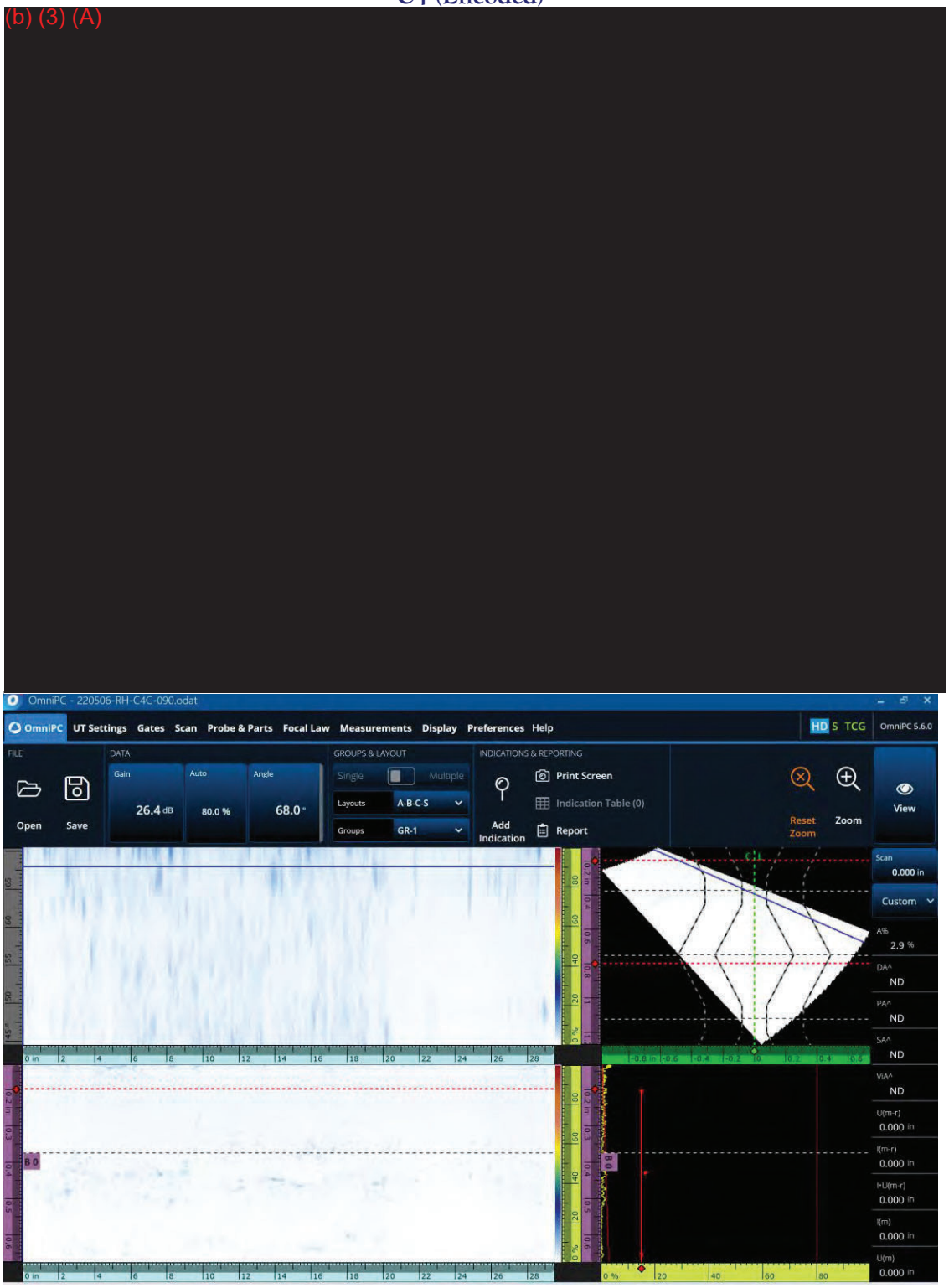
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

C4 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan. *Upper side of pipe not accessible (long seam section included to make up for missed section of circ weld).

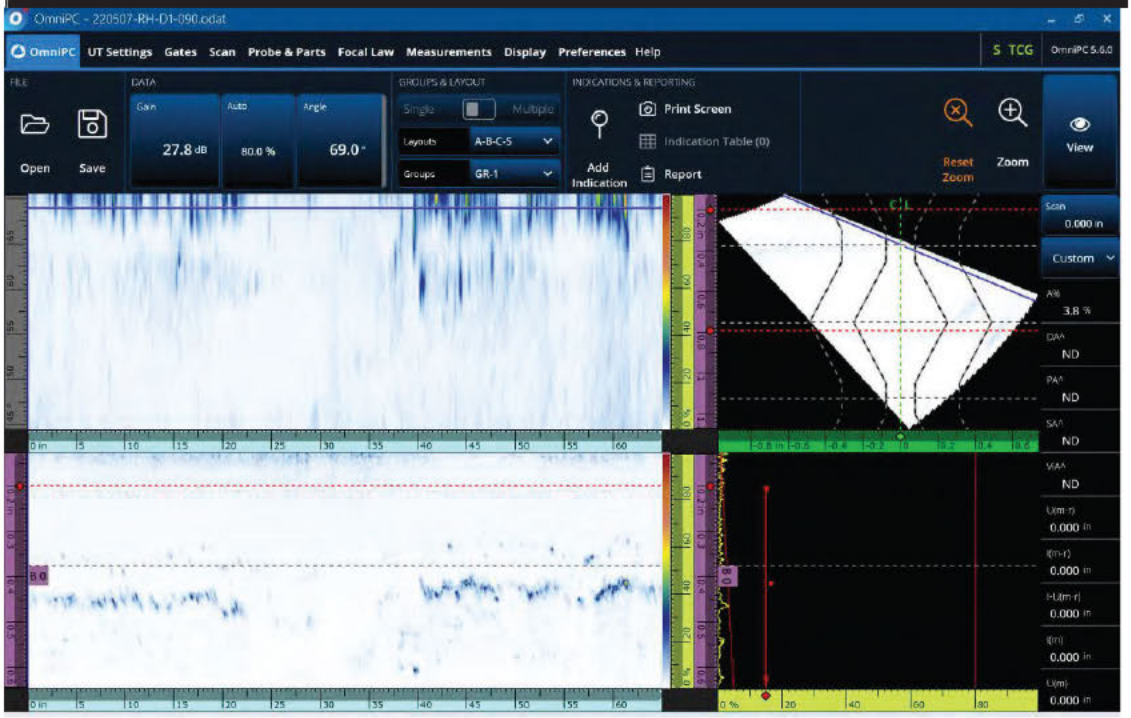
[redacted]

[redacted]

ENGINEERING & INSPECTIONS
HAWAII

D1 (Encoded)

(b) (3) (A)



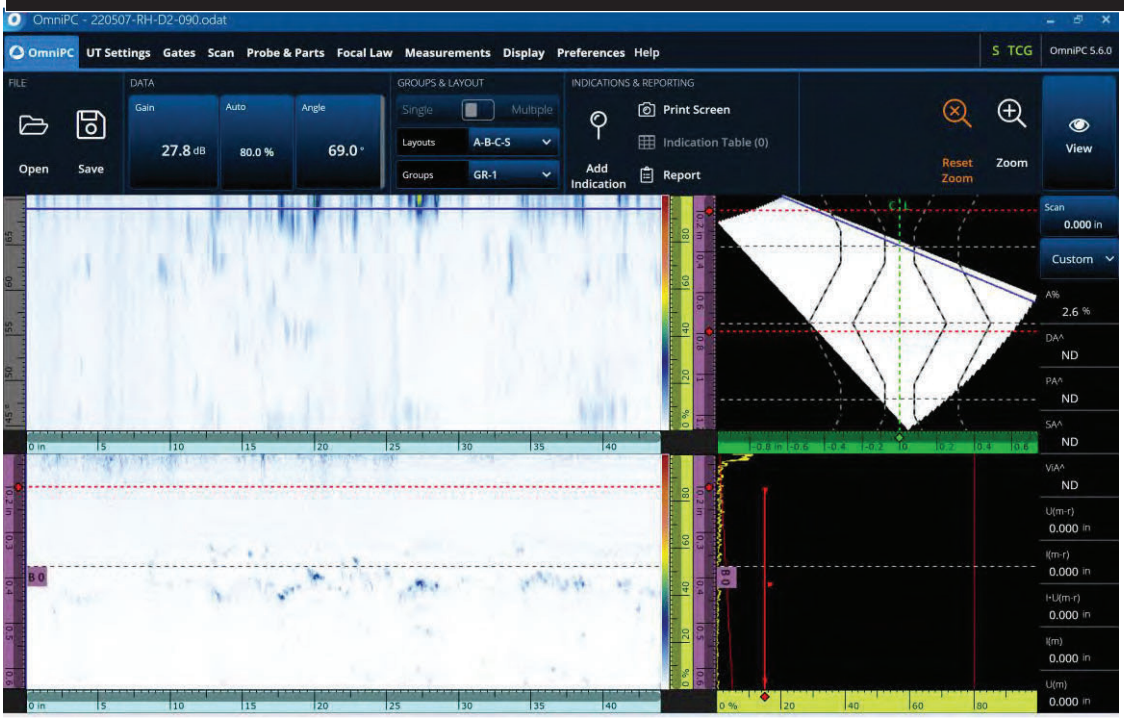
No service induced defect indications were detected in this scan.

[redacted]

[redacted]

D2 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

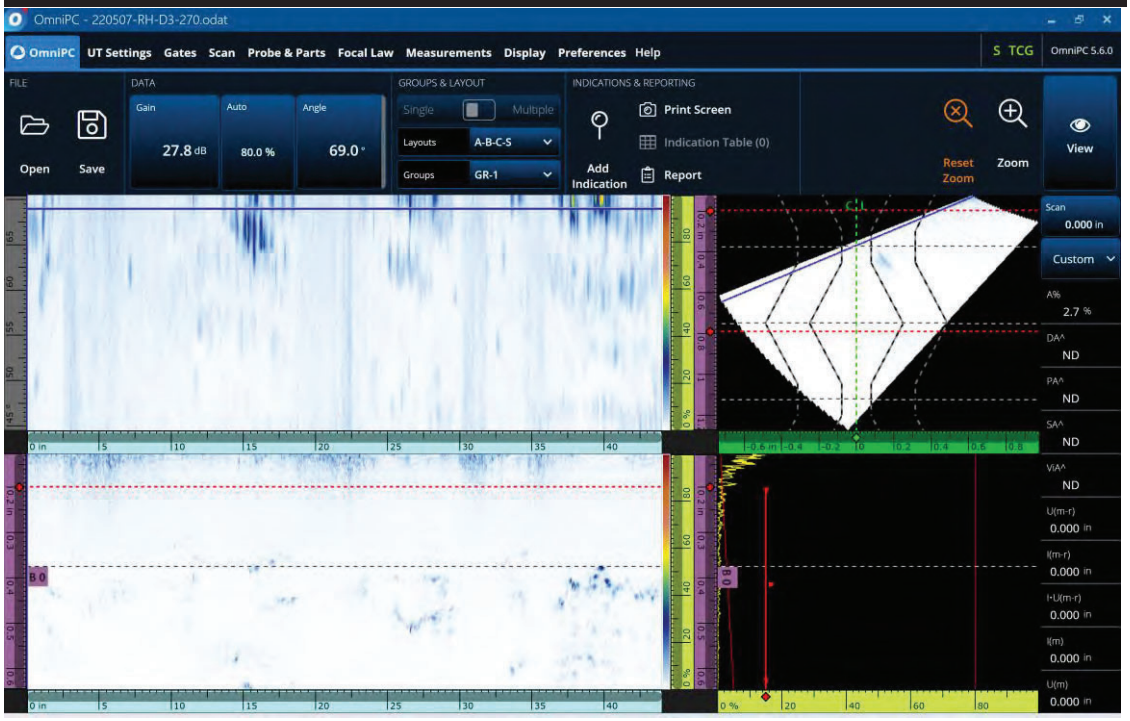
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

D3 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

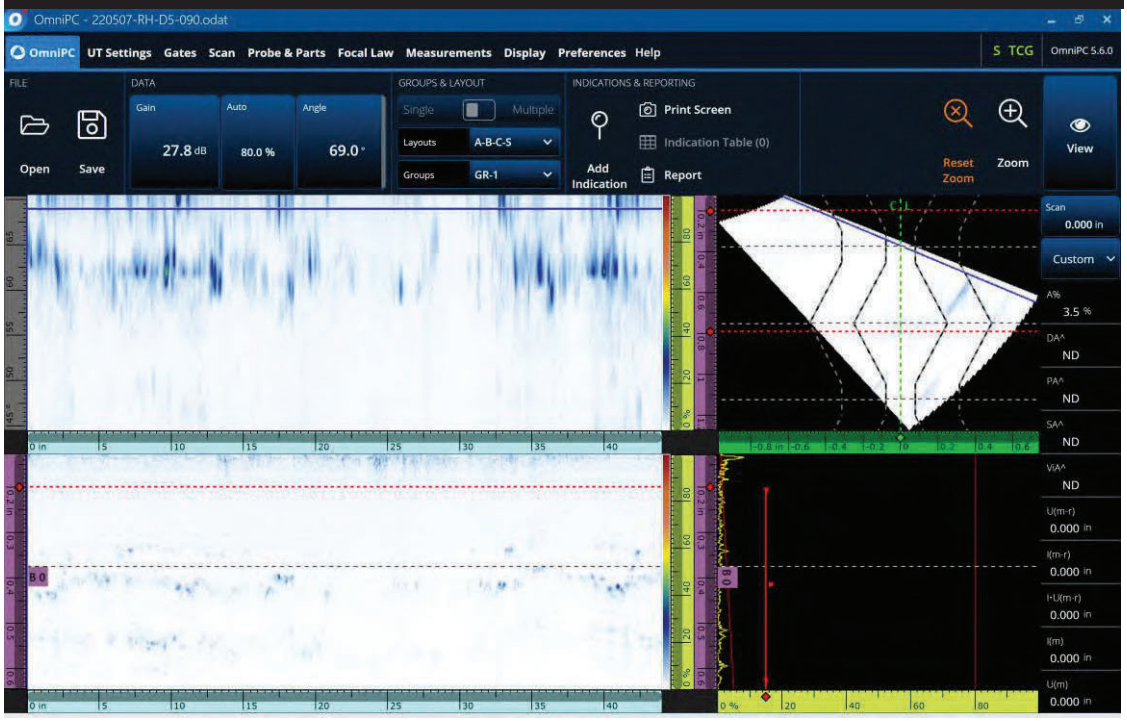
[redacted]

[redacted]

ENGINEERING & INSPECTIONS HAWAII

D5 (Encoded)

(b) (3) (A)



No service induced defect indications were detected in this scan.

[redacted]

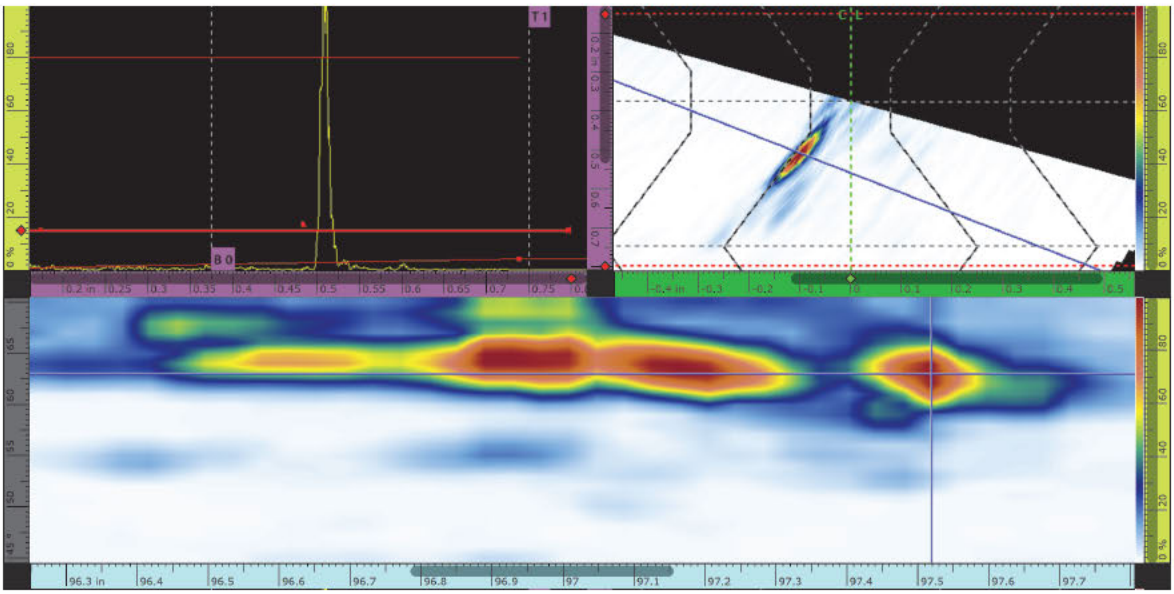
Appendix A

The purpose of this examination was to detect any service induced defects such cracking or erosion/corrosion that may be present in selected welds and heat affected zones. Original welding flaws were considered non-relevant for this inspection.

The following screen shots are examples of original welding flaws typically seen during this inspection. These are included to illustrate the original welding flaws that were typically detected but is not an exhaustive representation of all flaws found.

Engineering & Inspections Hawaii
91-515 Nukuawa St. Kapolei, HI 96707

Indication **Type: Lack Of SideWall Fusion**



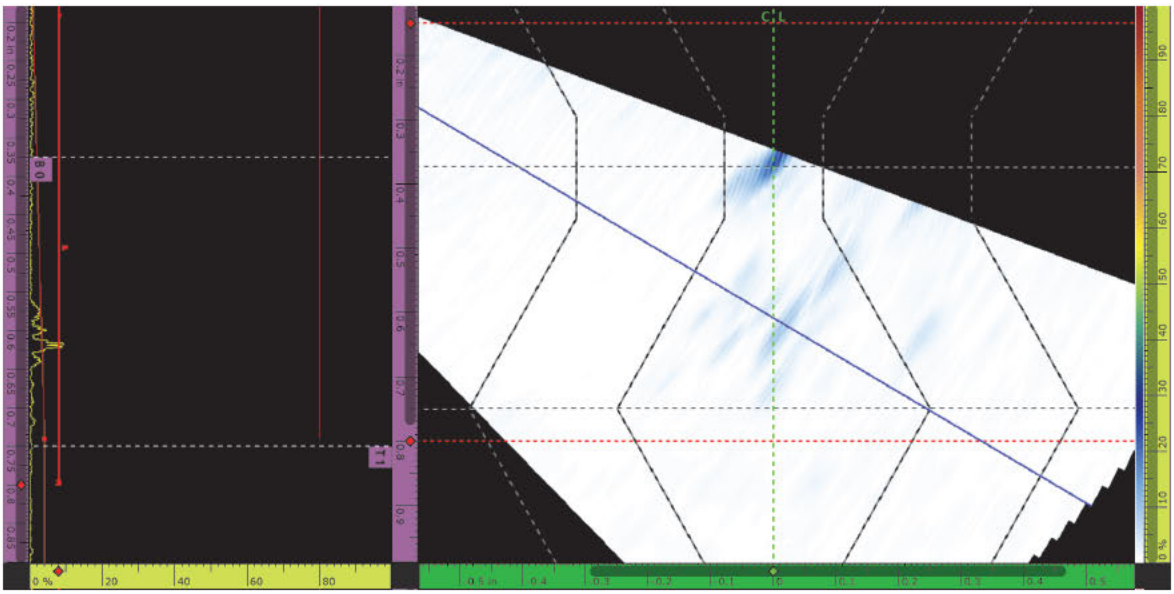
Ref.	
Group	**Sectorial**
A%	**121.5** %
DA^	**0.242** in
S(m-r)	**1.038** in
U(m-r)	**0.100** in
I(m-r)	**0.110** in
ViA^	**-0.100** in
PA^	**0.475** in
AdBA	**18.2** dB
I•U(m-r)	**0.149** in
S(m-r)CSC	**1.038** in

Comment

Pump house, location 4B, Original welding flaw, Lack of side wall fusion

Depth: 0.242", Length: 1.038", Through wall height: 0.100", Distance from weld centerline: +0.110"

Indication Type: Porosity



Ref.	
Group	**Sectorial**
A%	**9.5** %
DA^	**0.133** in
S(m-r)	**0.250** in
U(m-r)	**0.210** in
I(m-r)	**0.237** in
ViA^	**0.014** in
PA^	**0.514** in
AdBA	**1.5** dB
I•U(m-r)	**0.317** in
S(m-r)CSC	**0.000** in

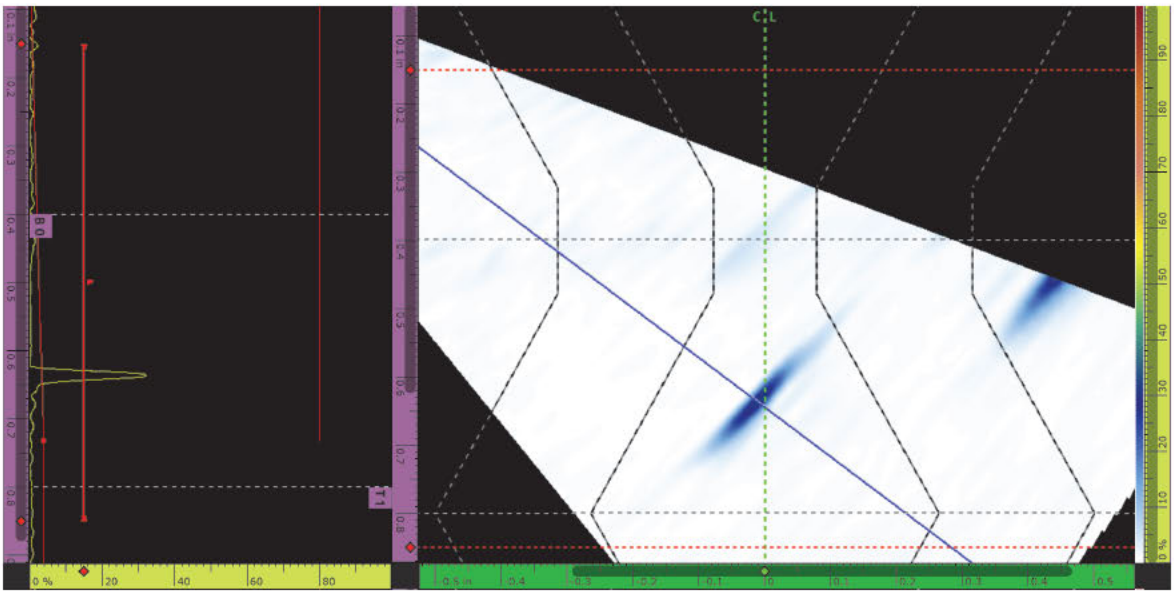
Comment

Pump house, Location 3A, Original welding flaw, Cluster porosity

Depth: 0.133", Length: 0.250" , Through wall height: 0.210", Distance from weld centerline: +0.134" -0.106"

Engineering & Inspections Hawaii
91-515 Nukuawa St. Kapolei, HI 96707

Indication **Type: Slag Inclusion**



Ref.	
Group	**GR-1**
A%	**32.3** %
DA^	**0.164** in
S(m-r)	**0.000** in
U(m-r)	**0.085** in
I(m-r)	**0.017** in
ViA^	**-0.012** in
PA^	**0.488** in
AdBA	**6.6** dB
I•U(m-r)	**0.086** in
S(m-r)CSC	**0.000** in

Comment

Harbor tunnel, Location HT49, Original welding flaw, Slag inclusion

Depth: 0.164", Length: 0.625" , Through wall height: 0.085", Distance from weld centerline: +0.017"

[redacted]

PAUT coating removal and restoration photos

[redacted]

[redacted]

PAUT coating removal and restoration photos (Cont.)

(b) (3) (A) [redacted]

(b) (3) (A) [redacted]

Two-part Kem Kromik Universal Metal Primer used

[redacted]

[redacted]

PAUT coating removal and restoration photos (Cont.)

(b) (3) (A)

(b) (3) (A)

DFT testing of primer

[redacted]

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464 S Independence Blvd, C-104, Virginia Beach, VA 23452
www.interspecllc.net

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Fax: 757-622-9103
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Table J - Straight Beam Pipe Ultrasonic Thickness Testing Data at PAUT CMLs

CML ID #	Pipe Ultrasonic Thickness Data at PAUT Locations (Inches)			
Surge Tanks				
ST1	0.342	-	-	0.360
ST2	0.361	-	-	0.362
ST3	0.377	-	-	0.358
Underground Pump House				
1A	0.390	-	-	0.365
2A	0.380	-	-	0.355
3A	0.360	-	-	0.380
5A	0.390	-	-	0.365
6A	0.367	-	-	0.400
2B	0.378	-	-	0.400
3B	0.250	-	-	0.375
4B	0.397	-	-	0.362
5B	0.397	-	-	0.376
Harbor Tunnel				
HT1	0.390	-	-	0.390
HT2	0.280	-	-	0.240
HT3	0.252	-	-	0.240
HT4	0.400	-	-	0.400
HT5	0.240	-	-	0.235
HT6	0.230	-	-	0.248
HT7	0.388	-	-	0.410
HT8	0.240	-	-	0.250
HT9	0.247	-	-	0.247
HT10	0.395	-	-	0.407
HT11	0.238	-	-	0.245
HT12	0.239	-	-	0.247
HT13	0.406	-	-	0.396
HT14	0.258	-	-	0.230

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Table J - Straight Beam Pipe Ultrasonic Thickness Testing Data at PAUT CMLs (Cont.)

CML ID #	Pipe Ultrasonic Thickness Data at PAUT Locations (Inches)			
HT15	0.236	-	-	0.238
HT16	0.383	-	-	0.399
HT17	0.246	-	-	0.244
HT18	0.249	-	-	0.252
HT19	0.400	-	-	0.396
HT20	0.249	-	-	0.267
HT21	0.262	-	-	0.254
HT22	0.386	-	-	0.385
HT23	0.252	-	-	0.249
HT24	0.242	-	-	0.248
HT25	0.387	-	-	0.363
HT26	0.257	-	-	0.236
HT27	0.233	-	-	0.234
HT28	0.370	-	-	0.382
HT29	0.226	-	-	0.230
HT30	0.245	-	-	0.237
HT31	0.390	-	-	0.388
HT32	0.234	-	-	0.245
HT33	0.243	-	-	0.245
HT34	0.395	-	-	0.394
HT35	0.235	-	-	0.249
HT36	0.233	-	-	0.242
HT37	0.390	-	-	0.399
HT38	0.248	-	-	0.241
HT39	0.235	-	-	0.239
HT40	0.406	-	-	0.401
HT41	0.232	-	-	0.228
HT42	0.230	-	-	0.250
HT43	0.417	-	-	0.397

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Table J - Straight Beam Pipe Ultrasonic Thickness Testing Data at PAUT CMLs (Cont.)

CML ID #	Pipe Ultrasonic Thickness Data at PAUT Locations (Inches)			
HT44	0.236	-	-	0.244
HT45	0.230	-	-	0.246
HT46	0.358	-	-	0.406
HT47	0.248	-	-	0.230
HT48	0.238	-	-	0.239
HT49	0.406	-	-	0.408
HT50	0.240	-	-	0.225
HT51	0.237	-	-	0.232
HT52	0.377	-	-	0.368
HT53	0.236	-	-	0.244
HT54	0.252	-	-	0.242
HT55	0.398	-	-	0.411
HT56	0.253	-	-	0.258
HT57	0.245	-	-	0.230
Tank Gallery				
A1	0.348	-	-	0.350
A3	0.350	-	-	0.450 (TEE)
A4	0.350	-	-	0.450 (TEE)
A5	0.363	-	-	0.371
B1	0.370	-	-	0.375
B2	0.340	-	-	0.472 (TEE)
B3	0.342	-	-	0.505 (TEE)
B4	0.345	-	-	0.550 (TEE)
B5	0.380	-	-	0.380
C1	0.370	-	-	0.370
C2	0.349	-	-	0.360 (TEE)
C3	0.350	-	-	0.470 (TEE)
C4	0.385	-	-	0.375
D1	0.350	-	-	0.380

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Table J - Straight Beam Pipe Ultrasonic Thickness Testing Data at PAUT CMLs (Cont.)

CML ID #	Pipe Ultrasonic Thickness Data at PAUT Locations (Inches)			
D2	0.348	-	-	0.538 (TEE)
D3	0.344	-	-	0.500 (TEE)
D5	0.347	-	-	0.347

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[redacted]

Annex 2

Results of the Guided Wave Testing Conducted

A.2.1 Executive Summary

Guided wave ([redacted] or long-range ultrasonic testing (LRUT) of the selected concrete bulkhead penetrations and concrete support contact points at the Red Hill fuel complex was completed on April 12, 2022 to evaluate the system's integrity, collect data, and establish a database for future inspections and evaluations. The piping penetrations through the interfaces were inspected unless obstructed by the geometrical features of the pipe or appurtenance attachments. The locations of data acquisition and summary are listed in LRUT Evaluation Summary Table (Table K).

The general pipe configuration; including the bell-shaped pipe ends, pipe weld configuration, pipe weld size, multiple welds at close proximity to each other and other geometrical features on the pipe line (branch connections, anchor plates, other attachments) presented a challenging data acquisition and analysis.

Majority of the data captured and analyzed indicated the piping was satisfactory with no indication within the detectible limits of the LRUT equipment. There were however five (5) locations that have indication requiring a follow-on verification to determine the extent and size of indication. The CMLs for these LRUT scans are listed in Table A.2.1. Other areas of corrosion and pitting captured on the LRUT data were field verified during the test or during the API 570 close visual inspection.

There are one or more signals produced within the bulkhead that are marked as anchor/supports because highest magnitude is at the 6 o'clock position and similar pattern was seen on other tests at this facility. Additionally, there are some bulkheads with expose anchor plates or ring that matched approximately the same "burial depth" within the concrete bulkhead. Other inspections InterSpec performed using borescope and other inspection techniques did also confirm the presence of anchor plates within the bulkhead. Review of construction drawing, other available drawings or previous bulkhead repair projects is recommended to confirm the signals are actually due to anchor plates/rings welded to the pipe.

The data acquisition and analyses were done using a Magnetostrictive sensor (MsS) system. The MsS system is a device that electromagnetically generates and receives low-frequency ultrasonic guided waves. It is used for rapidly surveying a long [redacted] of pipeline from a single test location. The MsS technology was selected because it is very useful for inspecting and monitoring areas that are difficult to access, such as those at high elevations, behind walls, buried, or under insulation, or from a remote accessible location.

The project included removing layers of deteriorated coating as needed, performing the LRUT, and restoring the coating with a Kem Kromik Universal Metal Primer. The primary focus of this inspection was determining the condition of the bulkhead/concrete penetration piping.

The LRUT condition monitoring locations (CMLs) are documented in the tables in this Annex and shown in Appendix C (Drawings).

[redacted]

[redacted]

Table A.2.1 (Location requiring a follow-up verification)			
CML #	**Description/Name**	**[redacted] #**	**Pipe**
[redacted] B8	There is a failed asbestos wrap with some corrosion noted past the bulkhead (tank gallery side) in the positive direction (creating signal at Q1 (7" past the bulkhead; but remove wrap to verify and inspect indication produced).	(b) (3) (A)	(b) (3) (A) (F76)
[redacted] B17	One location of defect later identified as inactive pitting (approx. 0.050") with some large area of scaling but minimal metal loss. Two areas of possible similar magnitude of pitting on some frequency seen under pipe wrap. Wrap removal required to get exact size of pitting depth (marked as M1 and M2).	(b) (3) (A)	(b) (3) (A) (F24)
[redacted] B21	Multiple welds in close proximity to each other are producing directionality and multiple reflection signals but one confirmed indication detected at -402" to -411" on this pipe. There is also one indication identified underneath a concrete saddle support (Saddle # 195) that requires prove-up (visual, thickness and pit inspection) after pipe is lifted off the saddle support. Indication at saddle area was noted on all frequencies ranges.	(b) (3) (A)	(b) (3) (A) (F76)
[redacted] B26	This data has several multiple reflections and directionality due to weld geometry. There is one indication (Q1 at −460″) that needs to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test (Note: pipe warp may need to be removed if present).	(b) (3) (A)	(b) (3) (A) (JP5)
[redacted] B27	This data has several multiple reflections and directionality due to weld geometry. There are two indications (Q1 at −976″ and Q2 at −963″) that need to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test (Note: pipe warp may need to be removed if present).	(b) (3) (A)	(b) (3) (A) (F76)

A.2.2 Introduction and Background:

This annex presents the work carried out and an analysis of data collected during the inspection conducted in April 2022 at Joint Base Pearl Harbor Hickam; Hawaii, under contract for Austin Brockenbrough & Associates LLC. The inspection was performed by certified MsS LRUT inspectors. The inspection was conducted by *InterSpec, LLC*

A2.3 Test Procedure:

LRUT pipe inspection is accomplished using the Magnetostrictive Sensor (MsS) System. The system is composed of the MsSR3030 instrument, MsS probes, and a laptop computer. MsS probes consist of deformed ferromagnetic strips and ribbon cables of appropriate size for the piping to be inspected. After selecting suitable test areas (typically small-bore piping and locations with cross sectional reduction), the pipe is cleaned with a moist rag to remove surface contaminants. The ferromagnetic strips are then applied using a wax-based shear couplant and held in place with tape. The assembled sensor ferromagnetic strip is then conditioned two to three times with an acoustic signal at a relatively constant speed of about 1 ft./sec. The appropriate 40 pin dual coil adapters are installed over the ferromagnetic strip. A 32, 45, 64, 90, and 128 kHz probes were used for this facility. Following all sensor installations, the data was recorded on the MSSR3030 system with a relative amplitude of 25% and 5000 kHz sampling in Pulse Echo Ultrasonic Mode. A repetition rate of 8 Hz and sampling average of five to ten cycles were selected for data acquisition.

Following the data acquisition, the plot is field analyzed for accuracy, signal amplitude, and range. Any immediate anomalies in the test are identified for further evaluation. Subsequent data analysis is performed using the MsS data analysis and reporting software.

[redacted]

CUI

Table K - LRUT Evaluation Summary Table

CML #	NPS	Product	DATA	Inspection Area Zone	Sensor Location PS	Comments
GW B1	[redacted]	F76	Yes	Bulkhead	(b) [redacted]	Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration
GW B2	[redacted]	FOR	Bad	Trench at Door 5		Weak Signal
GW B2A	[redacted]	FOR	Bad	Trench at Door 5		Weak Signal
GW B3				Blank		
GW B4	[redacted]	F76	Yes	Bulkhead	(b) (3) [redacted]	Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration.
GW B5	[redacted]	JP5	Yes	Bulkhead	(b) [redacted]	Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration.
GW B6	[redacted]	F24	Yes	Bulkhead	(b) (3) [redacted]	Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration. BUT: Note Q1 likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in the adjacent pipe (GW−B7) within the bulkhead . There does appear to be an anchor plate welded inside the bulkhead located approximately 7" inside the bulkhead (Harbor tunnel side of bulkhead). The signal (M1) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review construction drawing is recommended to determine what M1 is.
GW B7	[redacted]	JP5	Yes	Bulkhead	(b) (3) [redacted]	Piping tested satisfactory with a few unidentified indications noted in the bulkhead (Q2 @ +56", Q3 @ 74") and one location before the penetration (Q1 @ 17). Note Q2 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in the adjacent pipe in other bulkhead. There is asbestos wrap in the positive direction (likely the creating signal Q1 but remove to verify). The anchor plates welded inside the bulkhead are located approximately 5" inside the bulkhead (Harbor tunnel side of bulkhead). The signal (M2) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review construction drawing is recommended to determine what M1 is. Small Indication at +74.75" ([redacted] (b) (3) [redacted]) or 20" inside the bulkhead.
GW B8	[redacted]	F76	Yes	Bulkhead	(b) (3) [redacted]	Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +46.3", M2 @ 58.6", M3 @ 70.7" and M4 @ 84.8") and one location past the penetration (Q1 @ 107.3). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows signals separated by approx. 12" inside the bulkhead and appears to be welds attaching to possibly rebar inside the bulkhead. There is a failed asbestos wrap with some corrosion noted past the bulkhead (tank gallery side) in the positive direction (creating signal at Q1 (7" past the bulkhead; but remove wrap to verify). The anchor plates welded inside the bulkhead are located approximately 6" inside the bulkhead (Harbor tunnel side of bulkhead). Review construction drawing is recommended to determine what M1 − M4 are. Follow−up with wrap removal recommended.
GW B9	[redacted]	F24	Yes	Bulkhead	(b) (3) [redacted]	Multiple welds in close proximity to each other is producing directionality and multiple reflection signals but no indication was noted at the area of interest within the bulkhead. The metal ring weld around the pipe is noted as M1 and M2. There is coating failure and surface corrosion at the (b) (3) [redacted] (Pumphouse side) penetration but no reportable indication on LRUT.
GW B10	[redacted]	JP5	Yes	Bulkhead	(b) (3) [redacted]	JP-5 line (b) [redacted] through pipe sleeve. The pipe sleeve is approx. 58" long. There is a metal ring on the pipe at the tank side that is tack welded (+24") and (+82"). Both rings welded on the pipe are visible at the bulk head penetrations. There one welded pipe nipple on -85"
GW B11	[redacted]	F76	Yes	Bulkhead	(b) (3) [redacted]	There are large plates seal welded (Anchor) to both sides of bulkhead and multiple welds in close proximity to the sensor creating directionality and multiple reflection signals.
GW B12	[redacted]	F76	yes	Saddle	(b) (3) [redacted]	Ok. No indication is found within the inspection range.
GW B13	[redacted]	F24	Yes	Bulkhead	(b) (4), [redacted]	Ok. No indication is found within the inspection range.

[redacted]

GW B14	[redacted]	JP5	Yes	Bulkhead	(b) (3)	Ok. No indication is found within the inspection range.
GW B15	[redacted]	F76	Yes	Bulkhead	(b) (3)	Ok. No indication is found within the inspection range.
GW B16	[redacted]	F76	Yes	Saddle	[redacted]	No indication is found within the inspection range other than the corrosion area located 447" to 467" from sensor is visible on lower frequencies (see report body for UTT and pit sizes)
GW B17	[redacted]	F24	Yes	Pipe	(b) (3)	One location of defect later identified as inactive pitting (approx. 0.050") with some large area of scaling but minimal metal loss. Two area of possible similar magnitude of pitting on some frequency seen under pipe wrap. Wrap removal required to get exact size of pitting depth (marked as M1 and M2).
GW B18	[redacted]	JP5	Yes	Pipe	(b) (3)	Ok. No indication is found within the inspection range.
GW B19	[redacted]	F24	Yes	Pipe	(b) (3)	No indication is found within the inspection range other than the corrosion area located near pipe support 290 (-480″ from sensor) is visible on multiple frequencies (see report body for UTT and pit sizes).
GW B20	[redacted]	JP5	Yes	Bulkhead & Pipe	(b) (3)	No indication is found within the inspection range other than the corrosion area located near (b) (3) (A) [redacted] (at -258″ and -195″ from sensor) is visible on multiple frequencies (see report body for UTT and pit sizes)
GW B21	[redacted]	F76	Yes	Bulkhead & Saddle	(b) (3)	Multiple welds in close proximity to each other is producing directionality and multiple reflection signals but one confirmed indication detected at -402" to -411" on this pipe. There is also one indication identified underneath a concrete saddle support (Saddle # 195) that requires prove up (visual, thickness and pit inspection) after pipe is lifted off the saddle support. Indication at saddle area was noted on all frequencies ranges.
GW B22	[redacted]	F24	Yes	Bulkhead	(b) (3)	Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +93.47″ and M2 @ +107.5″). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 14″ inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 6.5" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M2 are. The section of piping can remain in-service.
GW B23	[redacted]	JP5	Yes	Bulkhead & Saddle	(b) (3)	Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +90″ and M2 @ +104″). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 14″ inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 6" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M2 are. The section of piping can remain in-service.
GW B24	[redacted]	F76	Yes	Bulkhead & Saddle	(b) (3)	Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +107″, M2 @ 122″, M3 @ 137″). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 15″ inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 4.5" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M3 are. The section of piping can remain in-service.
GW B25	[redacted]	F24	Yes	Pipe	(b) (3)	Ok. No indication is found within the inspection range.
GW B26	[redacted]	JP5	Yes	Pipe	(b) (3)	This data has several multiple reflections and directionality due to weld geometry. There is one indication (Q1 at −460″) need to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test (Note: pipe warp may need to be removed if present).
GW B27	[redacted]	F76	Yes	Pipe	(b) (3)	This data has several multiple reflections and directionality due to weld geometry. There are two indications (Q1 at −976″ and Q2 at −963″) need to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test(Note: pipe warp may need to be removed if present).

GW B28	6	FOR	No	Pipe	Below ADIT 3 Door	Weak Signal
GW B29	6	FOR	Yes	Pipe	Outside ADIT 3	Limited and has high S/N in the inspection range. Do other NDE (Borescope and CP survey)
GW B30	[redacted]	F24	Yes	Bulkhead below Door	Surge Tank to UGPH	Ok. No indication is found within the inspection range.
GW B31	[redacted]	JP5	Yes	Bulkhead below Door	Surge Tank to UGPH	Ok. No indication is found within the inspection range.
GW B32	[redacted]	JP5	Yes	Ceiling Penetration	Surge Tank Ceiling	Ok. No indication is found within the inspection range.

Note:

1. *SAI = Soil-to-air interface*
2. *CAI = Concrete-to-air interface*
3. *See in CML locations in Appendix C (Drawings)*

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	23−Mar−2022
Pipe ID/Location:	GW−B1	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.392−inch−wall	Analysis S/W:	MsSPipe−V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W6, 13.0%; 2) W6, 15.0%
Procedure:	GWA 1.01	Attenuation:	1) 0.004 dB/inch
Inspection Range:	−874.9 to 363.9 inch		2) 0.004 dB/inch
Threshold Level:	1) 2.0%(−995.6 ~ 995.8)		
	2) 2.0%(−991.8 ~ 992.1)		

Test Pipe: Aboveground; Painted; 7.860000e+01 F F−76 (Diesel)−carrying pipe; 0.390, 0.392, 0.393, 0.394−inch wall; Supported with Carbon Steel

Note: ~F−76 ((b) (3)) line between (b) (3) (A) . Inspection zone is 60: bulkhead penetration. Bulkhead is 40.25" from sensor. The positive weld is a Bell−Bell Weld (BBW) with Dresser Coupling located past the BBW at approximately 147"

Summary: ~Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration. There are multiple reflections generated due to several welds within few feet of each other. The section of piping can remain in−service. There does appear to be a anchor plate welded inside the bulkhead located approximately 12" inside the bulkhead.

Sym.	Dist.(inch)	% Refl.	Comment
Y1	−874 92	3.1	Multiple Reflection; |MsS−X|=874 92; W2−W5−W4 (875.4, 0.11)
W1	−849.76	4.8	Weld;
W2	−828.19	10.4	Weld;
W3	−586.32	5.8	Weld;
Y2	−410 35	3 5	Multiple Reflection; |MsS−X|=410 35; W4−W5−W4 (408.6, 0 05)
W4	−361.35	5.1	Weld;
W5	−314.13	20.6	Weld;
Y3	−161 23	2.4	Multiple Reflection; |MsS−X|=161 23; W6−PS1 (159.8, 1 66)
W6	−107.00	15.0	Weld;
X1	−53.66	4 5	Directionality; |MsS−X|=53 66; PS1 (52.8, 3.78)
X2	−53.66	4 5	Directionality; |MsS−X|=53 66; PS1 (52.8, 3.78)
MsS1	0.00	−−	Initial Pulse;
(b)	52.84	13.8	Pipe Support; Pipe anchor (welded plate) inside bu khead
X3	108.83	4 5	Directionality; |MsS−X|=108.83; W6 (107.0, 4.10)
S1	161.67	1.9	Spacer; End of Pipe (inside Dresser Coupling)

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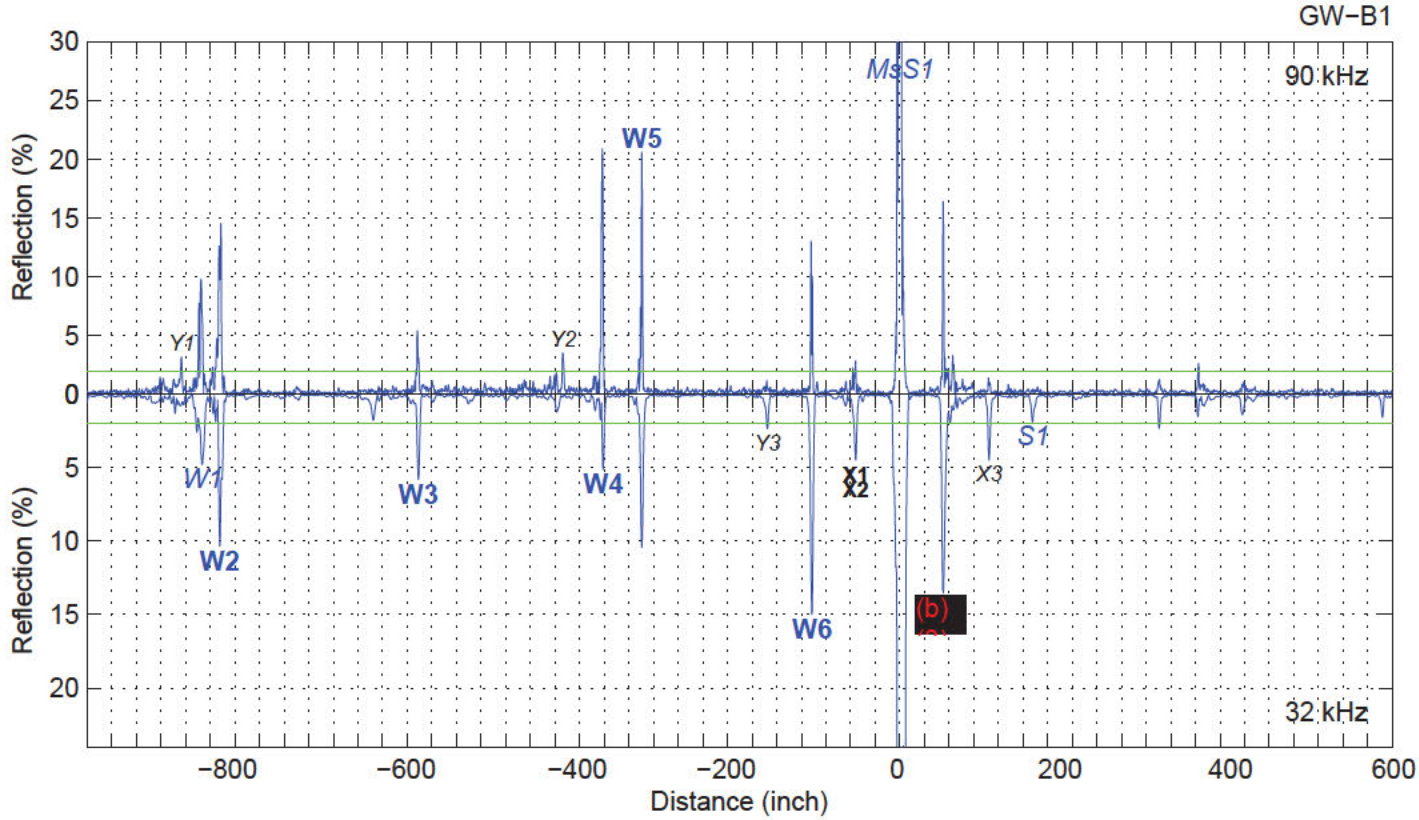

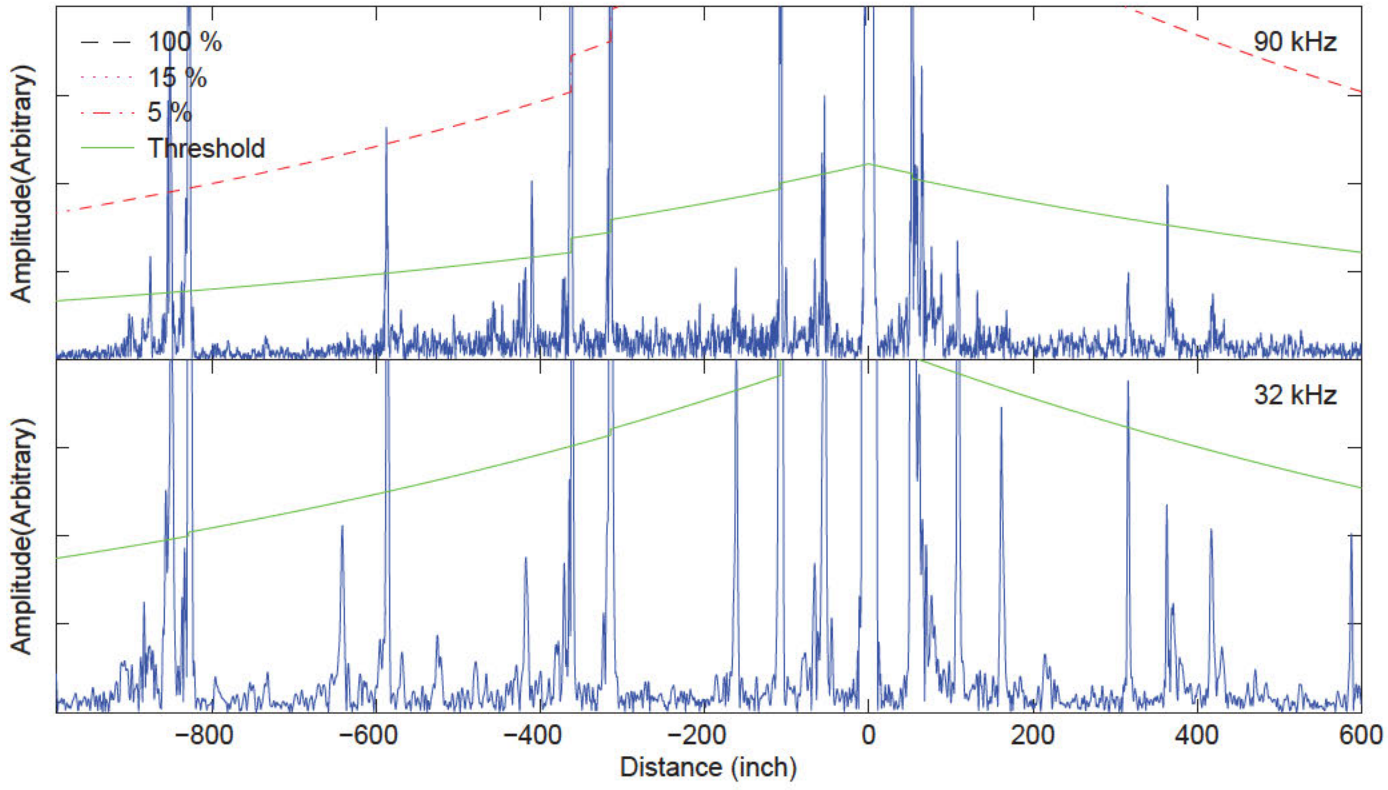

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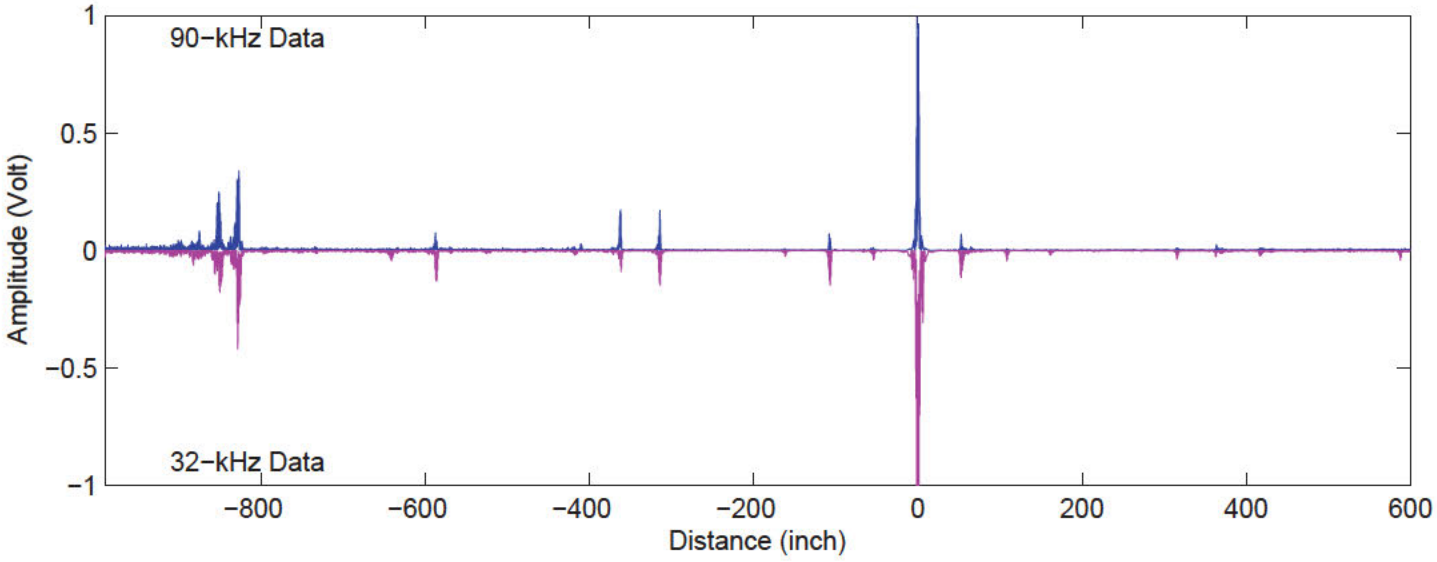
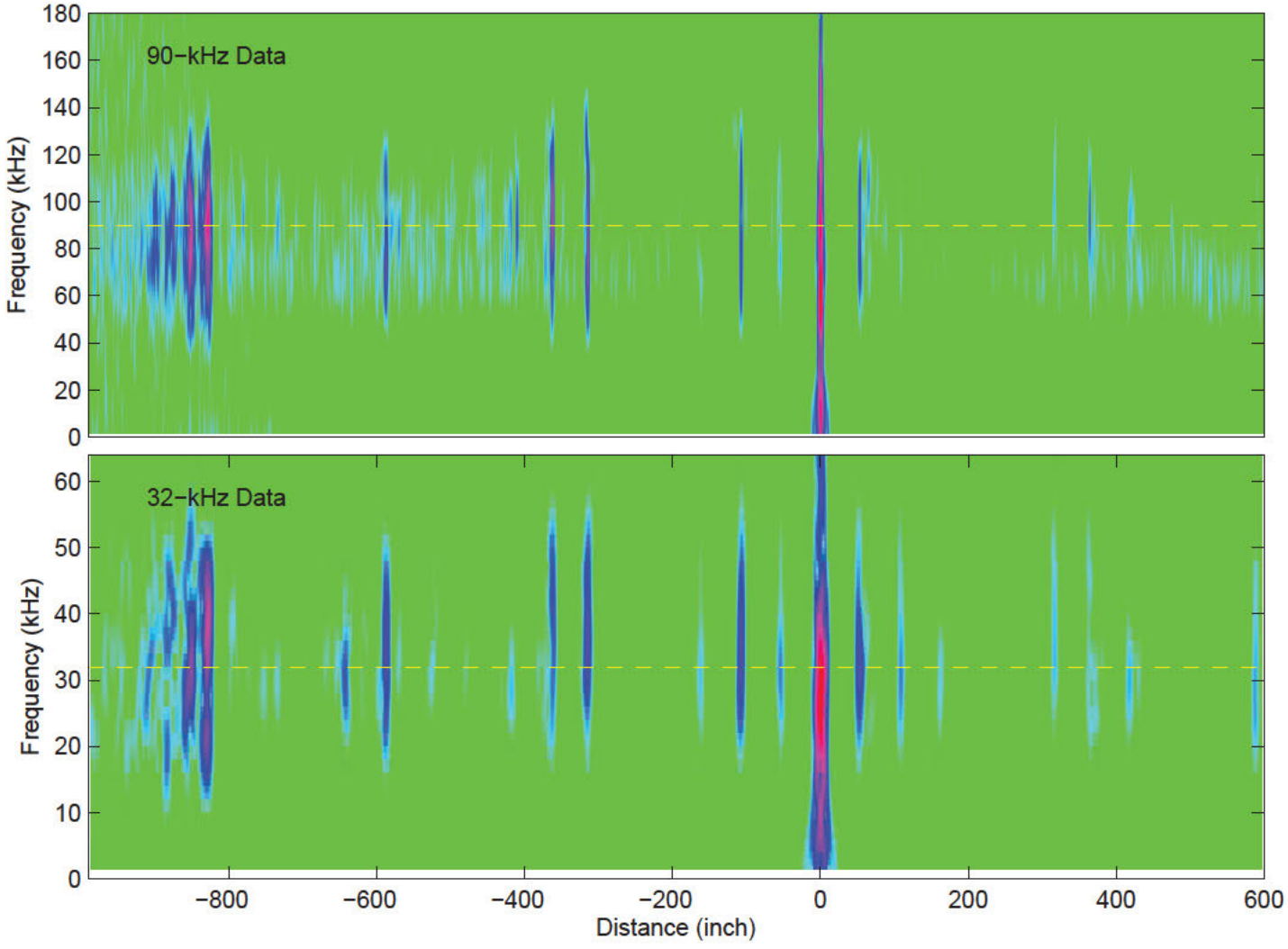
GW-B1





(b) (3) (A)

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(b) (3) (A)

GW-B1; Concrete penetration (bulkhead inspection); (Area = Between (b) (3) (A))

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	23−Mar−2022
Pipe ID/Location:	GW−B4	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.392−inch−wall	Analysis S/W:	MsSPipe−V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W3, 6.3%; 2) W3, 22.2%
Procedure:	GWA 1.01	Attenuation:	1) 0.003 dB/inch
Inspection Range:	−489.7 to 488.5 inch		2) 0.015 dB/inch
Threshold Level:	1) 0.6%(−498.7 ~ 498.8)		
	2) 2.0%(−496.9 ~ 497.1)		

Test Pipe: Aboveground; Painted; 80 F JP−5−carrying pipe; 0.235, 0.232, 0.235, 0.245−inch wall; Supported with Carbon Steel

Note: ~F−76 ((b) (3)) line between (b) (3) (A) (the steel pipe). Inspection zone is 48: bulkhead penetration. Bulkhead is 89" form sensor. The positive weld is a Bell−Bell Weld (BBW). Negative weld is regular butt weld located at −72" and −288 and 295". Welded branch at 208".

Summary: ~Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration. There are multiple reflections generated due to several welds within few feet of each other. The section of piping can remain in−service. There does appear to be an anchor plate welded inside the bulkhead located approximately 17" inside the bulkhead ((b) (3) side). The signal (M1) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review of the 2017 bulkhead repair/construction is recommended to determine what M1 is.

Sym.	Dist.(inch)	% Refl.	Comment
F1	−368.55	1.1	Flange;
Y1	−357 04	5.4	Multiple Reflection; |MsS−X|=357 04; W1−??−W3 (357 9, 2.23)
Y2	−352 36	3 6	Multiple Reflection; |MsS−X|=352 36; ??−W4 (353.0, 9.12)
X1	−344 53	4 3	Directionality; |MsS−X|=344.53; W4 (343.7, 4.99)
Y3	−324.44	2 3	Multiple Reflection; |MsS−X|=324.44; W2−PS4 (326.5, 1 04)
W1	−295.00	19.6	Weld;
W2	−288.30	33.5	Weld;
TC1	−279.35	0.7	T−Connection; Branch pipe connection
PS1	−187.36	1.3	Pipe Support; Welded pipe saddle support
PS2	−175.87	2.2	Pipe Support; Welded pipe saddle support
Y4	−107.75	4 5	Multiple Reflection; |MsS−X|=107.75; M1 (106.4, 2.67)
Y5	−85.27	0.7	Multiple Reflection; |MsS−X|=85.27; MsS1−W3−MsS1 (83.8, 2.43)
W3	−72.24	22.2	Weld;
MsS1	0.00	−−	Initial Pulse;
(b)	26.99	1.3	Pipe Support; Welded pipe saddle support
Y6	30.28	0.7	Multiple Reflection; |MsS−X|=30.28; PS3−MsS1 (31 3, 1.27)
(b)	38.19	3.9	Pipe Support; Welded pipe saddle support
X2	73.69	4 2	Directionality; |MsS−X|=73 69; W3 (72 2, 5.00)
M1	106.42	−−	Marker; Poss ble anchor ring welded on the pipe
X3	289.88	5 9	Directionality; |MsS−X|=289.88; W2 (288.3, 7.55)
Y7	296.58	3.1	Multiple Reflection; |MsS−X|=296 58; ??−W2 (297.7, 13.17)
W4	343.71	22.2	Weld; Bell−Bell Weld (BBW)
Y8	349.44	1 2	Multiple Reflection; |MsS−X|=349.44; W4−MsS1 (349.2, 2 06)
Y9	354.12	0.7	Multiple Reflection; |MsS−X|=354.12; W4−MsS1−MsS1 (354 9, 2.46)
Y10	393.74	3.1	Multiple Reflection; |MsS−X|=393.74; M1−W2 (394.7, 3.18)
Y11	416.61	3 9	Multiple Reflection; |MsS−X|=416 61; W4−W3 (416 0, 3.94)

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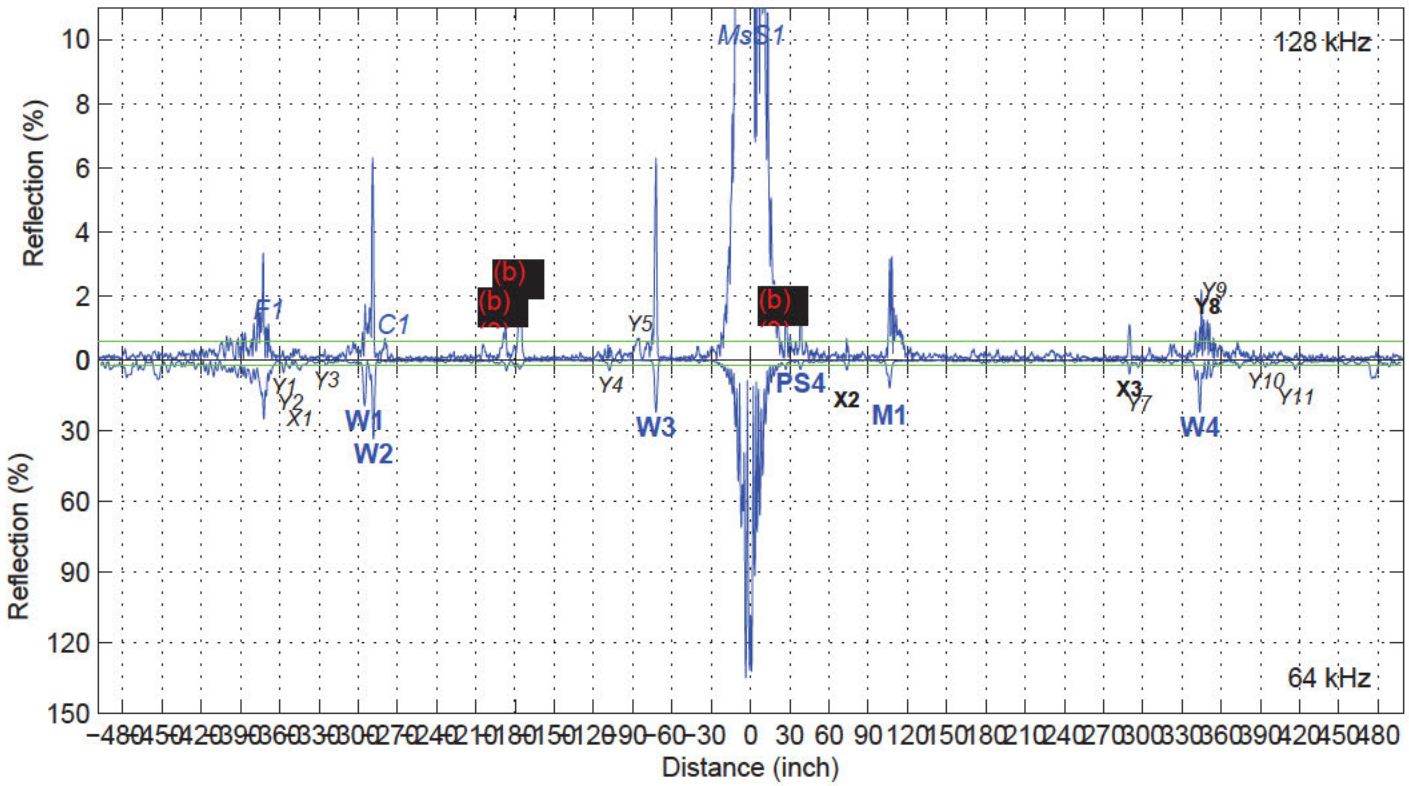
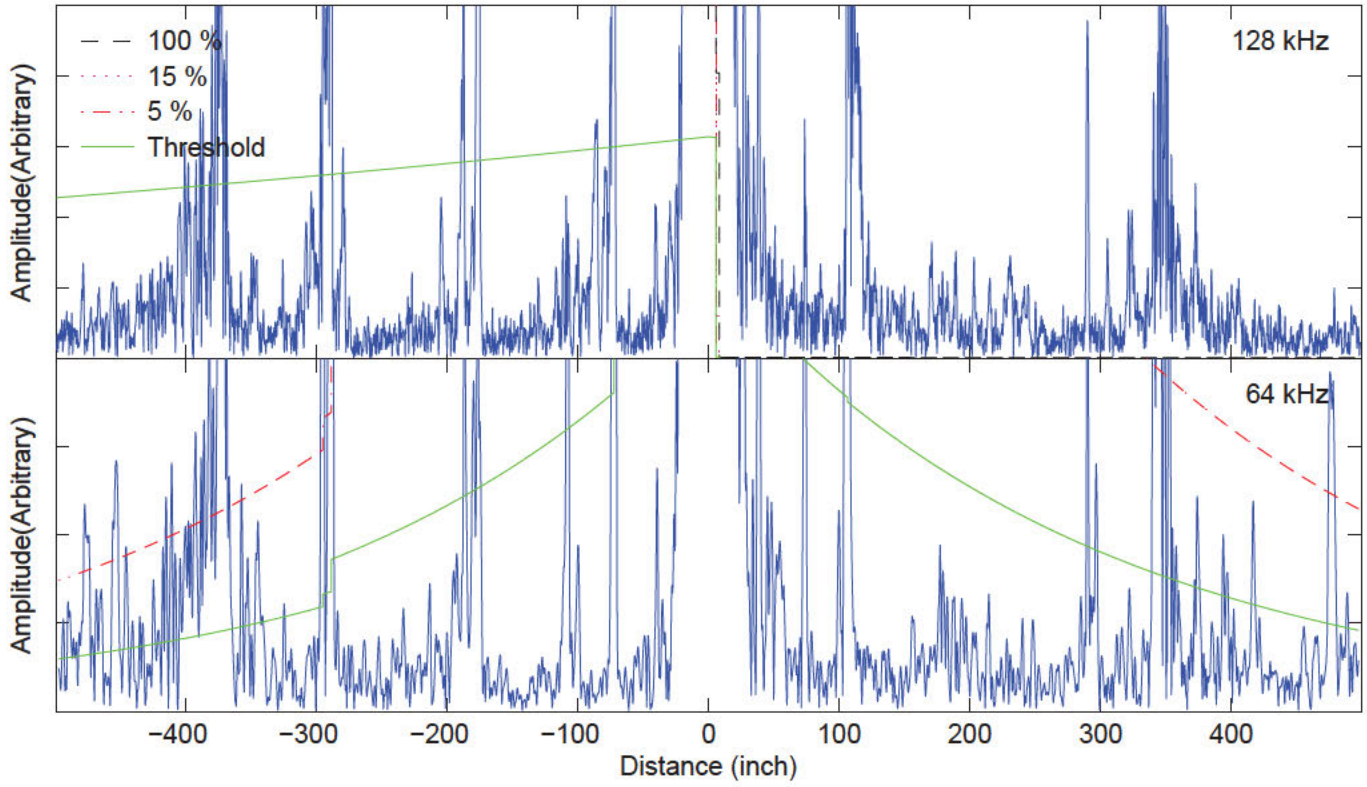
GW-B4





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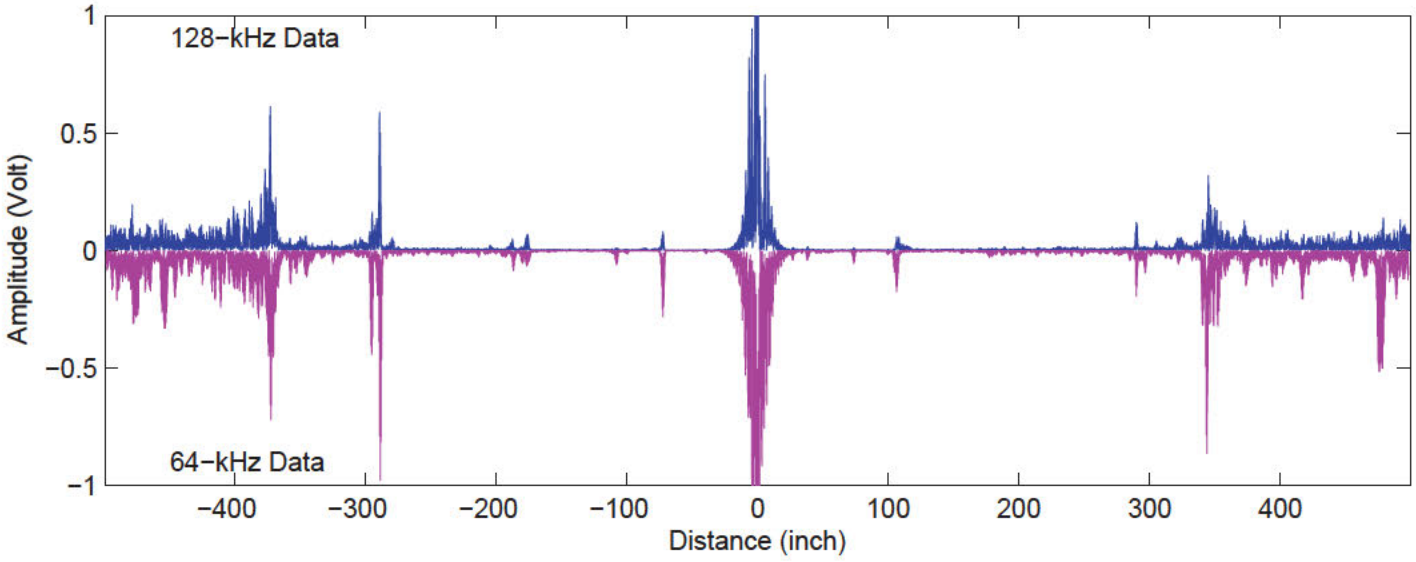

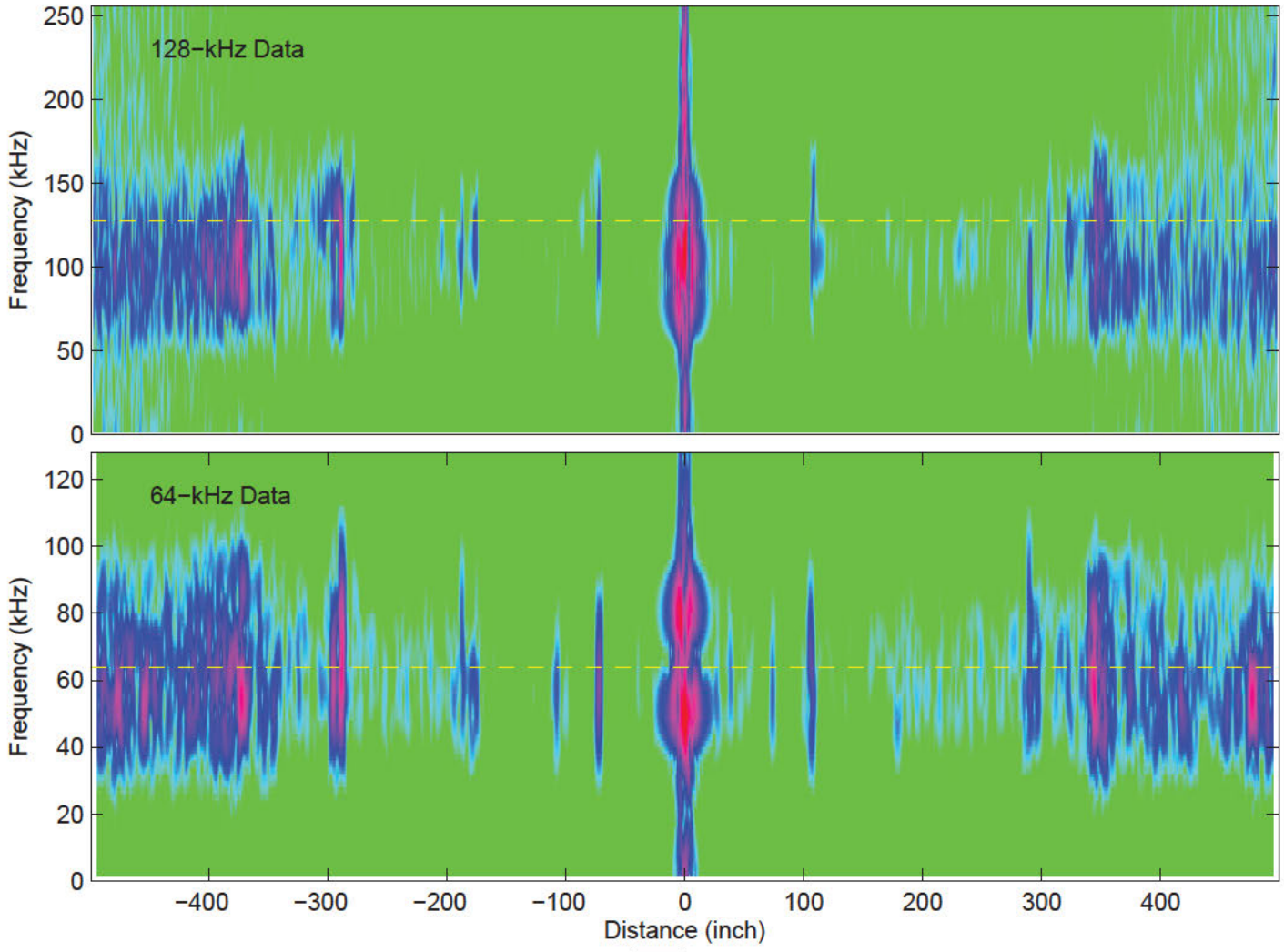

(b) (3) (A)

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(b) (3) (A)

GW-B4; Concrete penetration at Oil Tight Door (bulkhead inspection); (Area = Between (b) (3) (A))

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	23-Mar-2022
Pipe ID/Location:	GW-B5	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.250-inch-wall	Analysis S/W:	MsSPipe-V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W2, 25.4%; 2) W2, 47.6%
Procedure:	GWA 1.01	Attenuation:	1) 0.037 dB/inch
Inspection Range:	-193.4 to 200.6 inch		2) 0.031 dB/inch
Threshold Level:	1) 3.0%(-160.0 ~ 160.1)		
	2) 3.0%(-110.1 ~ 110.0)		

Test Pipe: Aboveground; Painted; 80 F JP-5-carrying pipe; 0.235, 0.232, 0.235, 0.245-inch wall; Supported with Carbon Steel

Note: ~JP-5 ((b) (3)) line between (b) (3) (A) . Inspection zone is the 48" bulkhead penetration. Bulkhead is 60" from sensor. This LRUT data is looking up to the tank gallery with the positive weld at approx. 172" as a standard weld and the negative weld is Bell-Bell Weld (BBW) weld located at -26" and a tack welded plate between pipe and (b) (3) (A) at -127".

Summary: ~Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration. There are multiple reflections generated due to several welds within few feet of each other. The section of piping can remain in-service. There does appear to be an anchor plate welded inside the bulkhead located approximately 14" inside the bulkhead (Harbor tunnel side of bulkhead). The signal (M1) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review of the 2017 bulkhead repair/construction is recommended to determine what M1 is.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-193.36	23.0	Flange;
W1	-187.71	47.3	Weld;
Y1	-145 68	18.1	Multiple Reflection; |MsS-X|=145 68; W2-M1-W2 (145.2, 3.47)
Y2	-120 01	11.6	Multiple Reflection; |MsS-X|=120 01; W2-M1 (119.9, 5 82)
W2	-25.26	47.6	Weld; BBW
MsS1	0.00	--	Initial Pulse;
M1	94.66	--	Marker; Poss ble anchor welded on the pipe inside bulkhead
Y3	121.10	4 3	Multiple Reflection; |MsS-X|=121.10; M1-W2 (119.9, 5 82)
W3	173.18	49.9	Weld;

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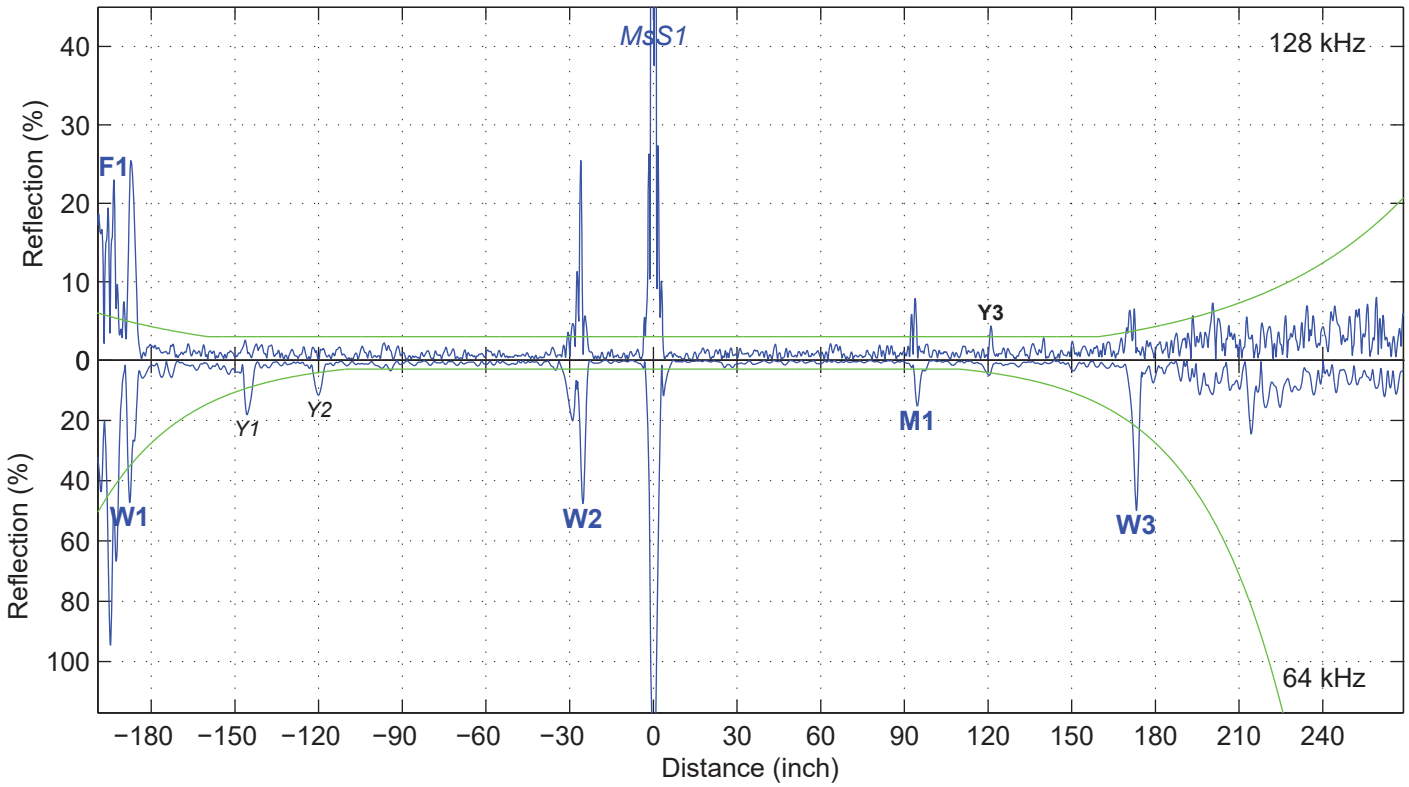
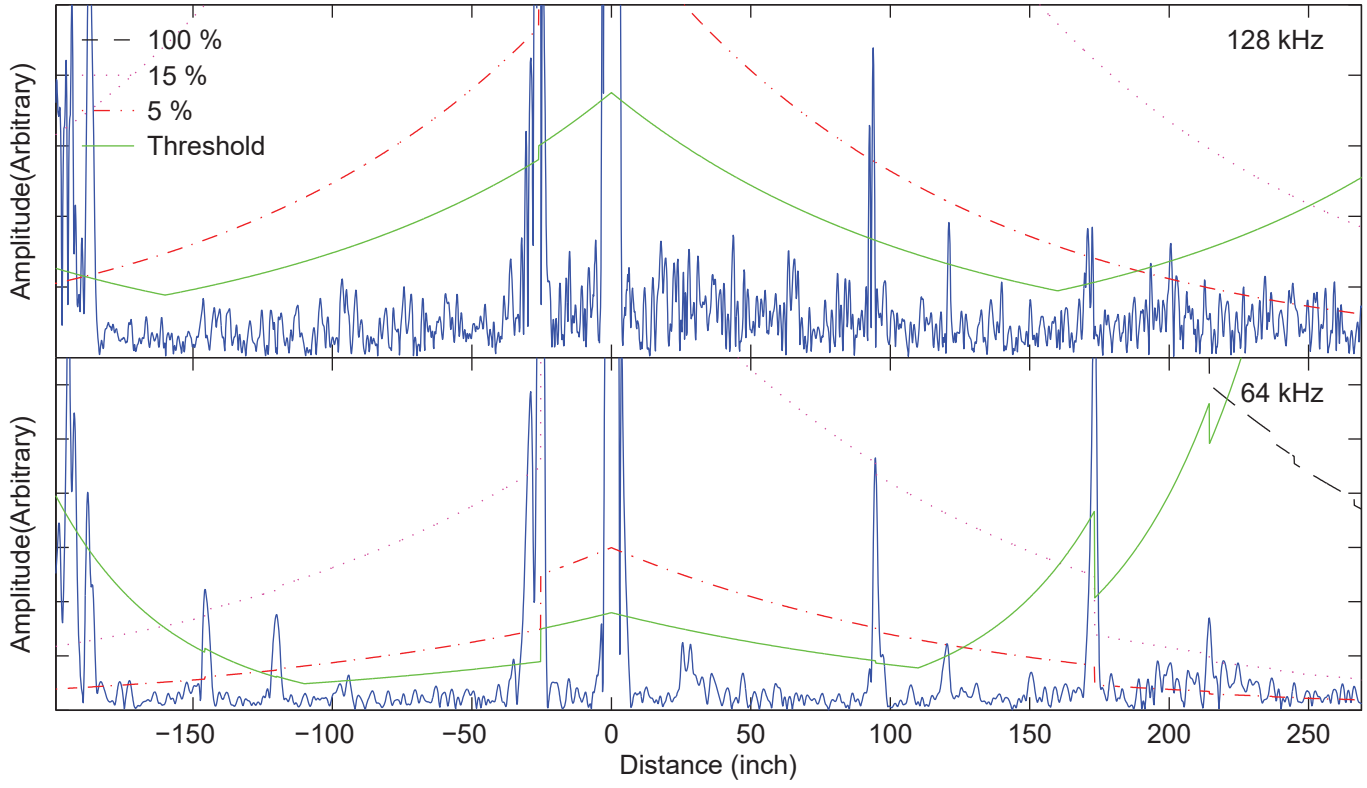
GW−B5





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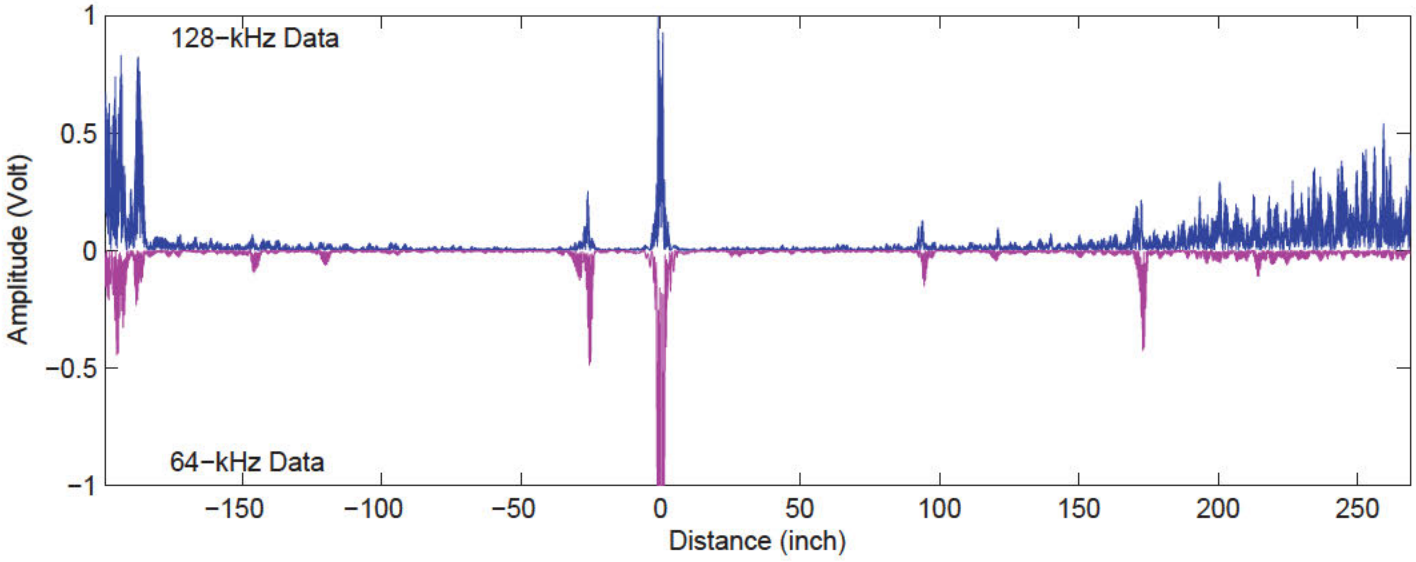
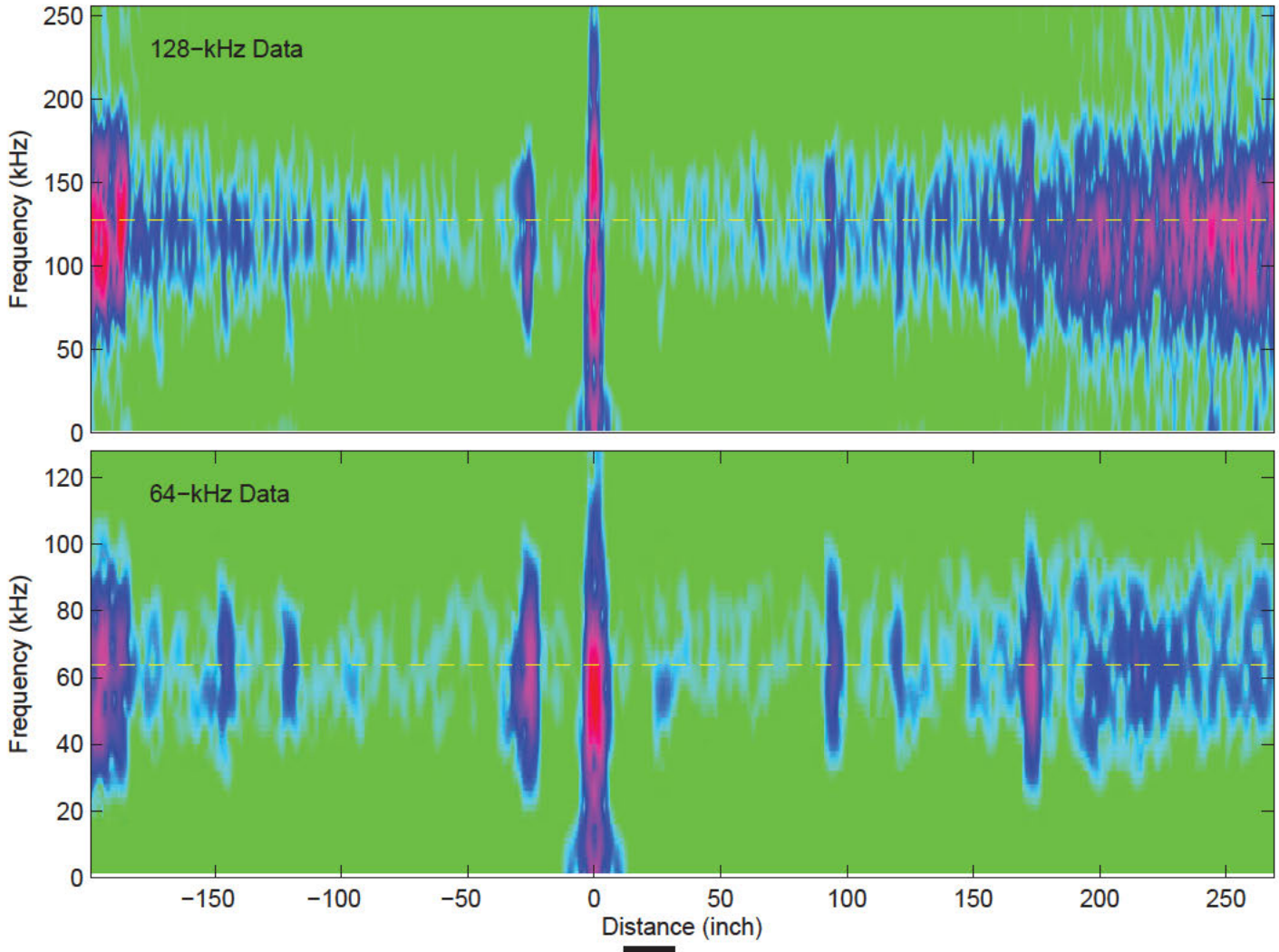
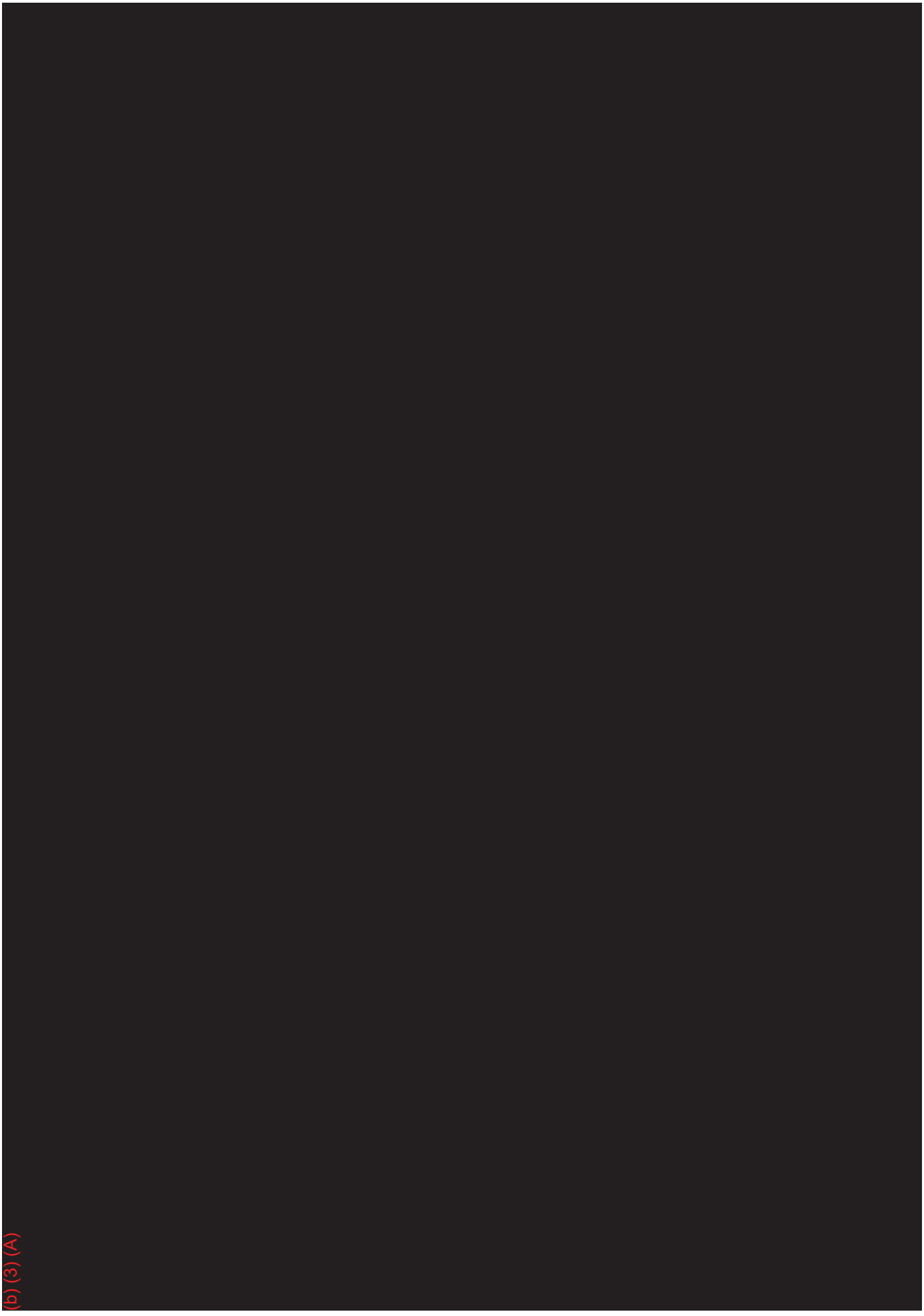
GW-B5







(b) (3) (A)

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(b) (3) (A)

GW-B5; Concrete penetration at Oil Tight Door (bulkhead inspection); (Area = Between (b) (3) (A))

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	24−Mar−2022
Pipe ID/Location:	GW−B6	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.250−inch−wall	Analysis S/W:	MsSPipe−V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	1(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W1, 15.0%; 2) W1, 15.0%
Procedure:	GWA 1.01	Attenuation:	1) 0.030 dB/inch
Inspection Range:	−113.4 to 37.9 inch		2) 0.004 dB/inch
Threshold Level:	1) 2.0%(−594.1 ~ 594.2)		
	2) 2.0%(−594.3 ~ 594.5)		

Test Pipe: Aboveground; Painted; 8.010000e+01 F JP−5−carrying pipe; 0.239, 0.236, 0.242, 0.240−inch wall; Supported with Carbon Steel

Note: ~F24 (b) (3)) line between (b) (3) (A) at anchor bulkhead. Inspection is the 60" bulkhead penetration. Penetration is 30" from sensor. The negative weld is a Bell−Bell Weld (BBW) at −113".

Summary: ~Piping tested satisfactory with no corrosion indication noted at the bulkhead penetration. Note Q1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in the adjacent pipe (GW−B7) within the bulkhead There are multiple reflections generated due to several welds within few feet of each other. The section of piping can remain in−service. There does appear to be an anchor plate welded inside the bulkhead located approximately 7" inside the bulkhead (Harbor tunnel side of bulkhead). The signal (M1) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review construction drawing is recommended to determine what M1 is.

Sym.	Dist.(inch)	% Refl.	Comment
W1	−113.39	15.0	Weld; BBW
MsS1	0.00	−−	Initial Pulse;
M1	37.86	−−	Marker; Poss ble anchor welded on the pipe inside bulkhead
Q1	55.29	0.7	Indication; 26.4−%;
Y1	113.45	0 8	Multiple Reflection; |MsS−X|=113.45; W1 (113.4, 1 60)

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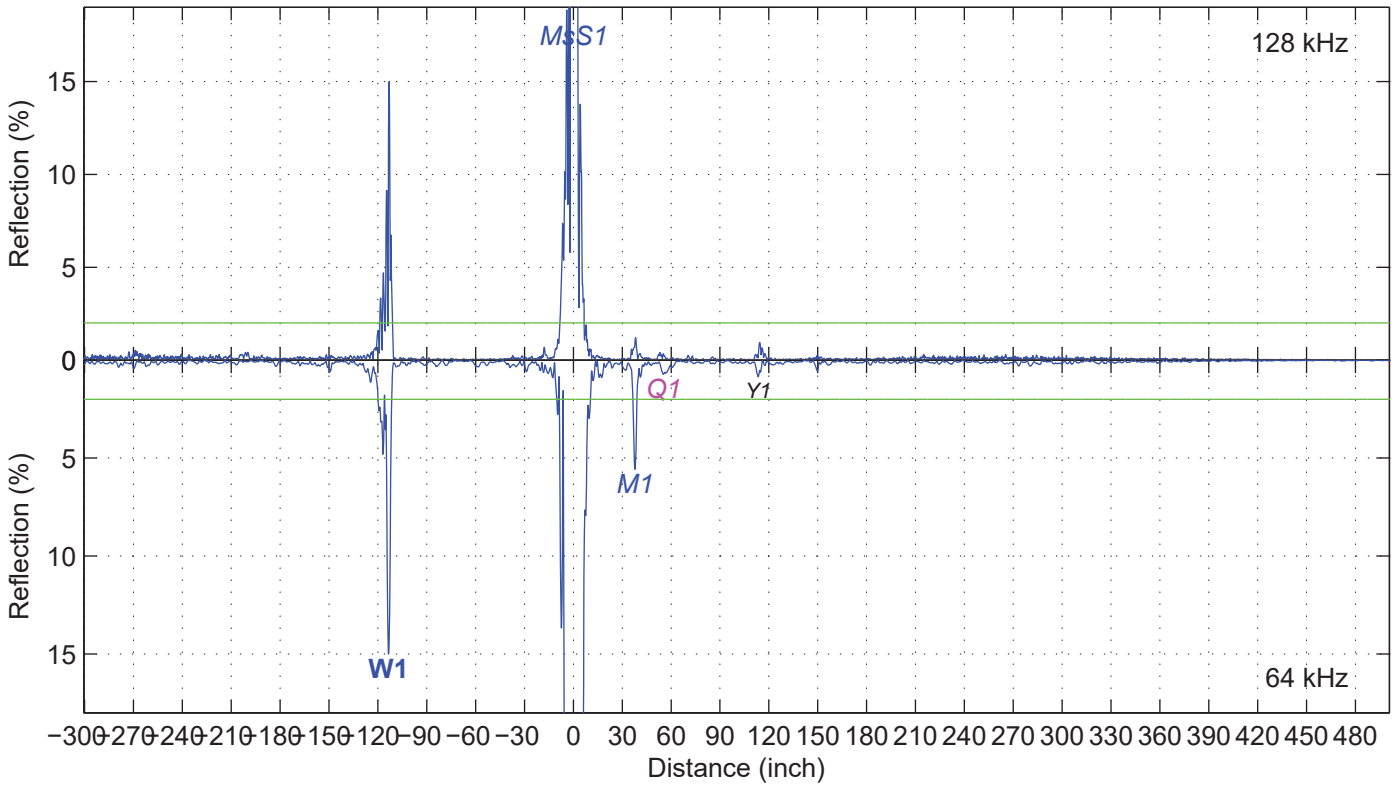
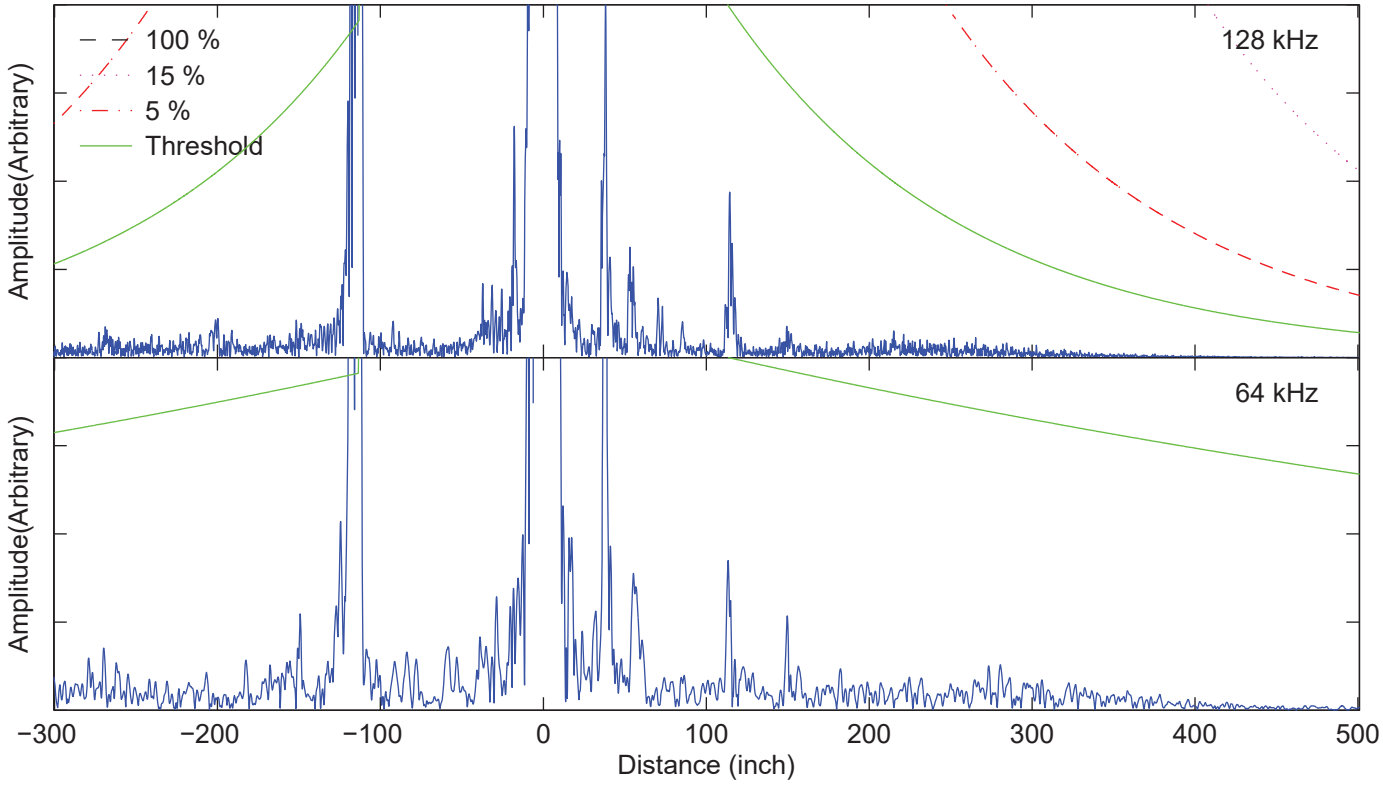
GW−B6





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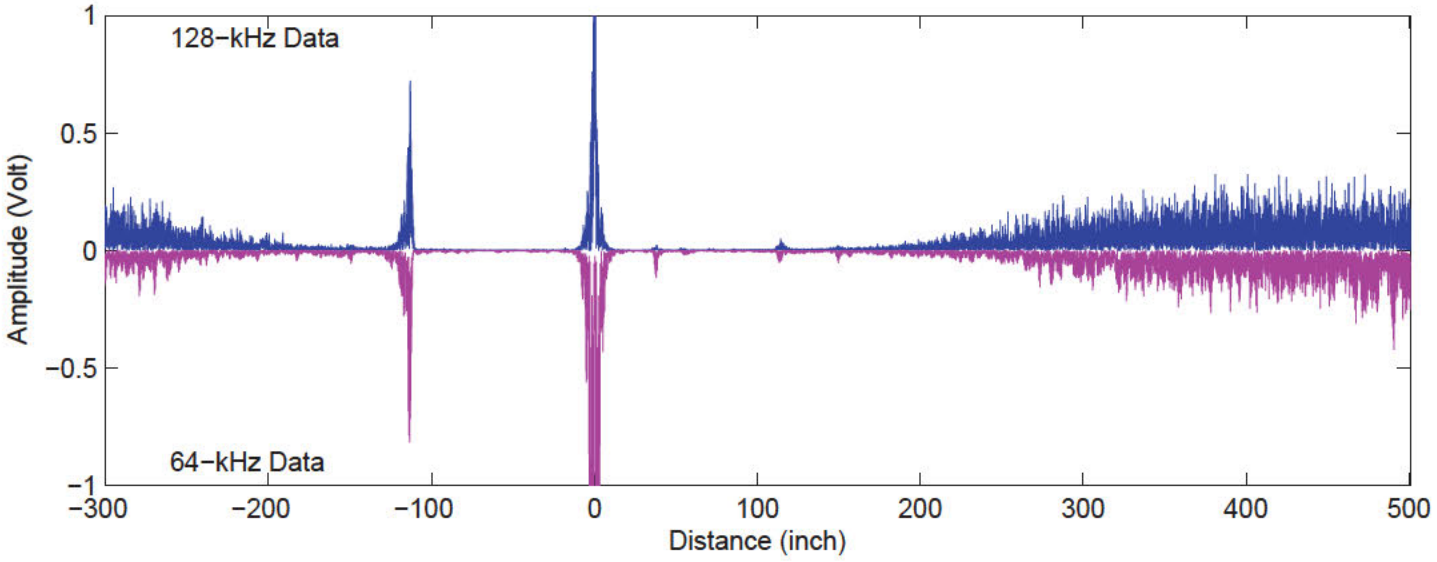
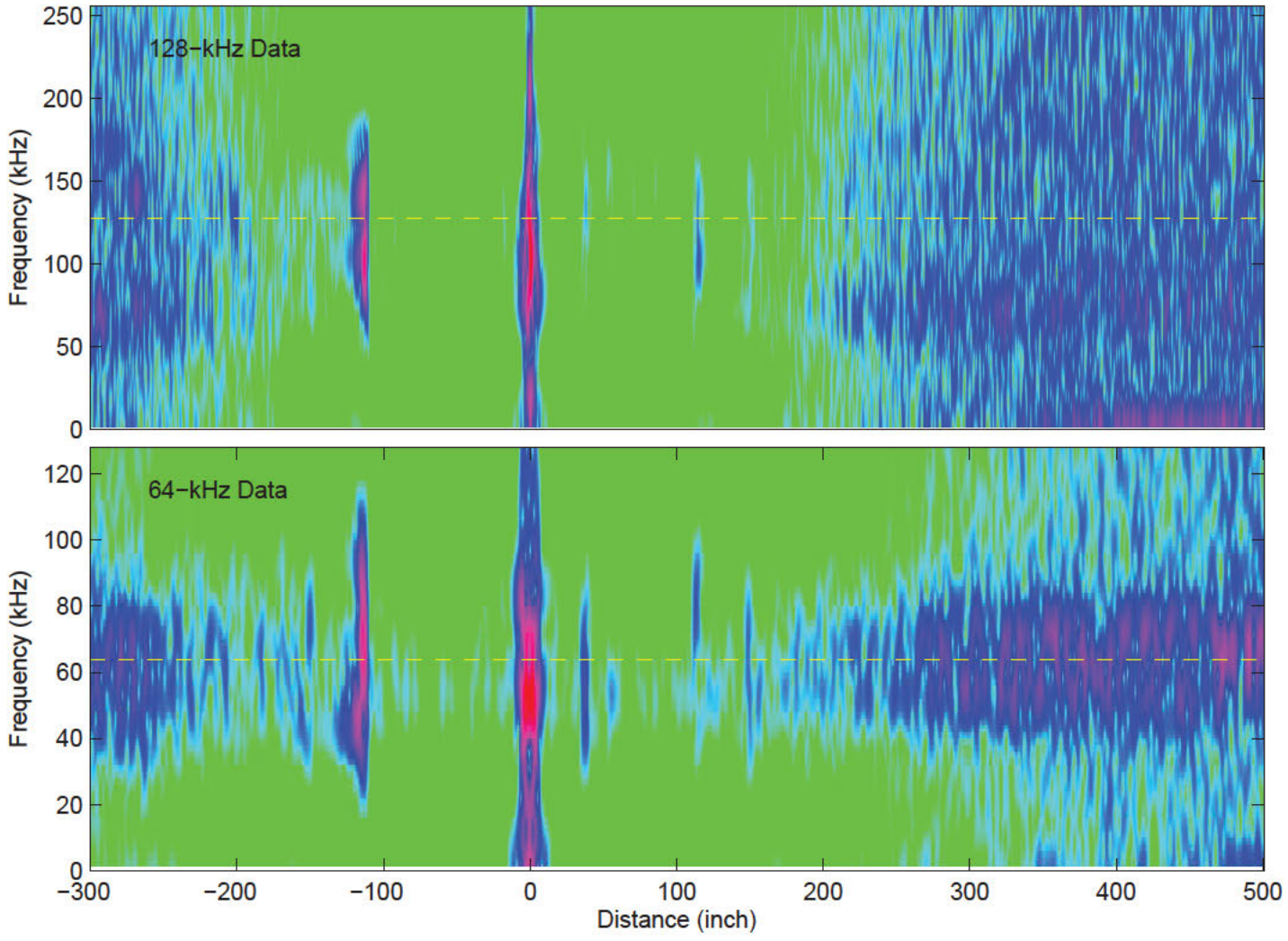
GW-B6





(b) (3) (A)

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(b) (3) (A)

GW-B6; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	24−Mar−2022
Pipe ID/Location:	GW−B7	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.250−inch−wall	Analysis S/W:	MsSPipe−V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	1(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W1, 15.0%; 2) M2, 15.0%
Procedure:	GWA 1.01	Attenuation:	1) 0.101 dB/inch
Inspection Range:	−205.9 to 401.7 inch		2) 0.066 dB/inch
Threshold Level:	1) 1.4%(−111.1 ~ 111.2); 2.0%(−137.6 ~ −111.1;111.2 ~ 137.5); 5.0%(−207.0 ~ −137.6;137.5 ~ 206.9)		
	2) 2.1%(−140.0 ~ 140.1); 5.0%(−203.0 ~ −140.0;140.1 ~ 203.0)		

Test Pipe: Aboveground; Painted; 8.010000e+01 F JP−5−carrying pipe; 0.239, 0.236, 0.242, 0.240−inch wall; Supported with Carbon Steel

Note: ~JP5 (b) (3) line between P(b) (3) (A) at anchor penetration. Inspection zone is 60" penetration. Penetration is 35" from sensor. weld is a Bell−Bell Weld (BBW) at −109". Two small dents were identified on positive side past wall at 195" and 209". One dent is field identified in the negative side −11"

Summary: ~Piping tested satisfactory with a few unidentified indications noted in the bulkhead (Q2 @ +56", Q3 @ 74") and one location before the penetration (Q1 @ 17). Note Q2 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in the adjacent pipe (GW−B6) within the bulkhead. There is asbestos wrap in the positive direction (likely the creating signal Q1 but remove to verify). The section of piping can remain in−service. The anchor plates welded inside the bulkhead are located approximately 5" inside the bulkhead (Harbor tunnel side of bulkhead). The signal (M2) identified as the possible anchor ring is constant around the pipe and shows up in different clock position around the pipe. Review construction drawing is recommended to determine what M1 is. Small Indication at +74.75" (PS 135 side) or 20" inside the bulkhead.

Sym.	Dist.(inch)	% Refl.	Comment
(b)	−183.73	6.3	Pipe Support; Tack Weld
W1	−109.00	15.0	Weld; BBW
M1	−11.68	−−	Marker; Dent C @ −11"
MsS1	0.00	−−	Initial Pulse;
Q1	17.09	5.0	Indication; 98.7−%;
M2	40.35	−−	Marker; Poss ble anchor welded on the pipe inside bulkhead
Q2	56.46	1.8	Indication; 50.2−%;
Q3	74.75	2.2	Indication; 57.9−%;
X1	111.67	2.1	Directionality; |MsS−X|=111.67; W1 (110.8, 5.19)
M3	196.69	−−	Marker; Dent B @ −195"
M4	206.56	−−	Marker; Dent A @ −209"
Y1	401.75	94.9	Multiple Reflection; |MsS−X|=401.75; ??−??−?? (401.4, 63.89)

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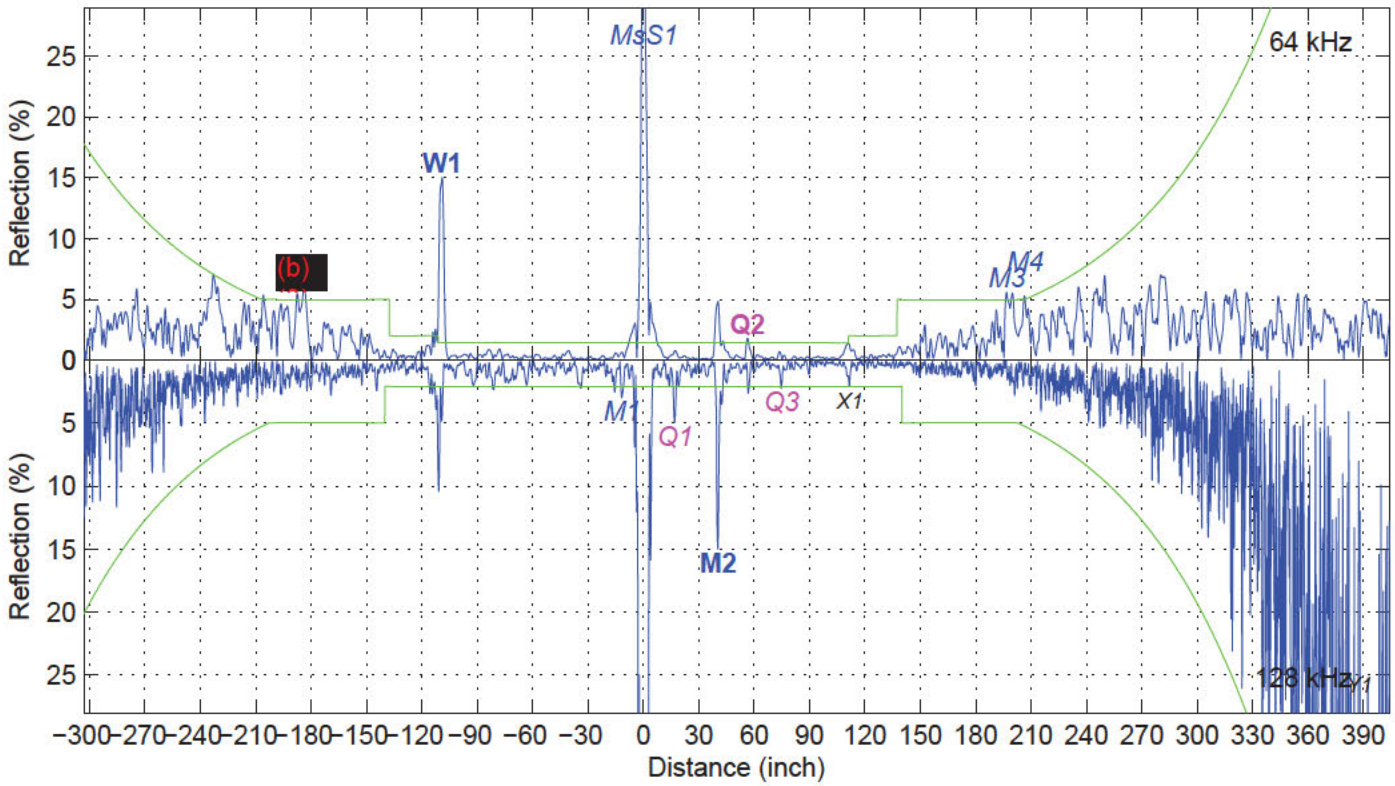
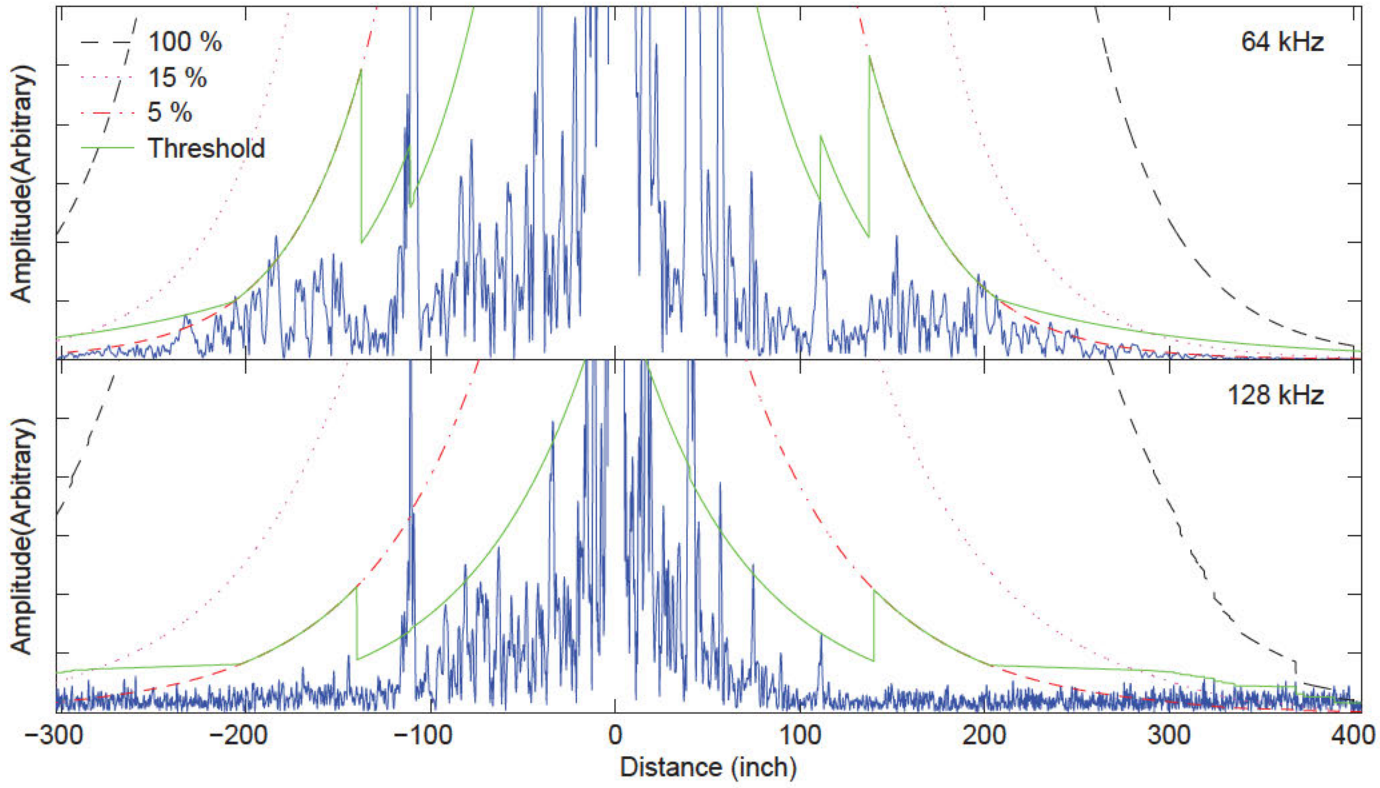
GW−B7





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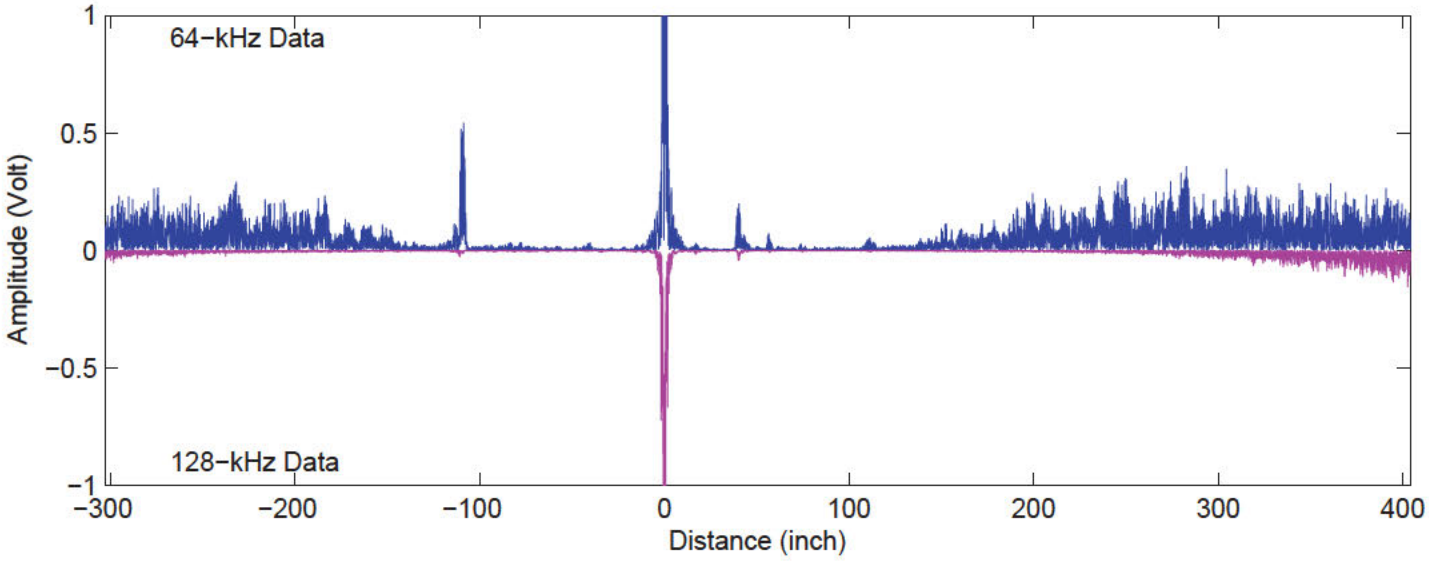
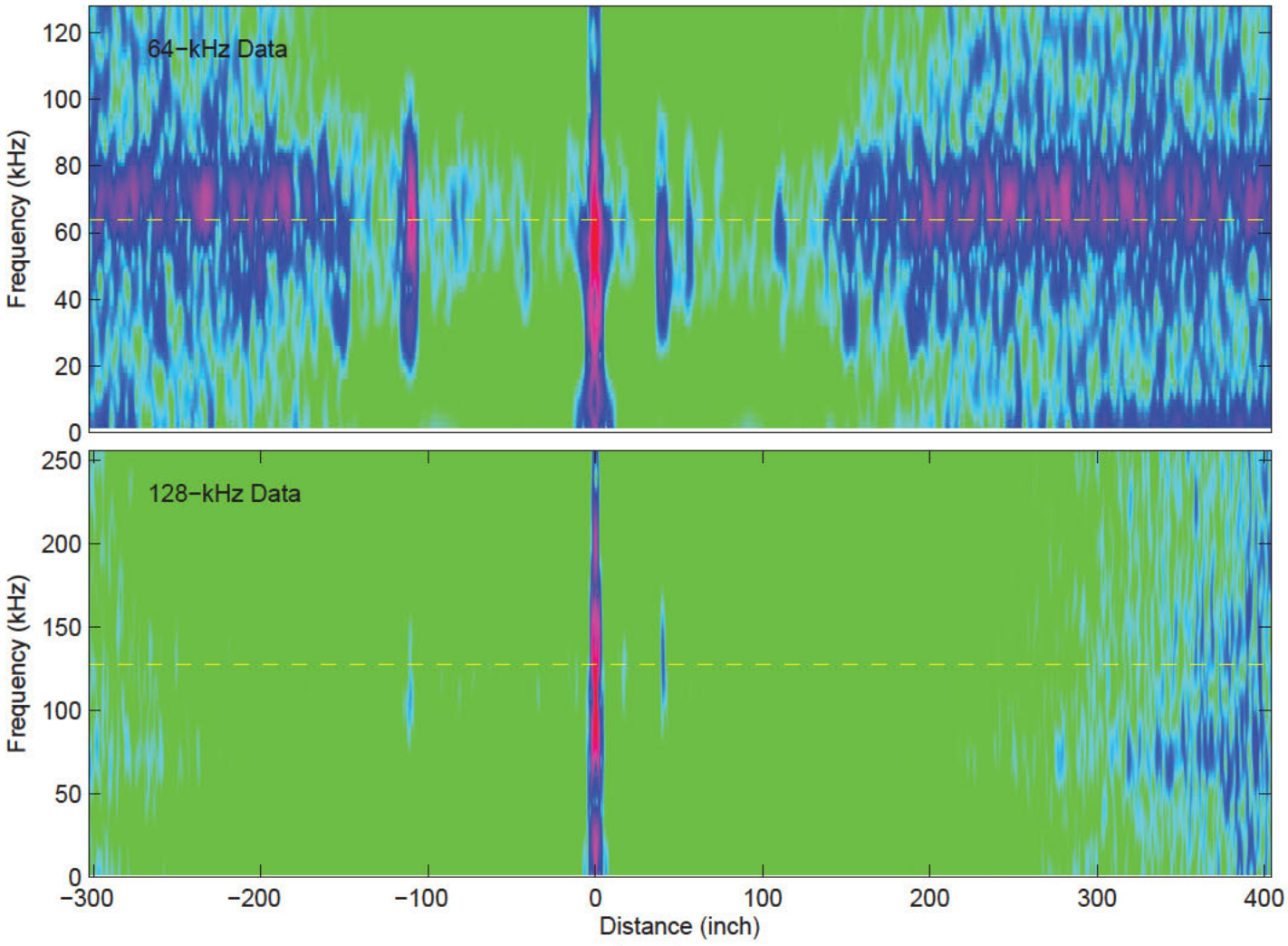
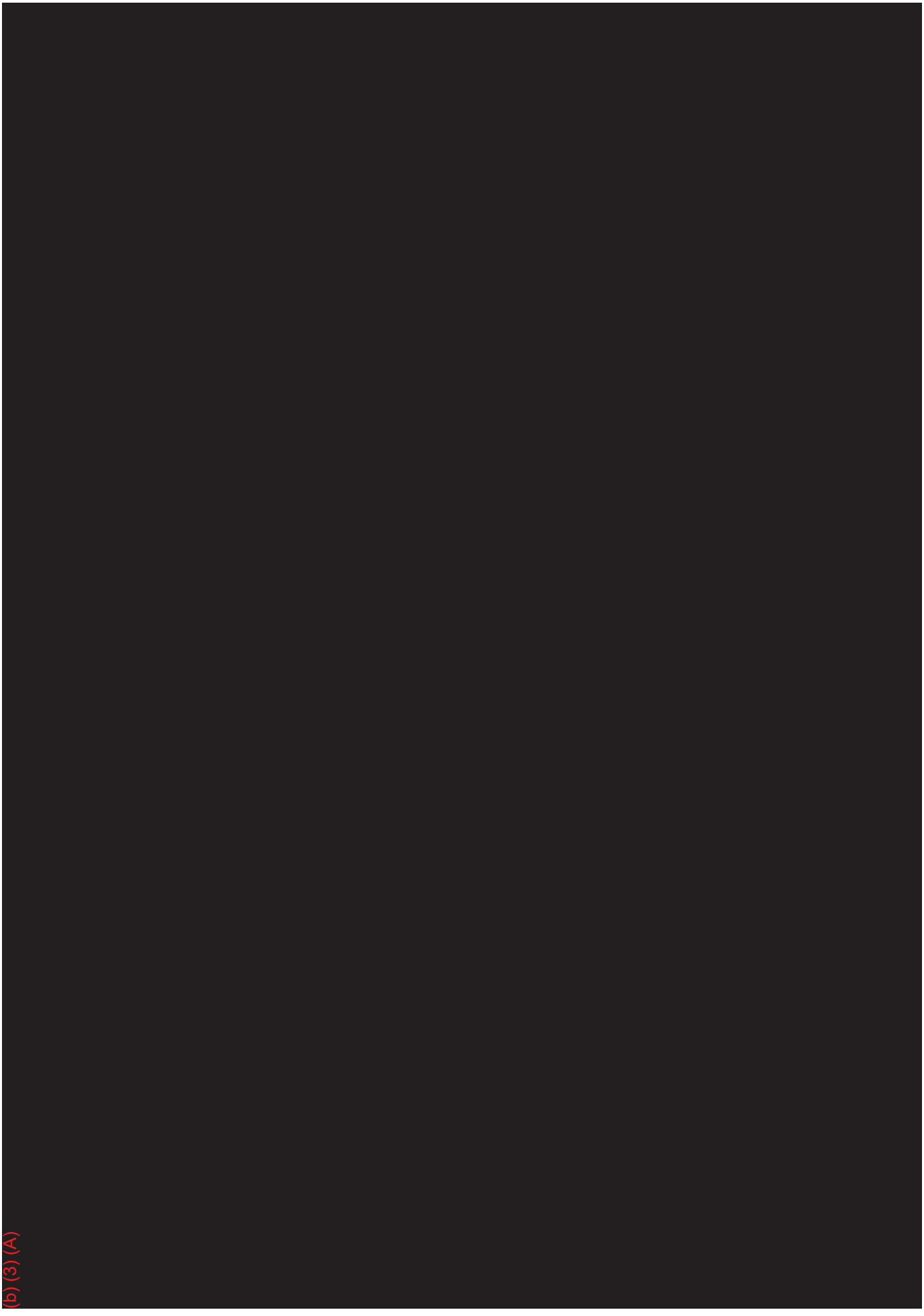
GW-B7







(b) (3) (A)

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(b) (3) (A)

GW-B7; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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MsS Guided Wave Testing Report

Site:	RH PPG	Date:	24-Mar-2022
Pipe ID/Location:	GW-B8	GWT System:	MsSR3030R 53100
Pipe Size	(b) (3) (A) , 0.396-inch-wall	Analysis S/W:	MsSPipe-V3.00
Inspector:	(b) (6)	Wave Mode:	Torsional Mode
Analyzer:	(b) (6)	Velocity:	(b) (3) (A)
Client:	AB&A	Refl. % Ref.:	1) W3, 7.4%; 2) W3, 26.1%
Procedure:	GWA 1.01	Attenuation:	1) 0.039 dB/inch
Inspection Range:	-501.0 to 401.5 inch		2) 0.027 dB/inch
Threshold Level:	1) 2.0%(-262.5 ~ 262.5); 4.0%(-414.3 ~ -262.5;262.5 ~ 414.4)		
	2) 2.5%(-302.7 ~ 302.8); 4.0%(-371.5 ~ -302.7;302.8 ~ 371.4)		

Test Pipe: Aboveground; Painted; 8.020000e+01 F F76-carrying pipe; 0.394, 0.369, 0.385, 0.396-inch wall; Supported with Carbon Steel

Note: ~F76 (b) (3)) line between (b) (3) (A) (b) (3) (A)) at anchor penetration. Inspection zone is 60" wall penetration. Penetration is 40" from sensor. the negative weld is a BBW at -103". Positive butt weld at 137".

Summary: ~Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +46.3", M2 @ 58.6", M3 @ 70.7" and M4 @ 84.8) and one location past the penetration (Q1 @ 107.3). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows signals separated by approx. 12" inside the bulkhead and appears to be welds attaching to possibly rebar inside the bulkhead. There is a failed asbestos wrap with some corrosion noted past the bulkhead (tank gallery side) in the positive direction (creating signal at Q1 (7" past the bulkhead but remove to verify). The anchor plates welded inside the bulkhead are located approximately 6" inside the bulkhead (Harbor tunnel side of bulkhead). Review construction drawing is recommended to determine what M1 - M4 are. The section of piping can remain in-service but follow-up with wrap removal recommended.

Sym.	Dist.(inch)	% Refl.	Comment
W1	-505.56	27.6	Weld;
(b)	-400.71	5.4	Pipe Support; Welded Saddle
W2	-345.74	13.2	Weld;
Y1	-257 09	3.4	Multiple Reflection; |MsS-X|=257 09; W3-M1-W3 (250.0, 1.18)
Y2	-154.15	2 9	Multiple Reflection; |MsS-X|=154.15; W3-M1 (148.0, 3 60)
Y3	-116.70	3 3	Multiple Reflection; |MsS-X|=116.70; Y3-MsS1 (116.0, 0.33)
W3	-103.00	26.1	Weld; BBW
MsS1	0.00	--	Initial Pulse;
M1	46.30	--	Marker; Marker; Possible anchor welded on the pipe inside bulkhead
M2	58.55	--	Marker; M1 to M2 (approx. 12")
M3	70.67	--	Marker; M2 to M3 (approx. 12")
M4	84.78	--	Marker; M3 to M4 (approx. 12")
Q1	107.27	6.4	Indication; Corrosion Area at 6 o'clock
W4	139.75	0.8	Weld;
Y4	348.10	4.1	Multiple Reflection; |MsS-X|=348.10; W2 (342.6, 2 23)

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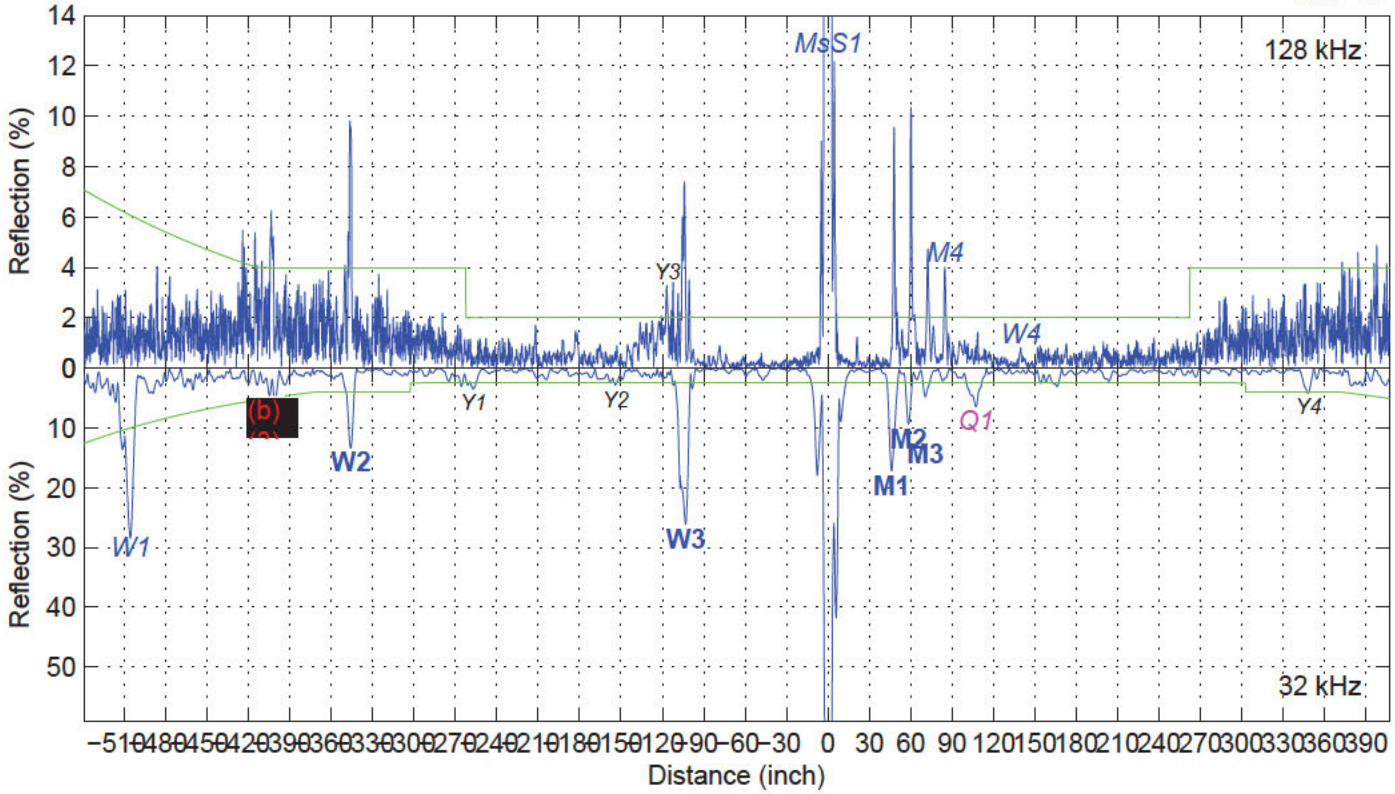
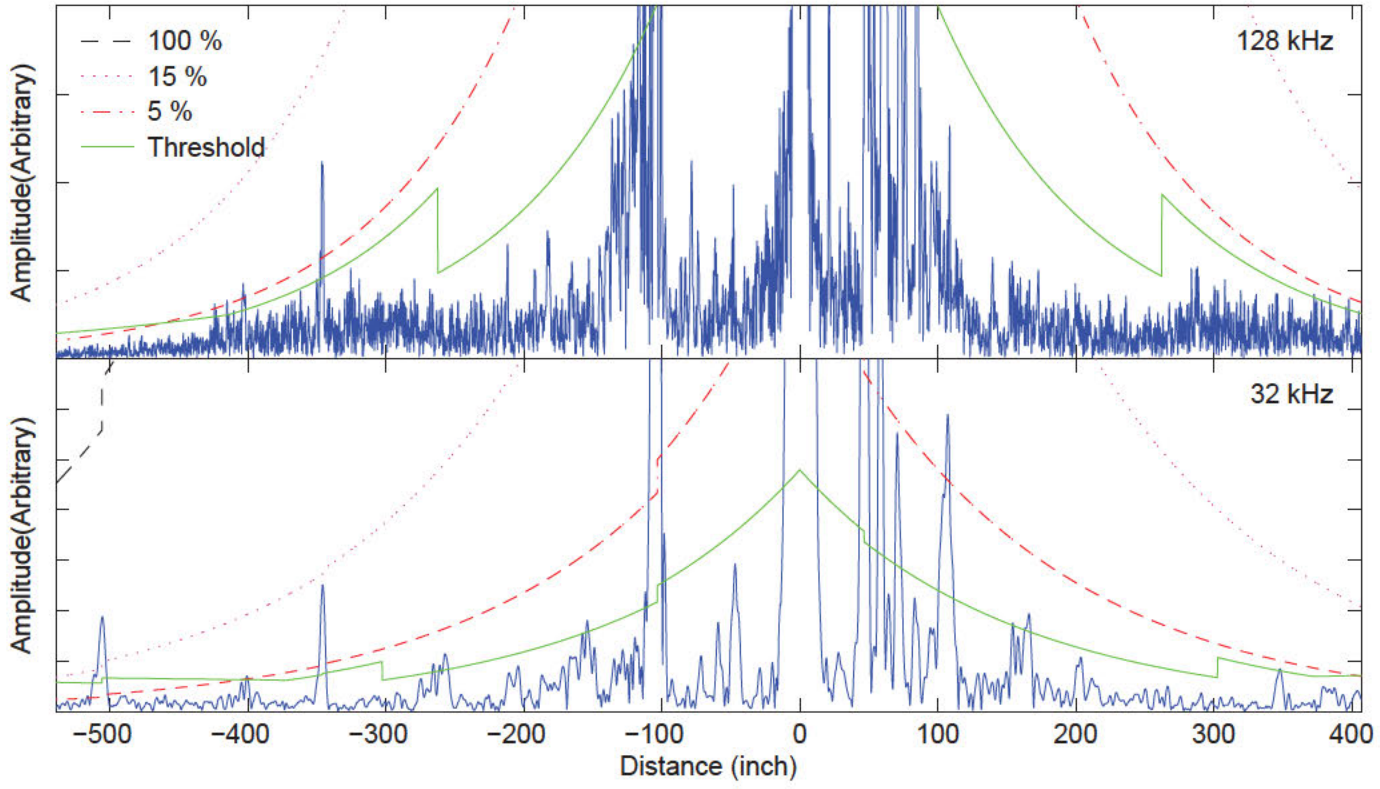
GW–B8





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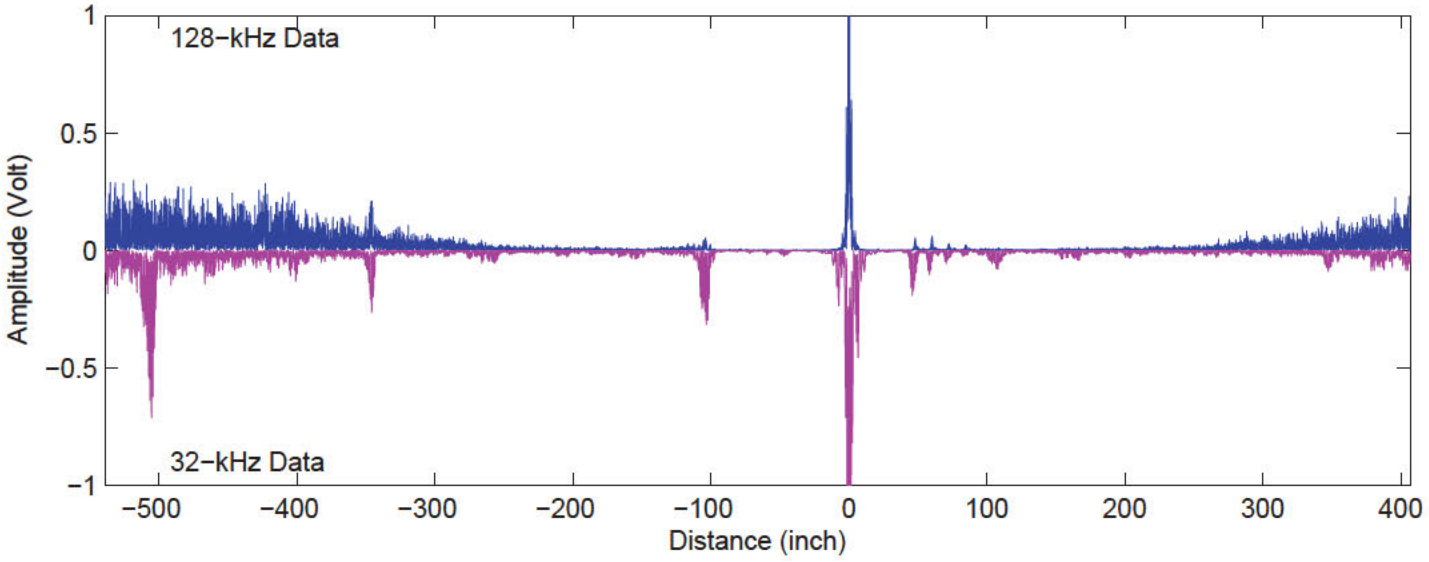
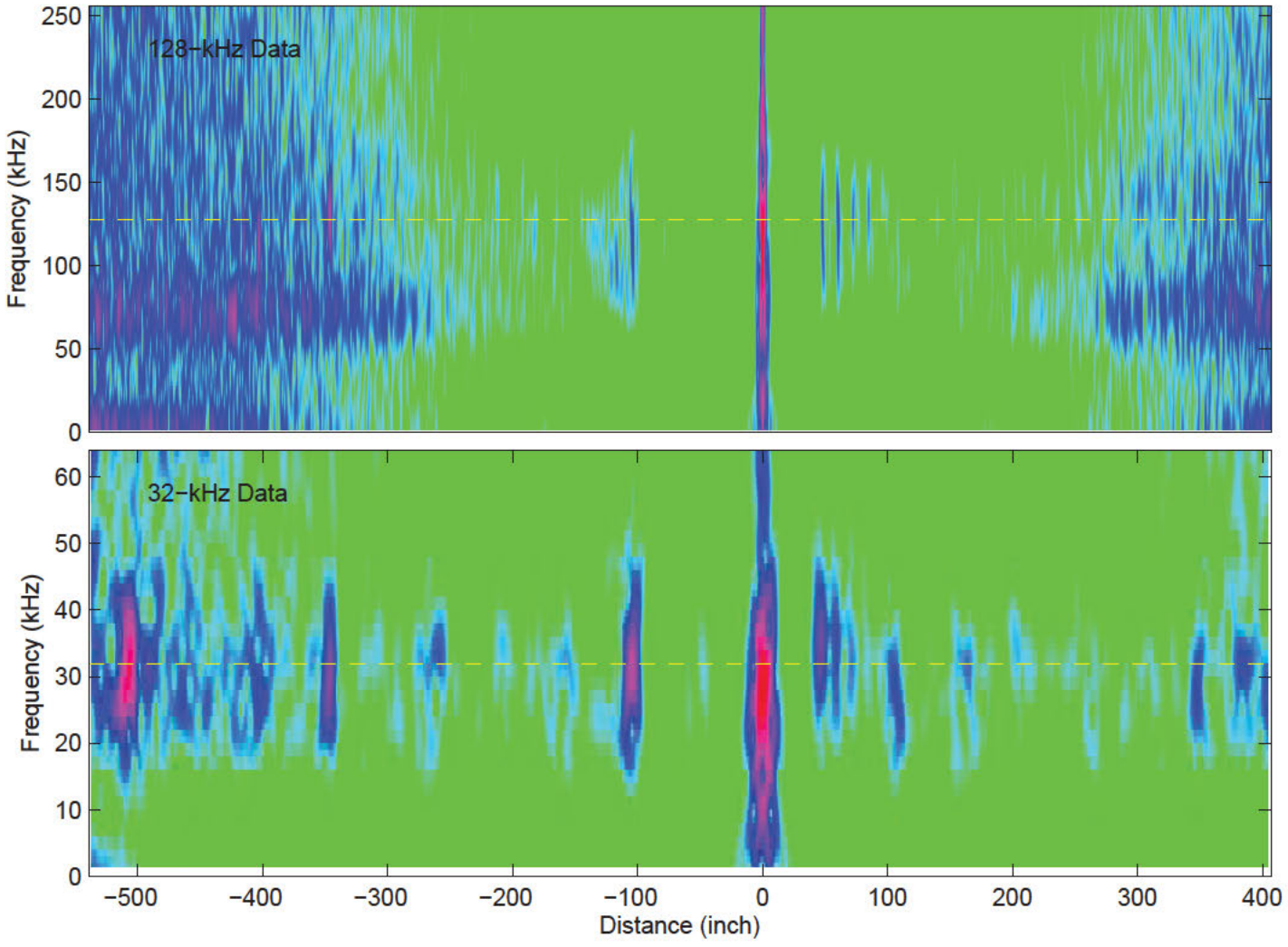
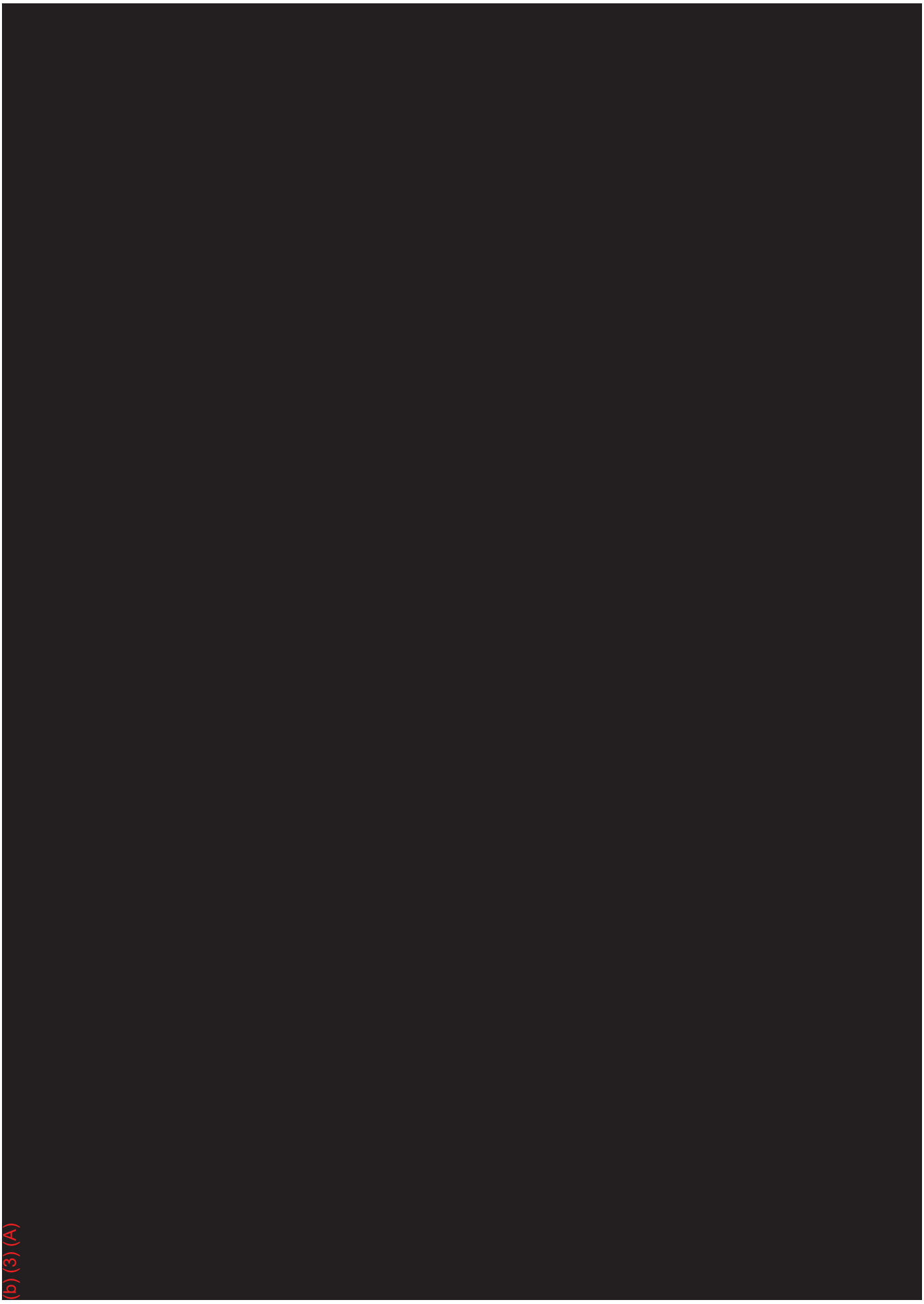
GW-B8







(b) (3) (A)

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(b) (3) (A)

GW-B8; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site:	RH PPG	Date:	25-Mar-2022
Pipe ID/Location:	GW-B9 (SP8) 6OC	GWT System:	MsSR3030R 8C00
Pipe Size:	(b) (3) (A) , 0.373-inch-wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	-297.6 to 282.7 inch

Test Pipe: Aboveground; Painted; 80°F F24-carrying pipe; 0.376, 0.380, 0.376, 0.376-inch wall; Supported with Steel

Note:

Summary: Multiple welds in close proximity to each other is producing directionality and multiple reflection signals but no indication was noted at the area of interest within the bulkhead. The metal ring weld around the pipe is noted as M1 and M2.

Sym.	Dist.(inch)	% Refl.	Comment
X1	-265.14	3.3	Directionality; |MsS-X|=265.14; W6 (265.21, 2.27)
(b)	-257.82	18.5	Pipe Support;
Y1	-245.77	13.6	Multiple Reflection; |MsS-X|=245.77; Y5-W5 (246.03, 2.53)
W1	-185.64	9.3	Weld;
Y2	-159.00	6.1	Multiple Reflection; |MsS-X|=159.00; W2-W5-W2 (159.00, 0.40)
Y3	-146.01	15.4	Multiple Reflection; |MsS-X|=146.01; W2-TC2 (146.50, 2.27)
Y4	-136.80	7.5	Multiple Reflection; |MsS-X|=136.80; W2-W5 (135.77, 2.03)
Y5	-132.79	10.7	Multiple Reflection; |MsS-X|=132.79; W2-W5 (135.08, 1.86)
Y6	-123.78	12.9	Multiple Reflection; |MsS-X|=123.78; TC2 (123.81, 2.41)
Y7	-119.53	2.8	Multiple Reflection; |MsS-X|=119.53; W3-W5 (121.85, 1.95)
X2	-114.57	2.6	Directionality; |MsS-X|=114.57; W5 (112.24, 2.88)
X3	-110.79	6.0	Directionality; |MsS-X|=110.79; W5 (113.24, 4.80)
X4	-100.64	3.5	Directionality; |MsS-X|=100.64; W4 (99.26, 2.81)
TC1	-87.18	1.8	T-Connection;
W2	-23.11	19.7	Weld;
W3	-10.00	15.4	Weld;
MsS1	0.00	--	Initial Pulse;
X5	10.53	3.0	Directionality; |MsS-X|=10.53; W3 (9.61, 2.81)
Mk1	23.51	--	Marker; Metal ring tack welded (anchor?)
Mk2	77.41	--	Marker; Metal ring tack welded (anchor?)
W4	99.45	15.4	Weld;
W5	113.24	25.7	Weld;
TC2	123.39	12.5	T-Connection;
Y8	146.89	6.1	Multiple Reflection; |MsS-X|=146.89; TC2-W2 (146.50, 2.27)
X6	235.32	23.4	Directionality;
W6	264.36	161.2	Weld;

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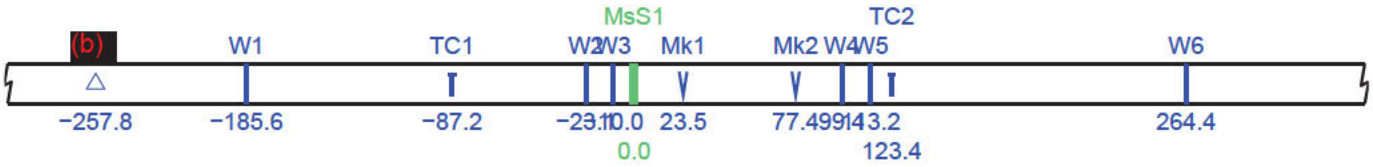
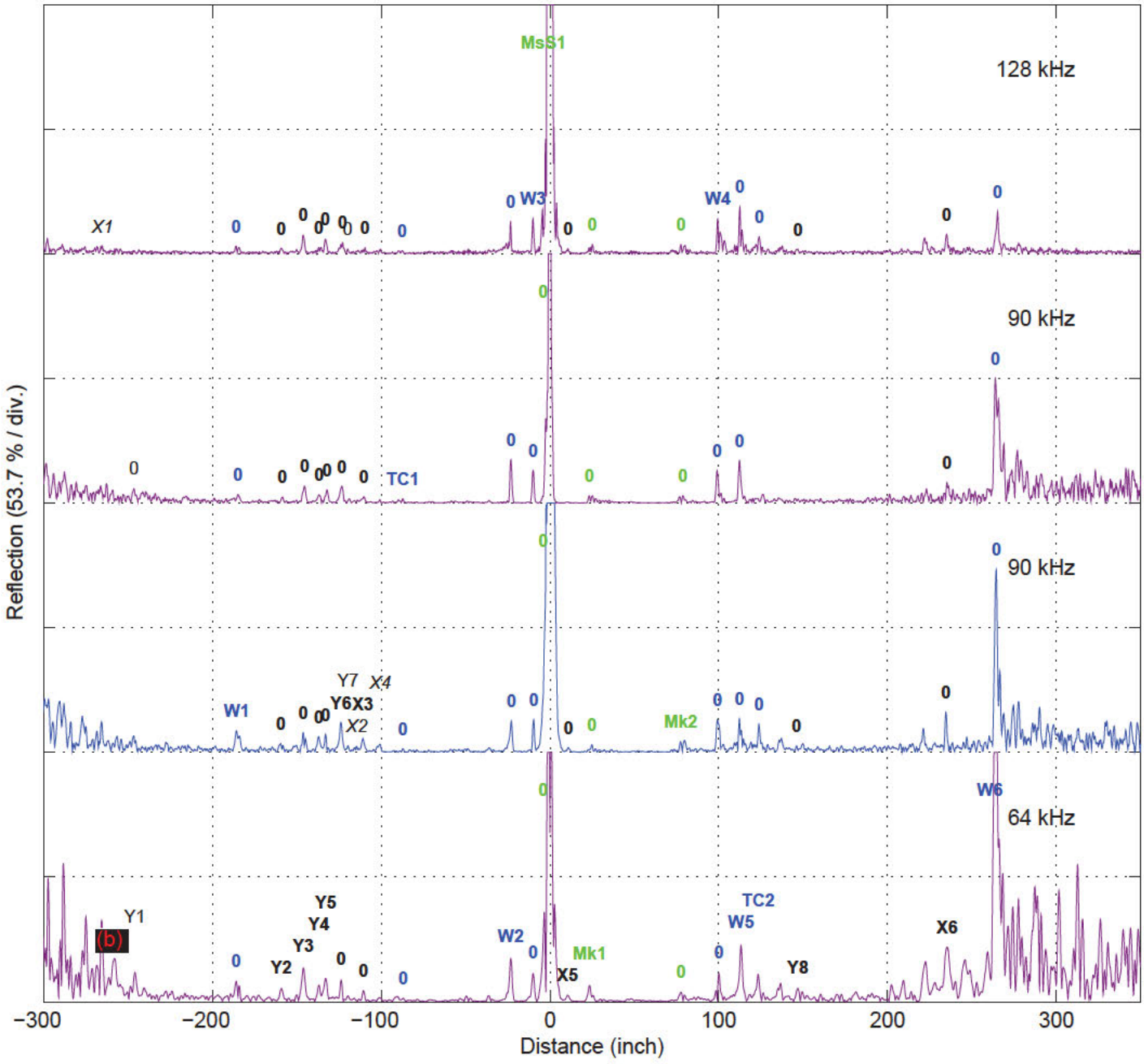
GW−B9 (SP8) 6OC





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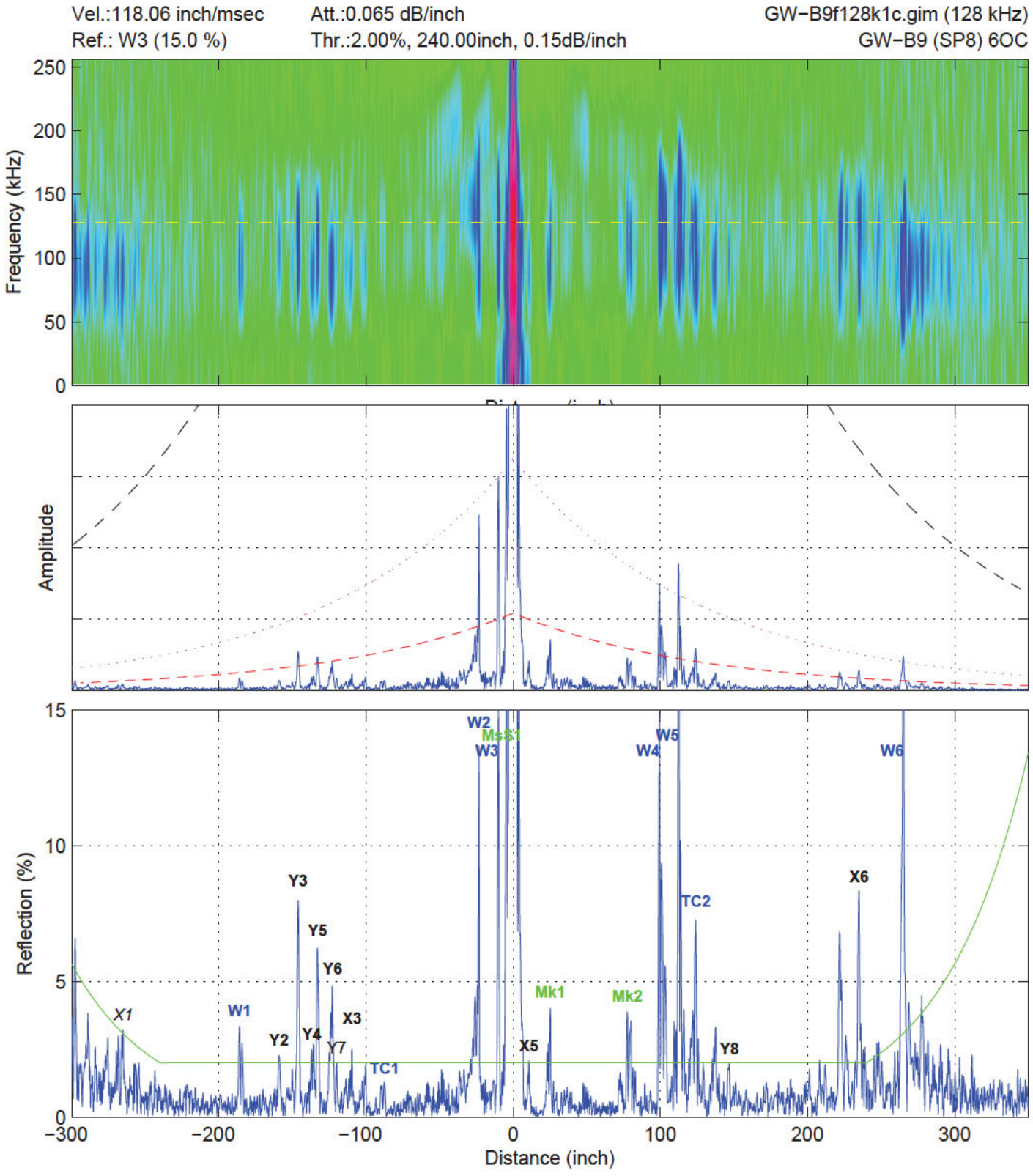

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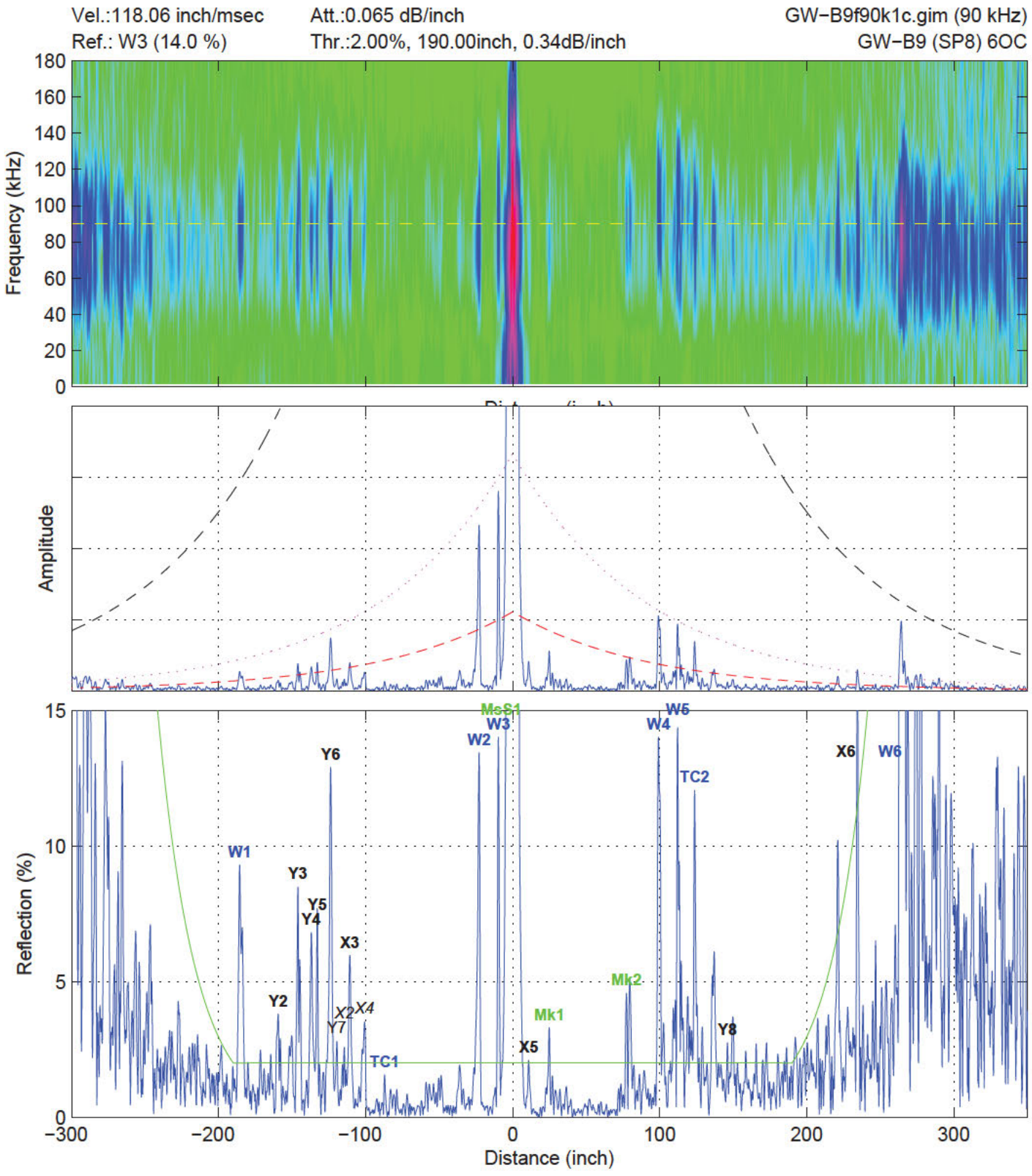

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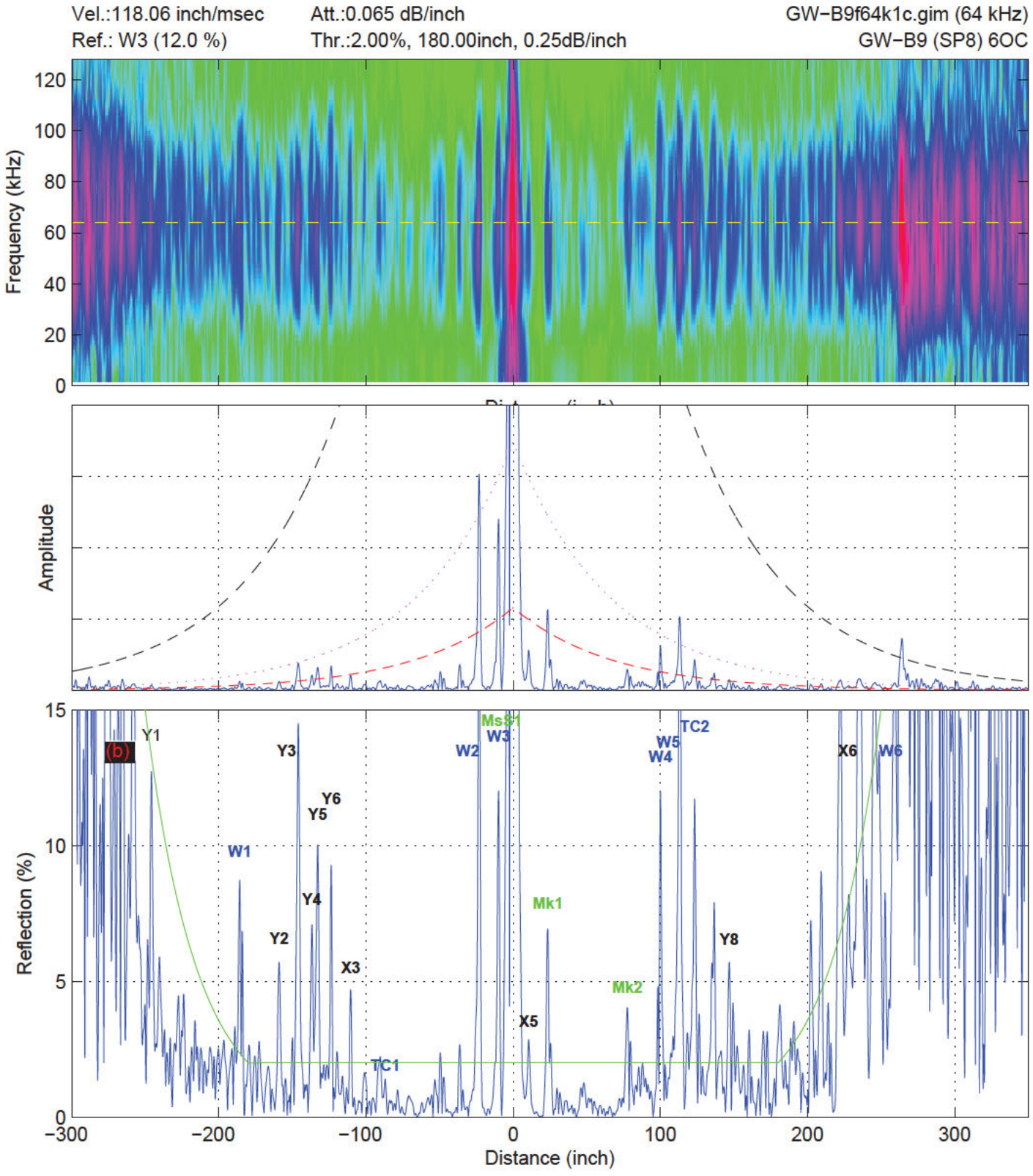

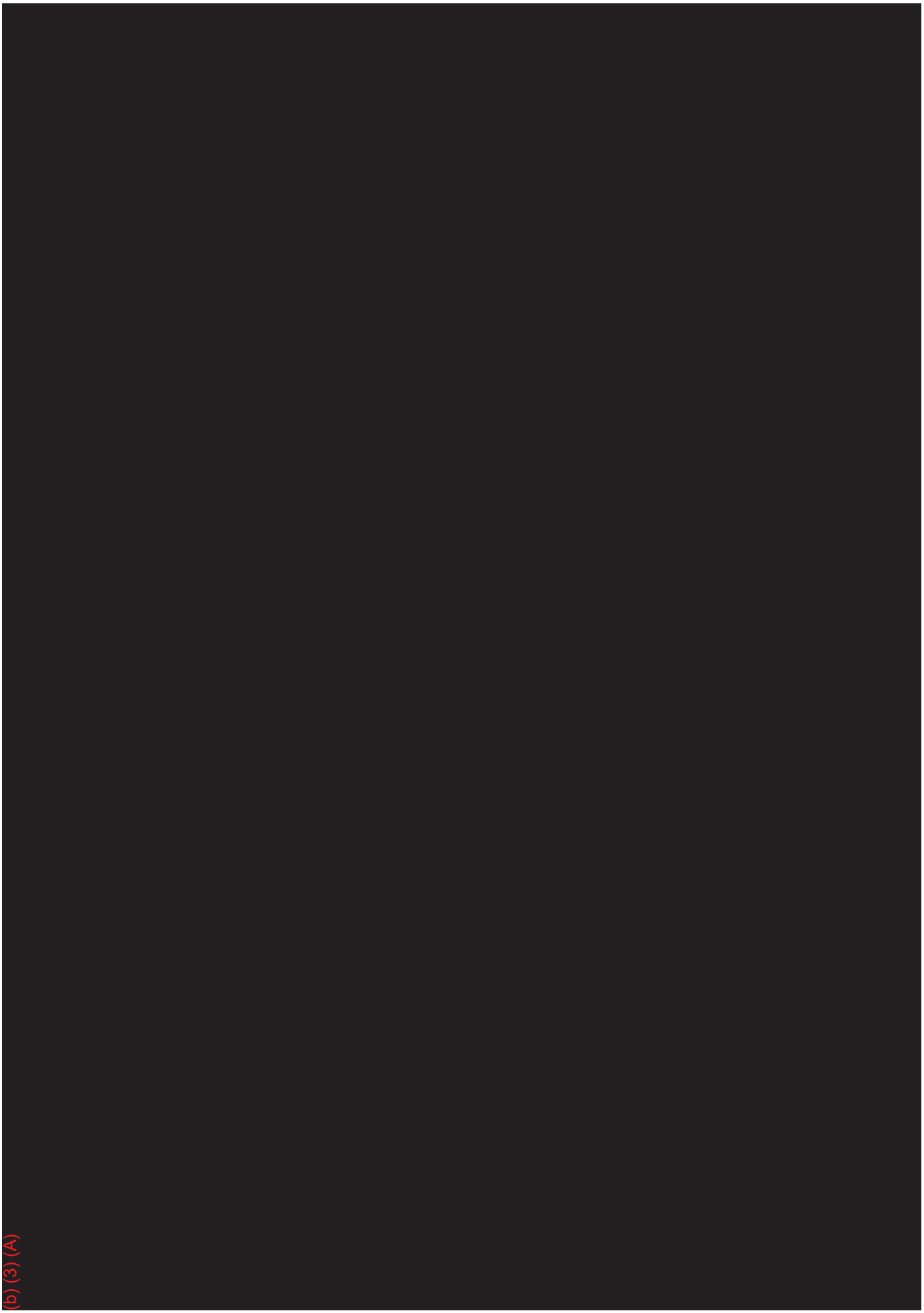

(b) (3) (A)

Inter Spec LLC
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(b) (3) (A)

[redacted]

GW-B9; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW−B10
Pipe Size: (b) (3) (A) , 0.375−inch−wall
Inspector: (b) (6)
Analyzer: (b) (6)
Client: AB&A (US Navy)

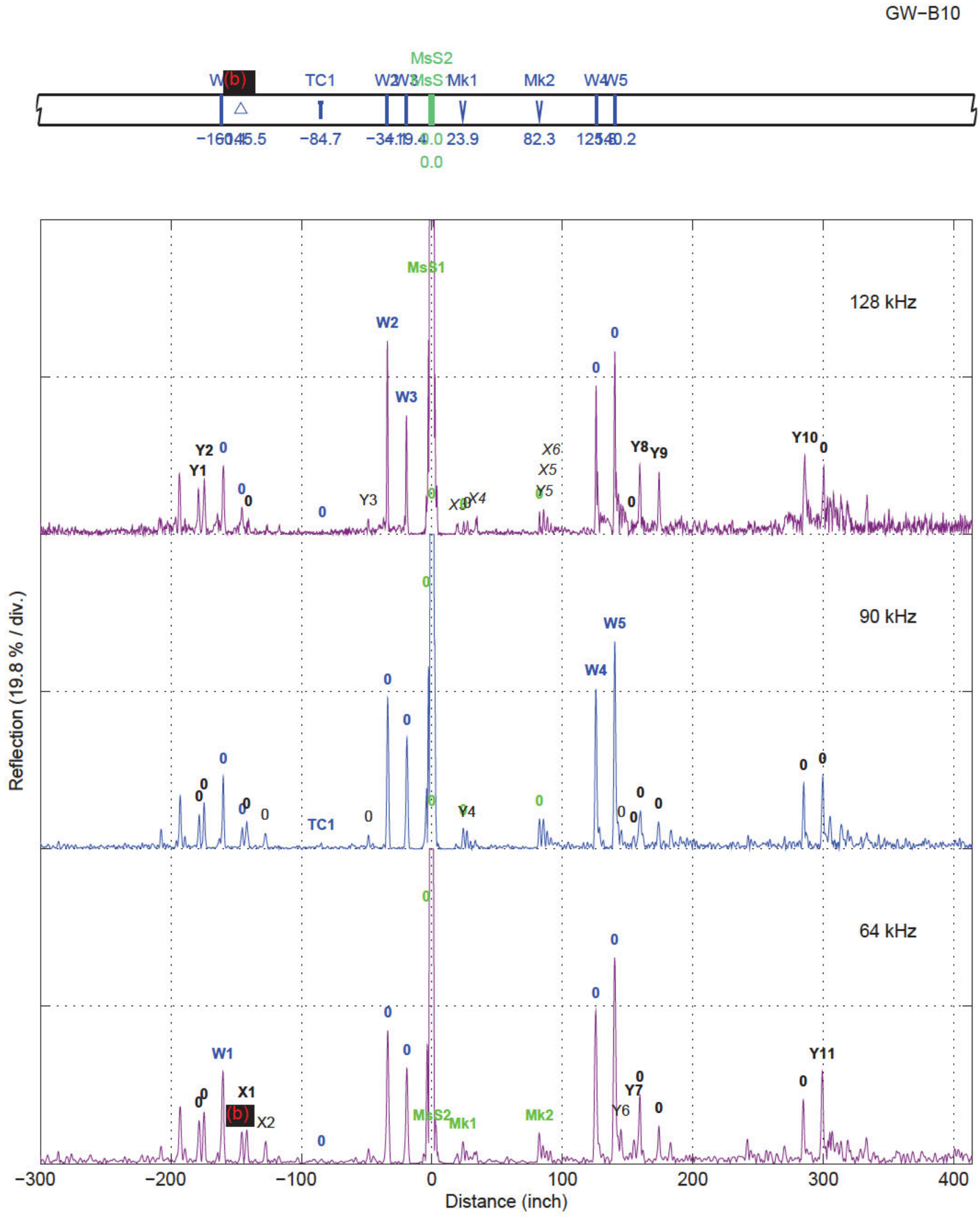
Date: 25−Mar−2022
GWT System: MsSR3030R 8C00
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: −352.2 to 333.5 inch

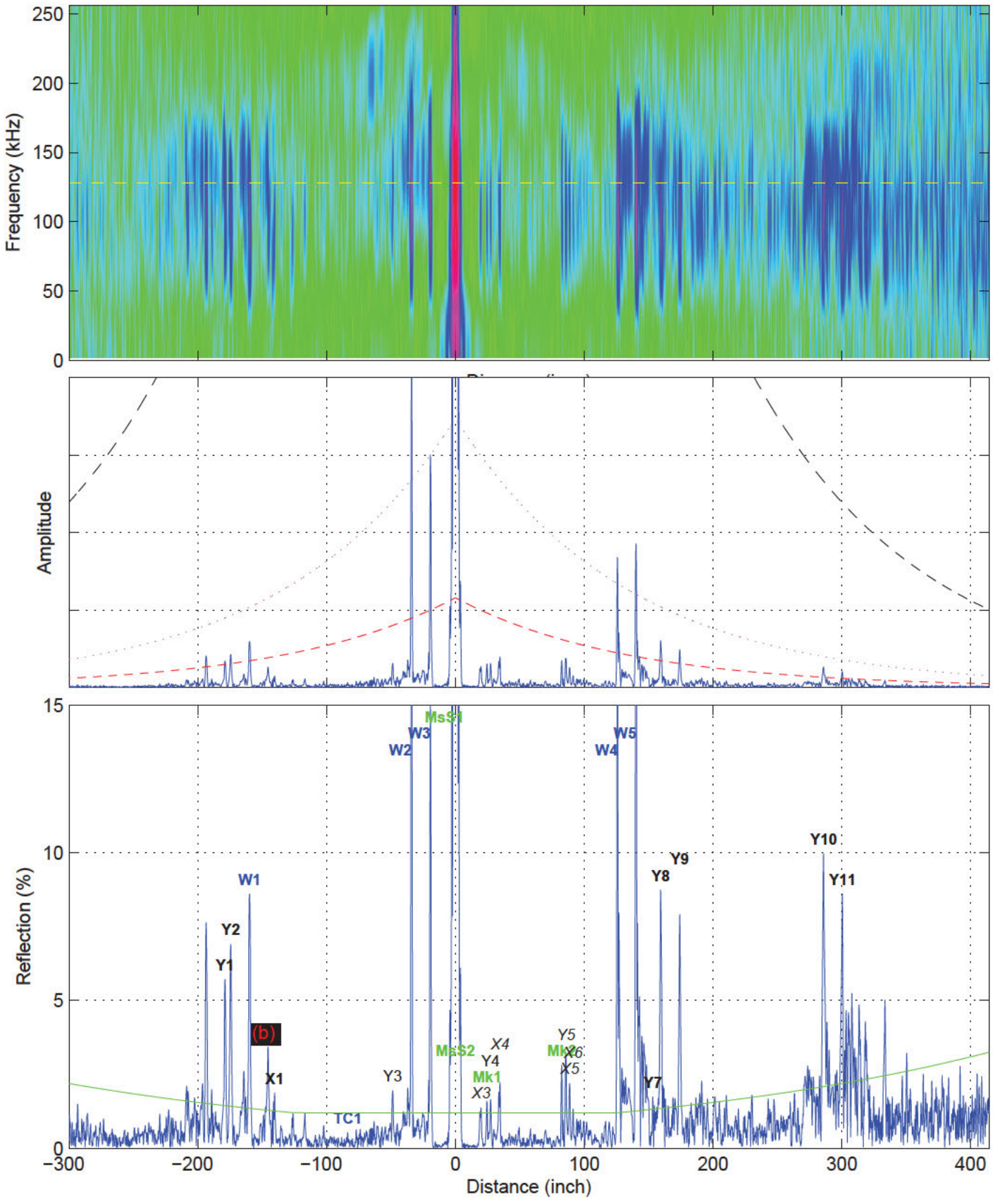
Test Pipe: Aboveground; Painted; 80°F JP−5−carrying pipe; 0.362, 0.370, 0.336, 0.361−inch wall; Supported with Steel

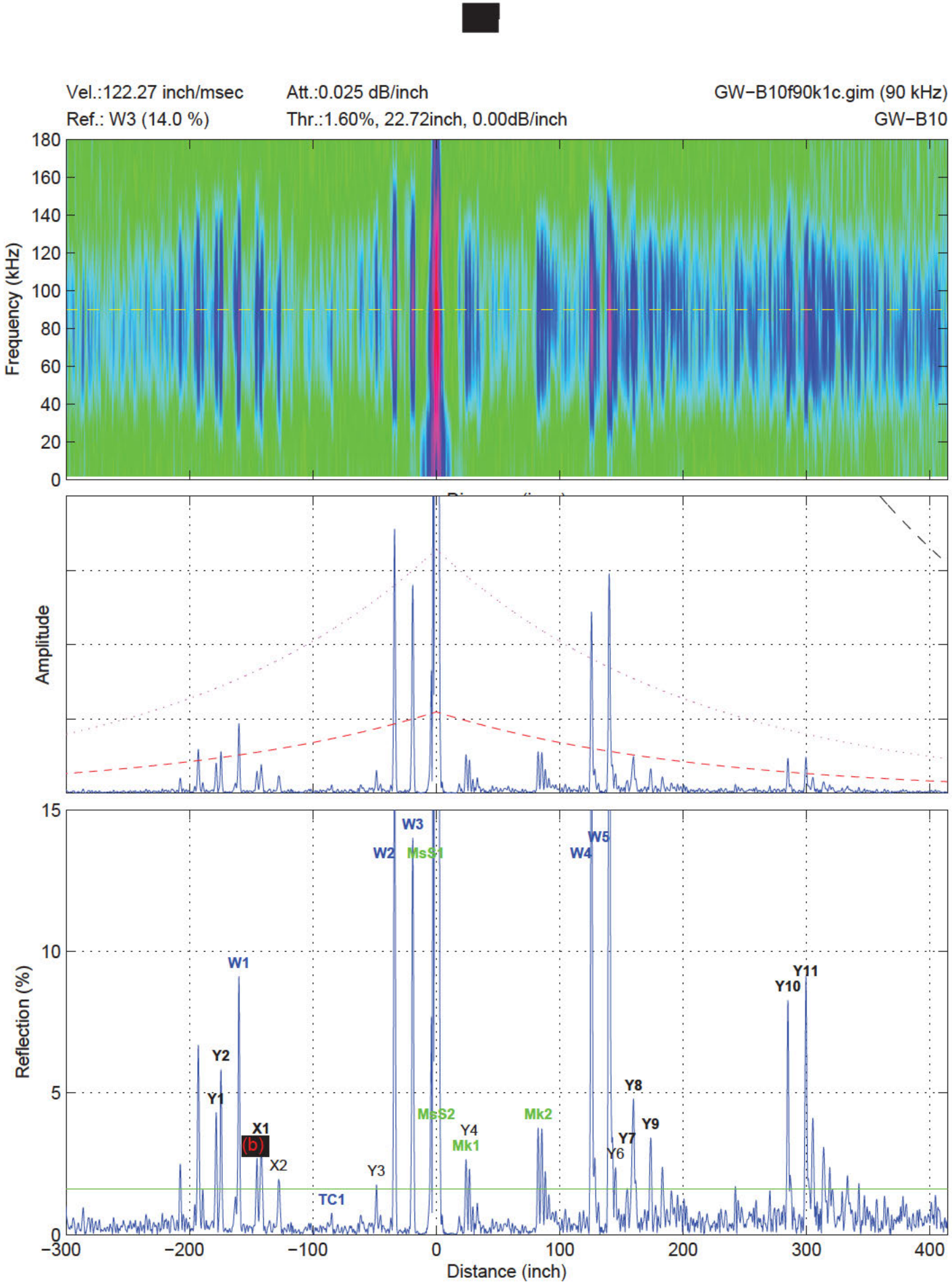
Note:

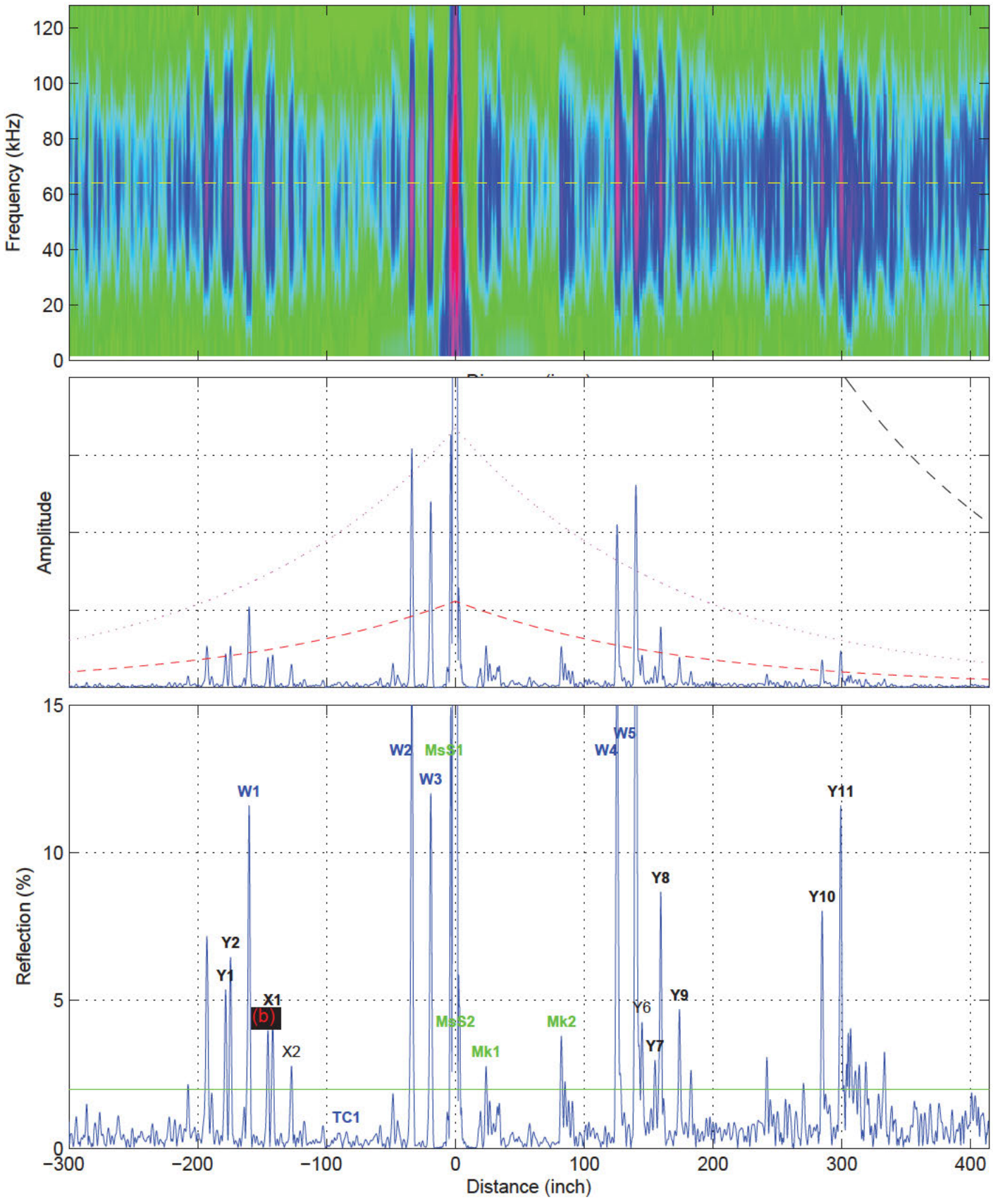
Summary: Multiple welds in close proximity to each other is producing directionality and multiple reflection signals but no indication was noted at the area of interest within the bulkhead. The metal ring weld around the pipe is noted as M1 and M2.

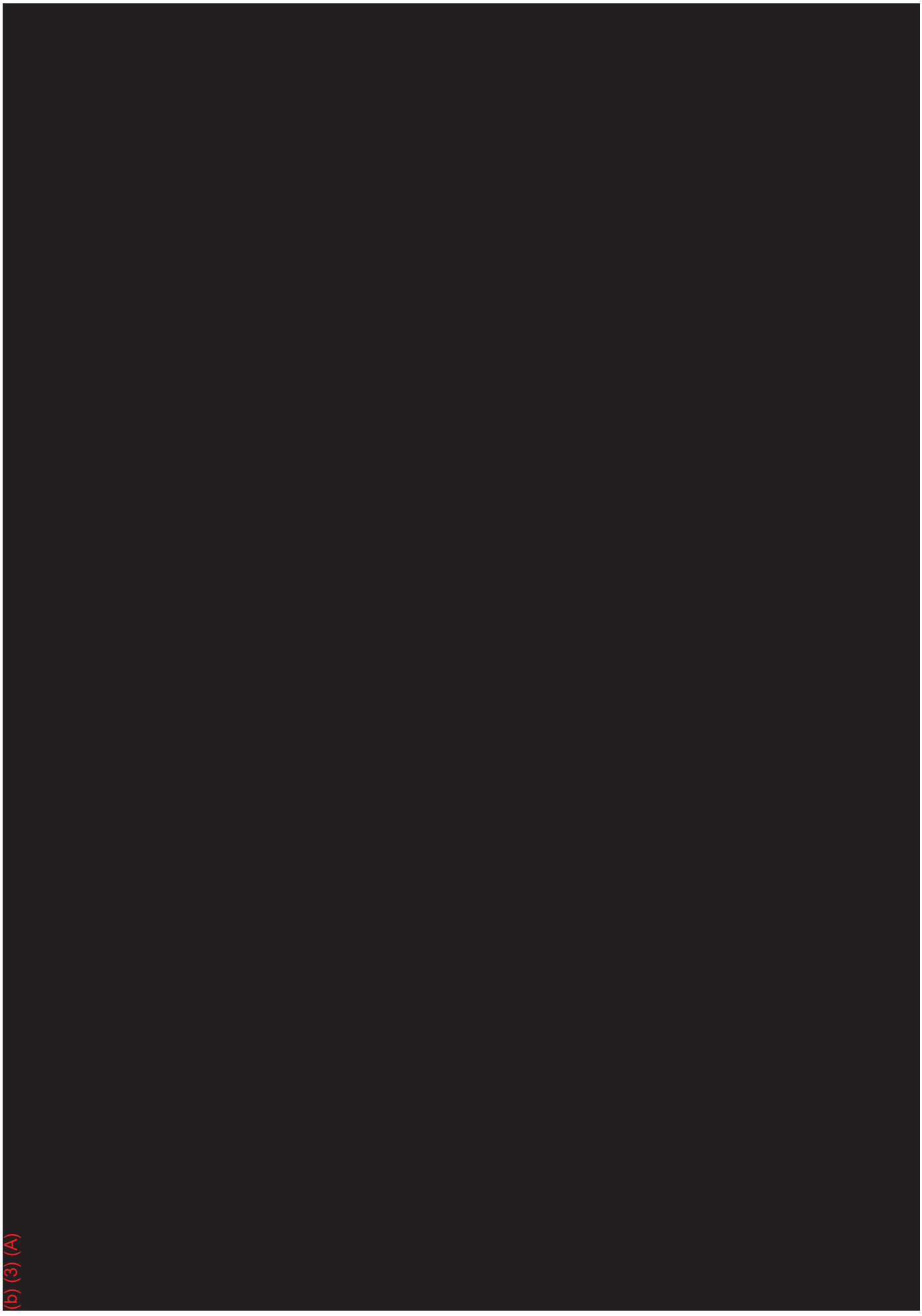
Sym.	Dist.(inch)	% Refl.	Comment
Y1	−178.84	5.7	Multiple Reflection; |MsS−X|=178.84; W3−Y8 (178.61, 0.80)
Y2	−174.31	6.9	Multiple Reflection; |MsS−X|=174.31; W2−W5 (173.84, 3.34)
W1	−160.13	11.6	Weld;
(b)	−145.46	4.0	Pipe Support;
X1	−141.79	4.2	Directionality; |MsS−X|=141.79; W5 (140.13, 3.65)
X2	−127.24	2.8	Directionality; |MsS−X|=127.24; W4 (125.58, 2.71)
TC1	−84.66	0.8	T−Connection; Q18 (85.74, 0.35);
Y3	−48.62	1.9	Multiple Reflection; |MsS−X|=48.62; W2−W3−W2 (48.75, 0.89)
W2	−34.08	24.4	Weld;
W3	−19.40	15.0	Weld;
MsS1	0.00	−−	Initial Pulse;
MsS2	0.00	−−	Initial Pulse; Metal ring tack welded (anchor?)
X3	19.97	1.4	Directionality; |MsS−X|=19.97; W3 (19.40, 1.69)
Mk1	23.86	−−	Marker; Metal ring tack welded (anchor?)
Y4	26.98	2.3	Multiple Reflection; |MsS−X|=26.98; W2 (33.79, 1.83)
X4	34.64	2.2	Directionality; |MsS−X|=34.64; W2 (34.08, 2.74)
Mk2	82.30	−−	Marker; Metal ring tack welded (anchor?)
Y5	85.74	3.1	Multiple Reflection;
X5	88.68	2.2	Directionality;
X6	91.37	1.3	Directionality;
W4	125.77	20.2	Weld;
W5	140.20	26.2	Weld;
Y6	144.90	4.3	Multiple Reflection; |MsS−X|=144.90; W4−W3 (144.77, 1.75)
Y7	154.93	3.0	Multiple Reflection; |MsS−X|=154.93; W5−W4−W5 (154.63, 1.38)
Y8	159.35	8.7	Multiple Reflection; |MsS−X|=159.35; W4−W2 (159.29, 2.48)
Y9	174.14	7.9	Multiple Reflection; |MsS−X|=174.14; W5−W2 (173.84, 3.34)
Y10	285.77	10.0	Multiple Reflection; |MsS−X|=285.77; W4−W1 (285.62, 1.14)
Y11	299.20	11.6	Multiple Reflection; |MsS−X|=299.20; W5−W1 (300.05, 1.48)


GW-B10
MsS2
W(b)
TC1
W2
W3
MsS1
Mk1
Mk2
W4
W5
−160.5
−84.7
−34.1
19.4
0.0
23.9
82.3
125.4
160.2
0.0
128 kHz
90 kHz
64 kHz
MsS1
W2
W3
Y2
Y1
Y3
X6
X5
X4
Y5
Y8
Y9
Y10
W5
W4
TC1
Y4
W1
X1
(b)
X2
MsS2
Mk1
Mk2
Y6
Y7
Y11
Reflection (19.8 % / div.)
−300
−200
−100
0
100
200
300
400
Distance (inch)


Vel.:122.27 inch/msec
Att.:0.025 dB/inch
GW−B10f128k1c.gim (128 kHz)
Ref.: W3 (15.0 %)
Thr.:1.20%, 126.02inch, 0.03dB/inch
GW−B10
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
W3
W4
W5
MsS1
MsS2
Mk1
Mk2
TC1
Y1
Y2
Y3
Y4
Y5
Y7
Y8
Y9
Y10
Y11
X1
X3
X4
X5
X6
(b)


Vel.:122.27 inch/msec
Att.:0.025 dB/inch
GW−B10f90k1c.gim (90 kHz)
Ref.: W3 (14.0 %)
Thr.:1.60%, 22.72inch, 0.00dB/inch
GW−B10
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
W3
W4
W5
MsS1
MsS2
Mk1
Mk2
Y1
Y2
Y3
Y4
Y6
Y7
Y8
Y9
Y10
Y11
X1
X2
(b)
TC1


Vel.:122.27 inch/msec
Att.:0.025 dB/inch
GW−B10f64k1c.gim (64 kHz)
Ref.: W3 (12.0 %)
Thr.:2.00%, 0.00inch, 0.00dB/inch
GW−B10
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
MsS1
W3
W4
W5
Y1
Y2
X1
(b)
X2
TC1
MsS2
Mk1
Mk2
Y6
Y7
Y8
Y9
Y10
Y11



(b) (3) (A)

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(b) (3) (A)

GW-B10; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site:	RH PPG	Date:	25−Mar−2022
Pipe ID/Location:	GW−B11	GWT System:	MsSR3030R 8C00
Pipe Size:	(b) (3) (A) , 0.375−inch−wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	Guided Wave Analysis LLC	Inspection Range:	−103.2 to 118.4 inch

Test Pipe: Aboveground; Painted; 80°F F76−carrying pipe; 0.376, 0.378, 0.376, 0.371−inch wall; Supported with Steel

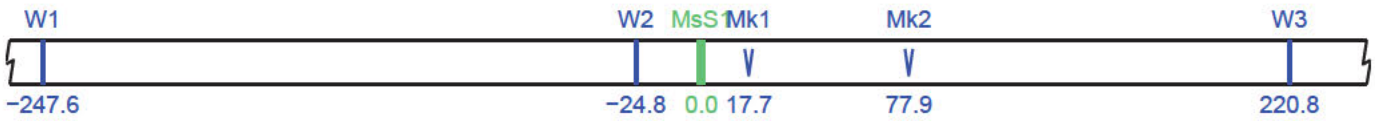
Note: Note no indication in the negative pipe support as notedd on teh last GW

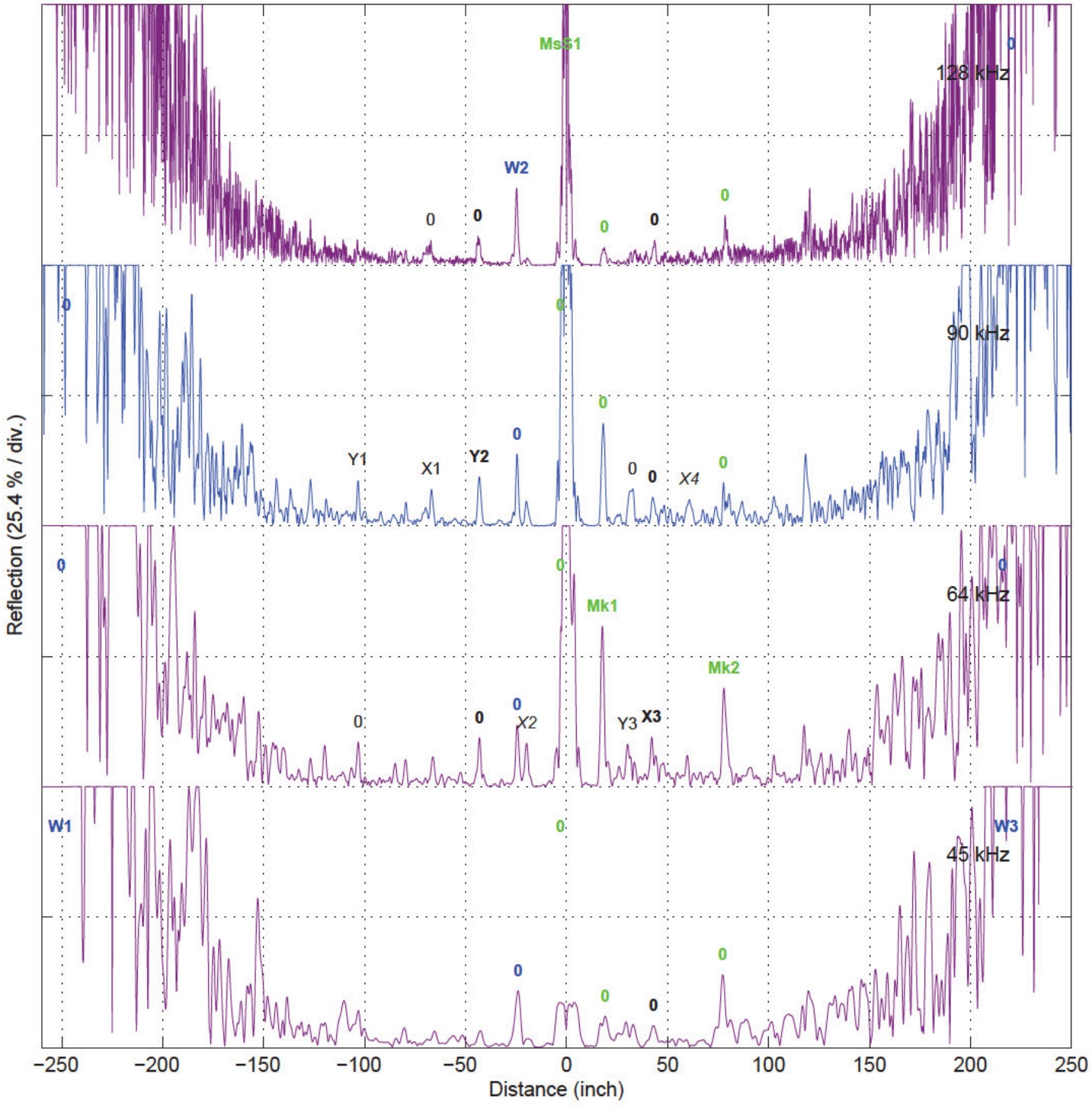
Summary: There are large plates seal welded (Anchor) to both sides of bulkhead and multiple welds in close proximity to the sensor creating directionality and multiple reflection signals. No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
W1	−247.58	6703.1	Weld;
Y1	−103.24	8.8	Multiple Reflection;
X1	−66.93	7.1	Directionality;
Y2	−43.21	9.5	Multiple Reflection;
W2	−24.78	15.0	Weld;
X2	−19.77	8.5	Directionality; |MsS−X|=19.77; Mk1 (17.75, 9.90)
MsS1	0.00	−−	Initial Pulse;
Mk1	17.75	−−	Marker; Large plate seal welded (Anchor)
Y3	30.22	8.3	Multiple Reflection; |MsS−X|=30.22; W2 (24.50, 3.03)
X3	42.20	9.6	Directionality; |MsS−X|=42.20; Y2 (43.21, 4.10)
X4	60.73	5.1	Directionality;
Mk2	77.90	−−	Marker; Large plate seal welded (Anchor)
W3	220.83	667.1	Weld;

[redacted]

GW-B11





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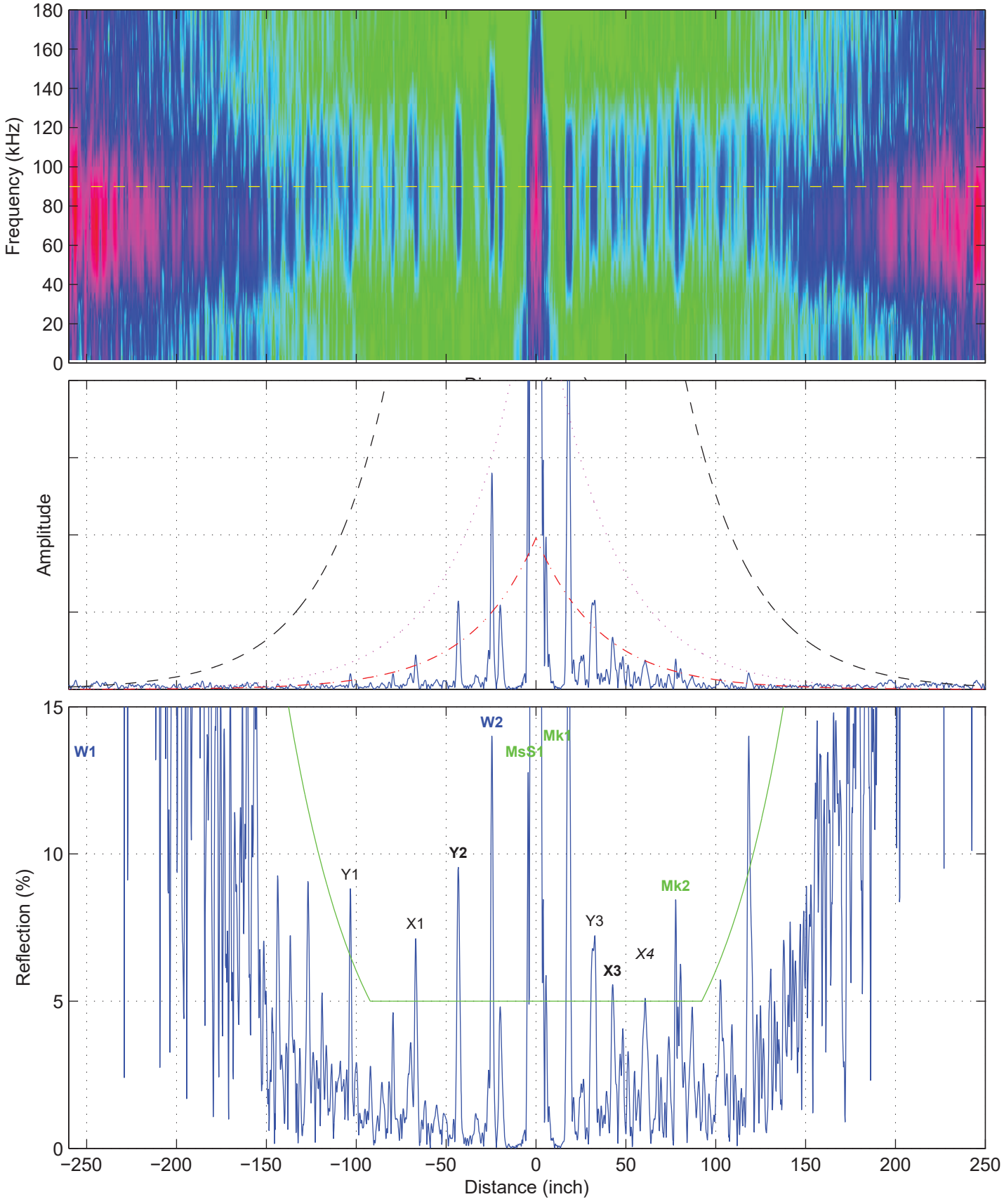
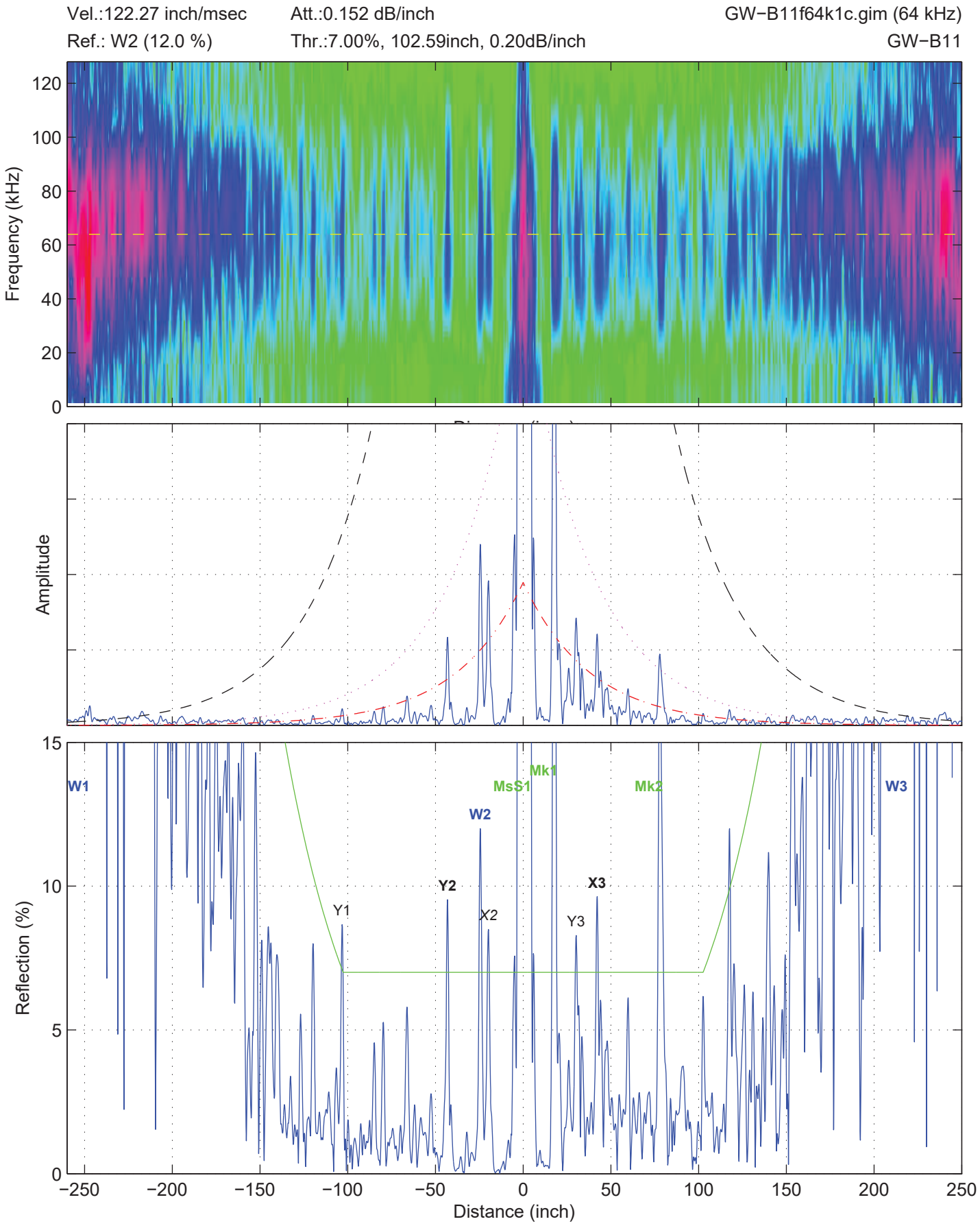
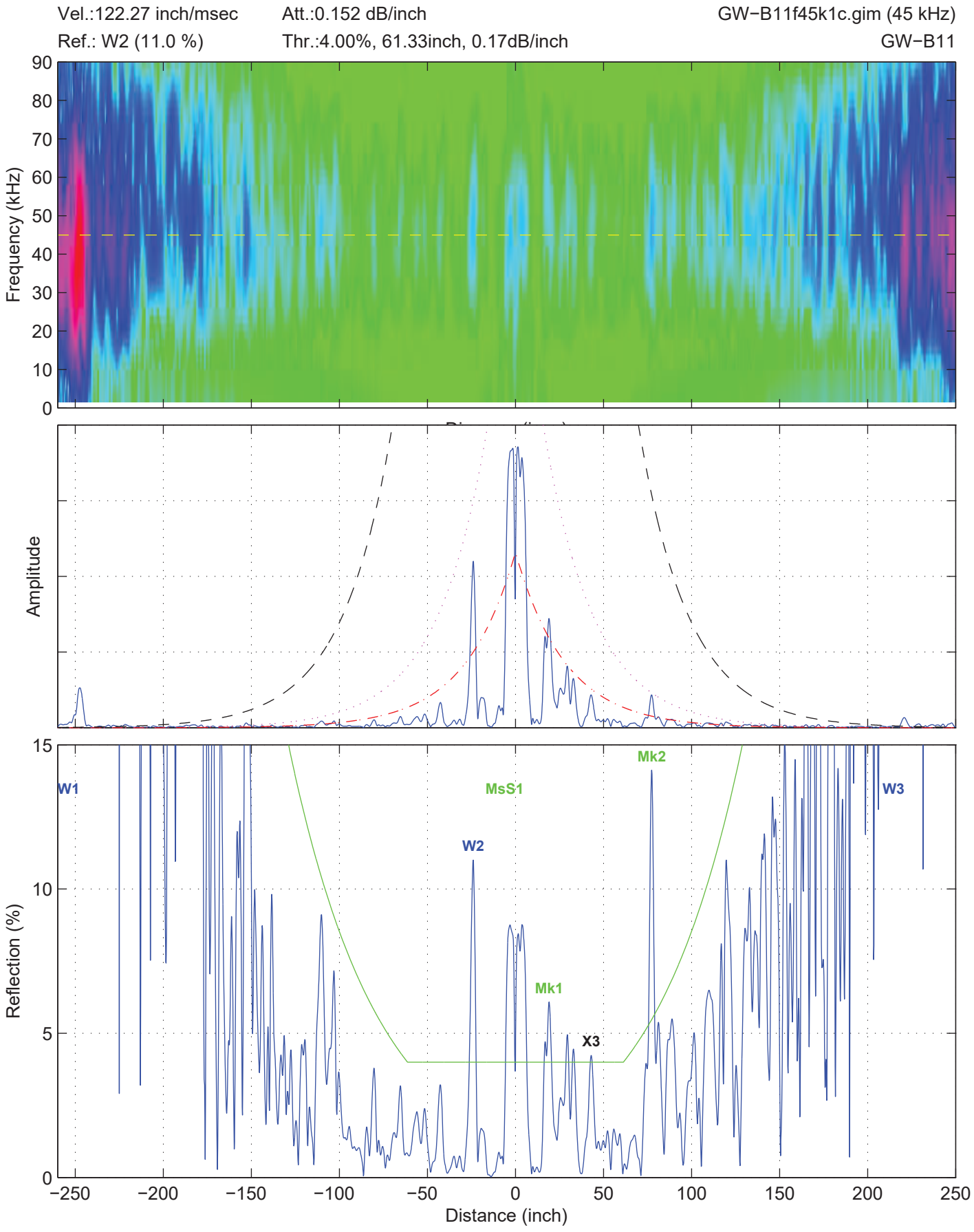
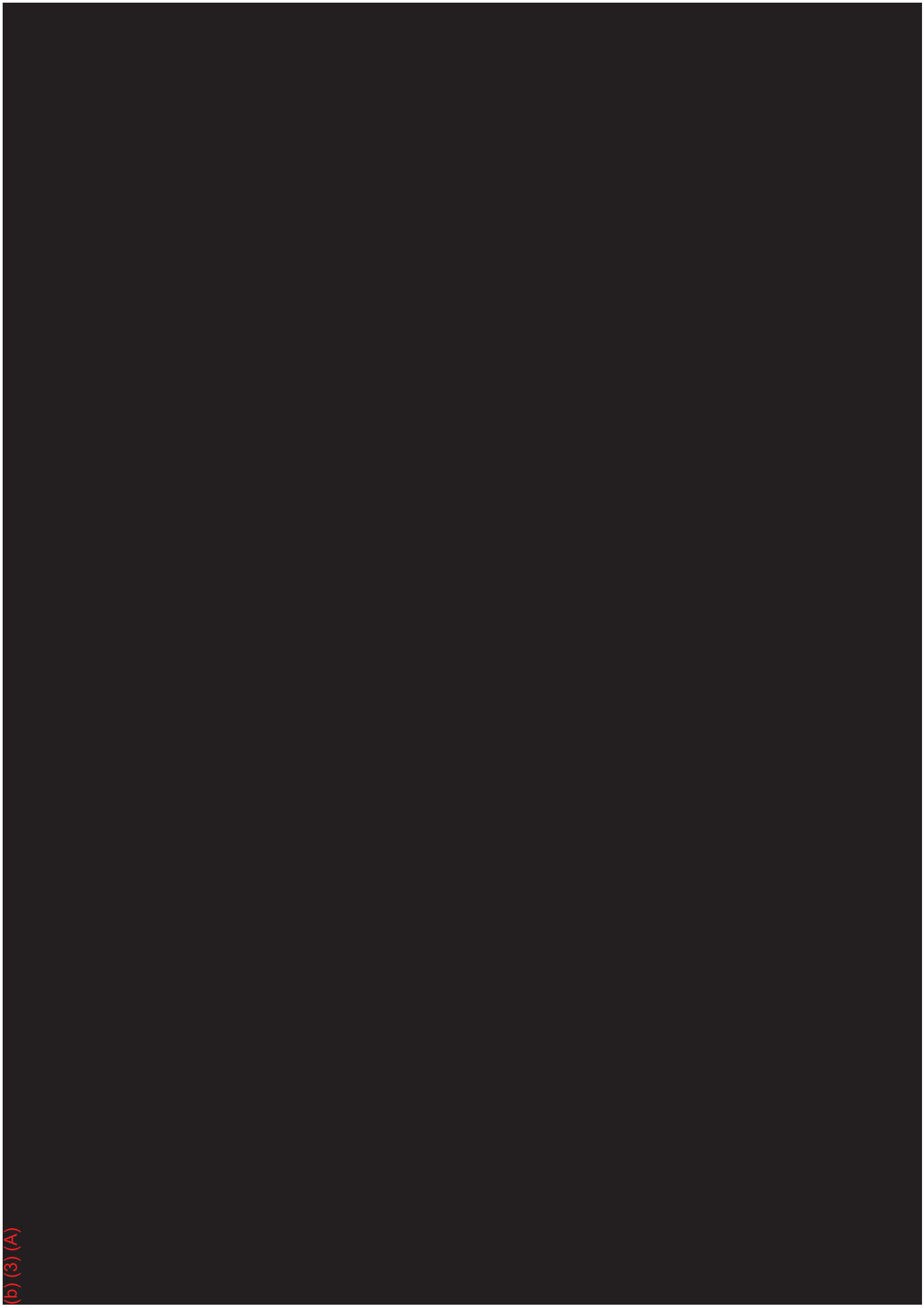

Vel.:122.27 inch/msec
Att.:0.152 dB/inch
GW−B11f90k1c.gim (90 kHz)
Ref.: W2 (14.0 %)
Thr.:5.00%, 92.24inch, 0.21dB/inch
GW−B11
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
MsS1
Mk1
Mk2
Y1
Y2
Y3
X1
X3
X4


Vel.:122.27 inch/msec
Att.:0.152 dB/inch
GW−B11f64k1c.gim (64 kHz)
Ref.: W2 (12.0 %)
Thr.:7.00%, 102.59inch, 0.20dB/inch
GW−B11
Frequency (kHz)
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
W1
W2
W3
MsS1
Mk1
Mk2
Y1
Y2
Y3
X2
X3
−250
−200
−150
−100
−50
0
50
100
150
200
250
Distance (inch)


Vel.:122.27 inch/msec
Att.:0.152 dB/inch
GW−B11f45k1c.gim (45 kHz)
Ref.: W2 (11.0 %)
Thr.:4.00%, 61.33inch, 0.17dB/inch
GW−B11
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
MsS1
W2
Mk2
W3
Mk1
X3



(b) (3) (A)

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(b) (3) (A)

GW-B11; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

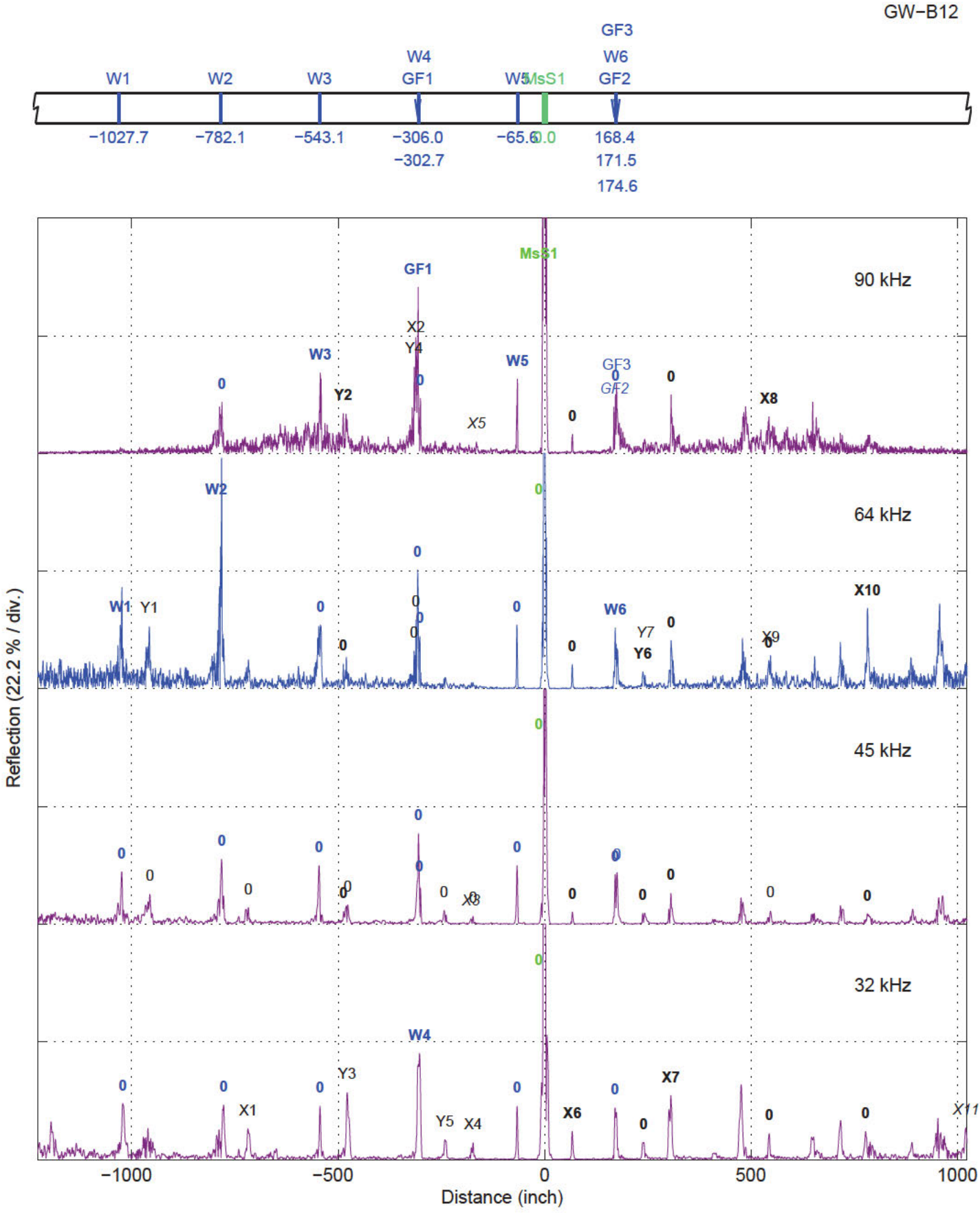
Site:	RH PPG	Date:	17-Oct-2018
Pipe ID/Location:	GW-B12	GWT System:	MsSR3030R 8C00
Pipe Size:	(b) (3) (A) , 0.435-inch-wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	-1195.4 to 1020.8 inch

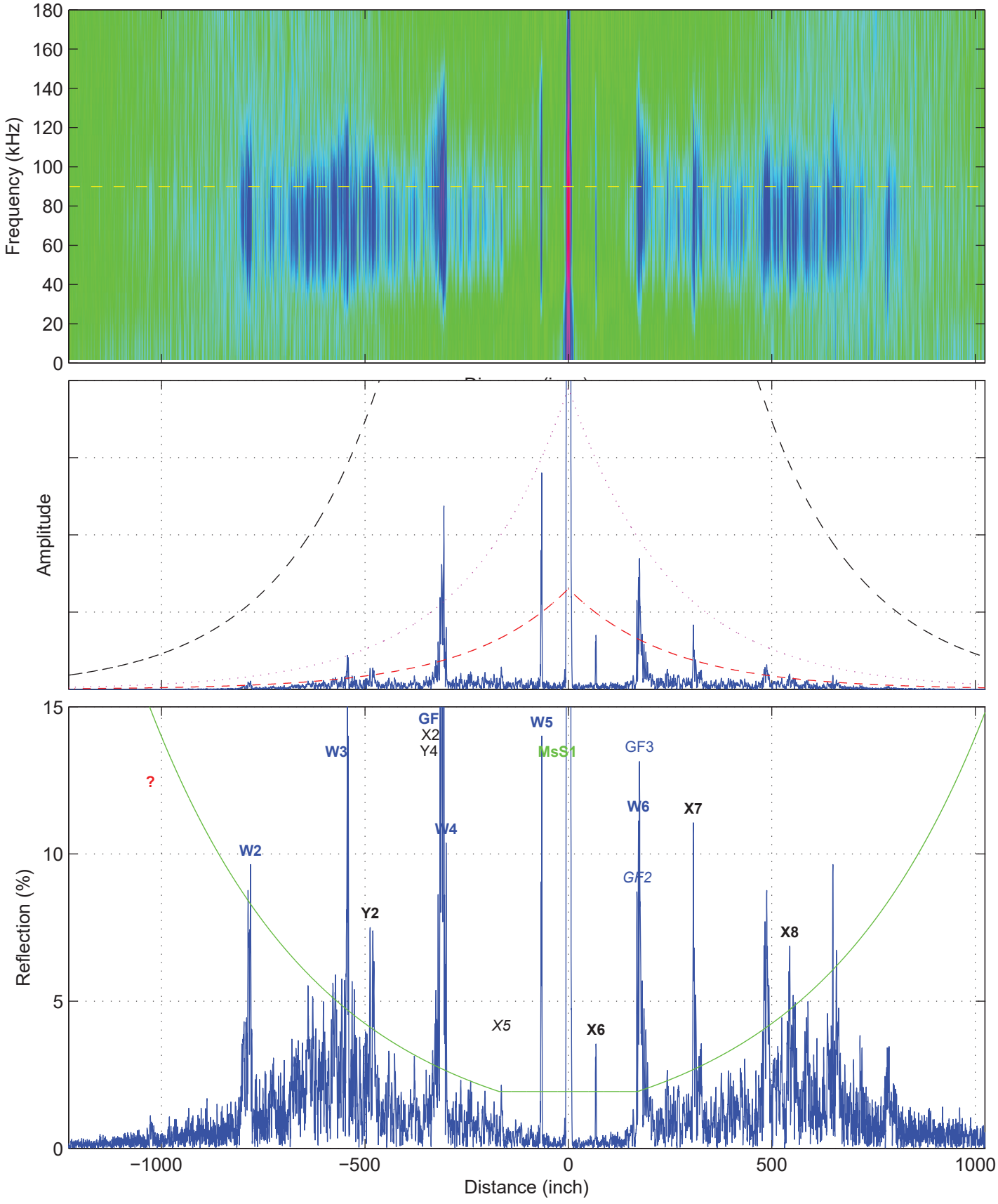
Test Pipe: Aboveground; Painted; 80°F F76-carrying pipe; 0.435, 0.439, 0.440, 0.424-inch wall; Supported with Steel

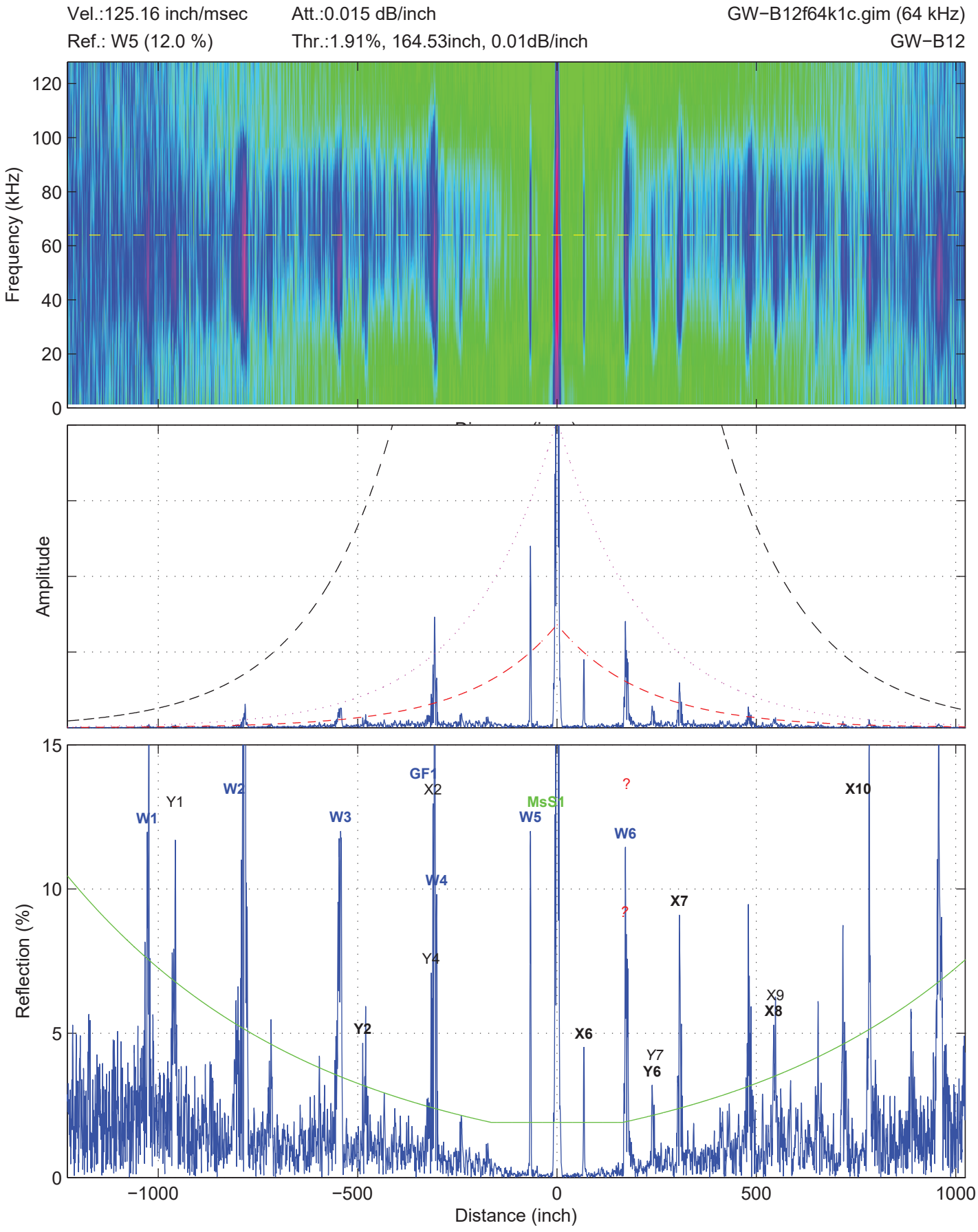
Note:

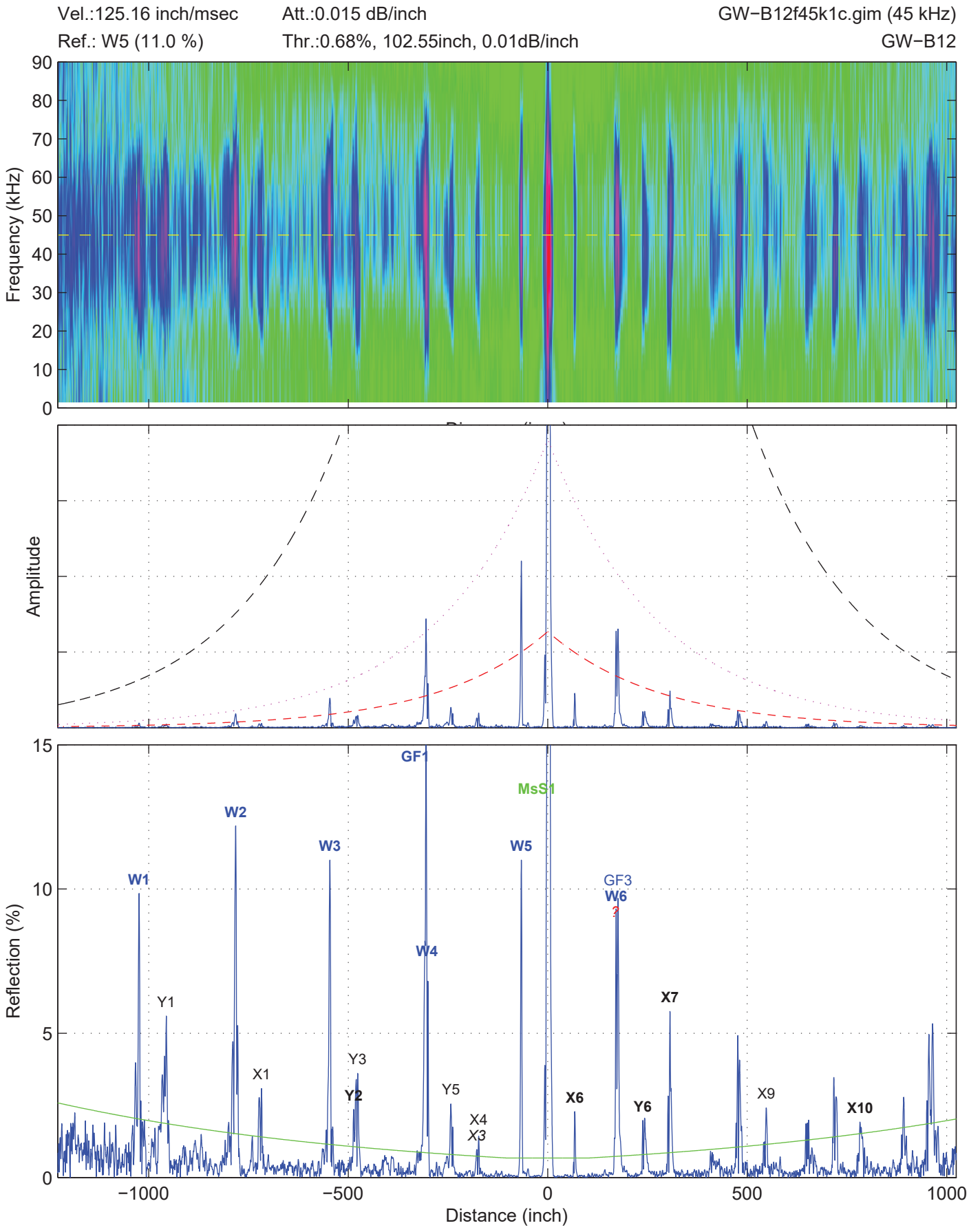
Summary: No indication is found within the inspection range.

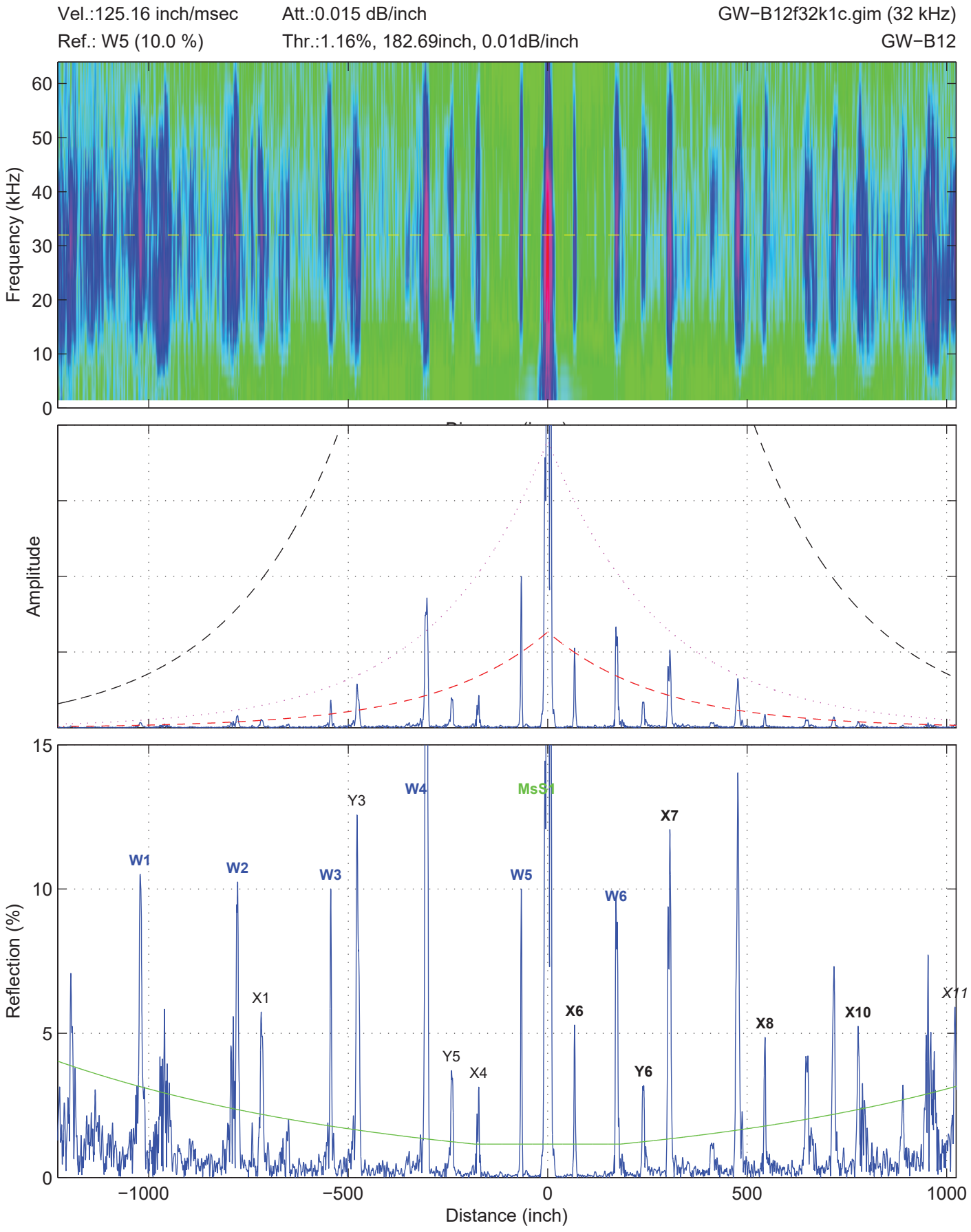
Sym.	Dist.(inch)	% Refl.	Comment
W1	-1027.71	12.0	Weld;
Y1	-957.49	11.7	Multiple Reflection; |MsS-X|=957.49; W2-GF3 (958.10, 1.14)
W2	-782.14	43.5	Weld;
X1	-718.31	5.7	Directionality; |MsS-X|=718.31; ?? (717.74, 4.11)
W3	-543.05	15.1	Weld;
Y2	-487.36	7.5	Multiple Reflection; |MsS-X|=487.36; GF1-GF3 (481.00, 1.59)
Y3	-478.01	12.6	Multiple Reflection; |MsS-X|=478.01; ?? (476.69, 8.59)
Y4	-315.39	16.3	Multiple Reflection; |MsS-X|=315.39; X2-GF1-X2 (317.02, 1.49)
X2	-311.51	21.8	Directionality; |MsS-X|=311.51; GF1-W4-GF1 (311.51, 1.02)
GF1	-306.00	31.3	Geometric Feature; Bell
W4	-302.66	19.9	Weld; W5-Q6 (321.38, 0.49);
Y5	-240.96	3.7	Multiple Reflection; |MsS-X|=240.96; W5-W6 (237.28, 2.27)
X3	-177.91	1.0	Directionality; |MsS-X|=177.91; GF3 (175.93, 1.93)
X4	-172.74	3.1	Directionality; |MsS-X|=172.74; W6 (171.17, 5.45)
X5	-164.82	2.1	Directionality; |MsS-X|=164.82; GF2 (168.36, 2.36)
W5	-65.57	14.0	Weld;
MsS1	0.00	--	Initial Pulse;
X6	67.29	5.3	Directionality; |MsS-X|=67.29; W5 (66.11, 5.62)
GF2	168.36	8.7	Geometric Feature;
W6	171.55	11.5	Weld;
GF3	174.62	13.1	Geometric Feature;
Y6	238.63	3.2	Multiple Reflection; |MsS-X|=238.63; W6-W5 (238.16, 2.37)
Y7	243.64	2.5	Multiple Reflection; |MsS-X|=243.64; W6-W5 (238.16, 2.24)
X7	306.22	12.1	Directionality; |MsS-X|=306.22; W4 (302.66, 11.22)
X8	544.09	6.9	Directionality; |MsS-X|=544.09; W3 (543.84, 5.62)
X9	547.90	6.3	Directionality; |MsS-X|=547.90; W3 (546.59, 5.01)
X10	782.70	15.1	Directionality; |MsS-X|=782.70; W2 (782.14, 18.54)
X11	1020.75	5.9	Directionality; |MsS-X|=1020.75; W1 (1021.70, 5.91)

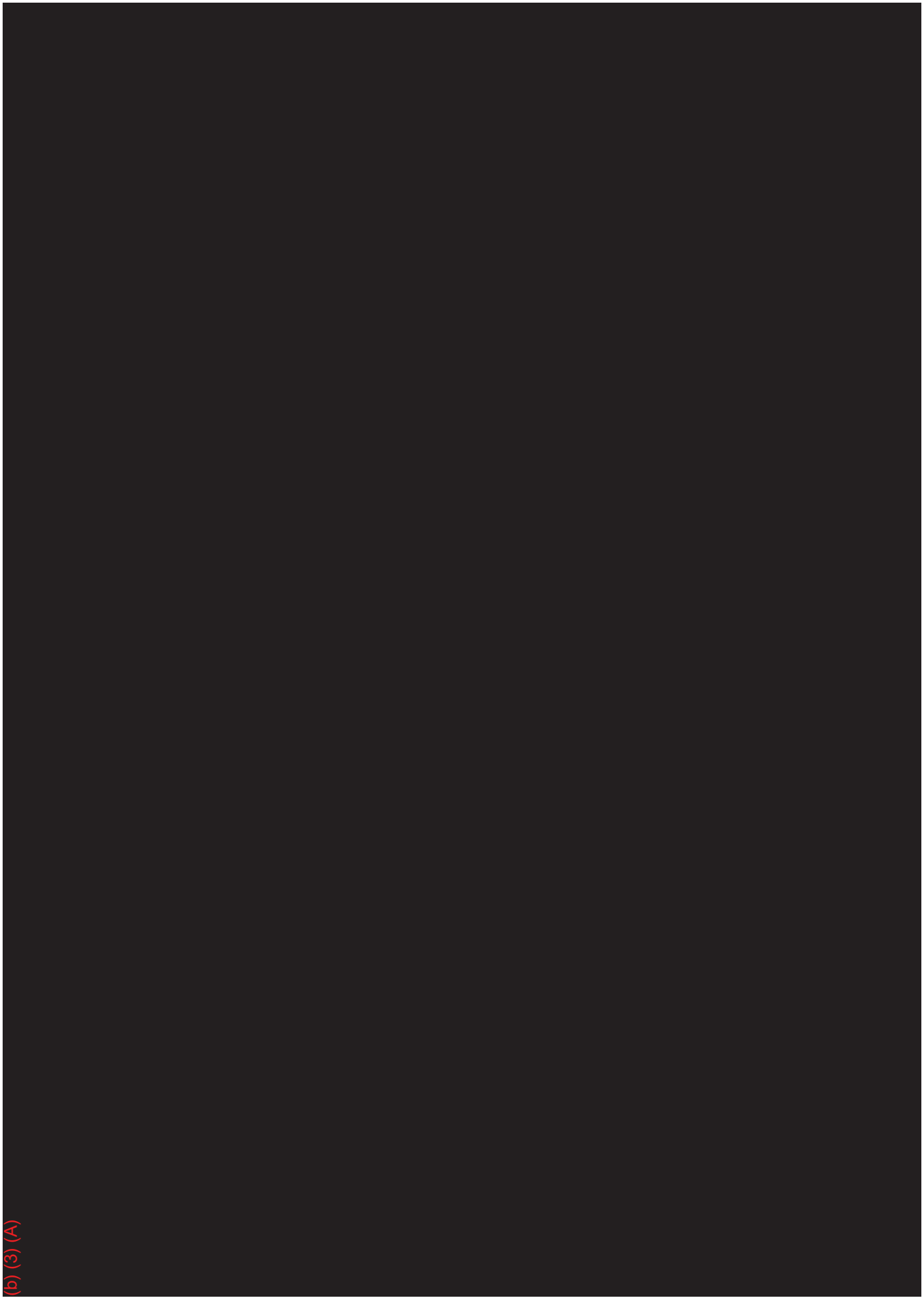

GW-B12
W1
W2
W3
W4
GF1
W5
MsS1
GF3
W6
GF2
−1027.7
−782.1
−543.1
−306.0
−302.7
−65.6
0.0
168.4
171.5
174.6
90 kHz
64 kHz
45 kHz
32 kHz
Reflection (22.2 % / div.)
−1000
−500
0
500
1000
Distance (inch)


Vel.:125.16 inch/msec
Att.:0.015 dB/inch
GW−B12f90k1c.gim (90 kHz)
Ref.: W5 (14.0 %)
Thr.:1.93%, 170.00inch, 0.02dB/inch
GW−B12
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
?
W2
W3
GF
X2
Y4
W4
Y2
W5
MsS1
GF3
W6
X7
GF2
X8
X5
X6


Vel.:125.16 inch/msec
Att.:0.015 dB/inch
GW−B12f64k1c.gim (64 kHz)
Ref.: W5 (12.0 %)
Thr.:1.91%, 164.53inch, 0.01dB/inch
GW−B12
Frequency (kHz)
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
W1
Y1
W2
W3
GF1
X2
W4
Y4
Y2
W5
MsS1
X6
?
W6
?
Y7
Y6
X7
X9
X8
X10
−1000
−500
0
500
1000
Distance (inch)


Vel.:125.16 inch/msec
Att.:0.015 dB/inch
GW−B12f45k1c.gim (45 kHz)
Ref.: W5 (11.0 %)
Thr.:0.68%, 102.55inch, 0.01dB/inch
GW−B12
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
W3
GF1
MsS1
W5
GF3
W6
W4
Y1
X1
Y3
Y2
Y5
X4
X3
X6
Y6
X7
X9
X10


Vel.:125.16 inch/msec
Att.:0.015 dB/inch
GW−B12f32k1c.gim (32 kHz)
Ref.: W5 (10.0 %)
Thr.:1.16%, 182.69inch, 0.01dB/inch
GW−B12
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
W3
Y3
W4
MsS1
W5
W6
X7
X1
X6
Y5
X4
Y6
X8
X10
X11
−1000
−500
0
500
1000



(b) (3) (A)

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(b) (3) (A)

GW-B12; General pipe and saddle inspection; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site:	RH PPG	Date:	17-Oct-2018
Pipe ID/Location:	GW-B13	GWT System:	MsSR3030R 8C00
Pipe Size:	(b) (3) (A) , 0.250-inch-wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	Guided Wave Analysis LLC	Inspection Range:	-296.4 to 354.7 inch

Test Pipe: Aboveground; Painted; 80°F F24-carrying pipe; 0.249, 0.249, 0.246, 0.249-inch wall; Supported with Steel

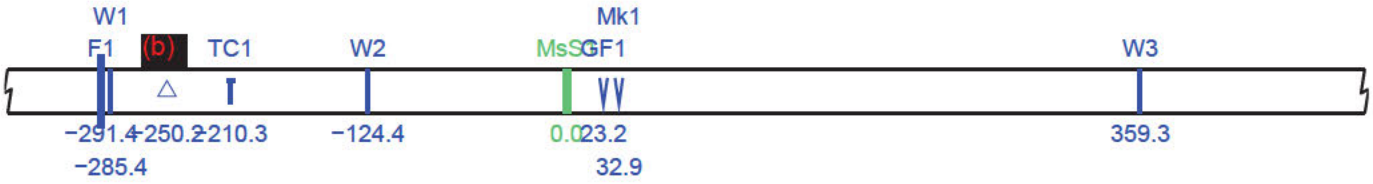
Note:

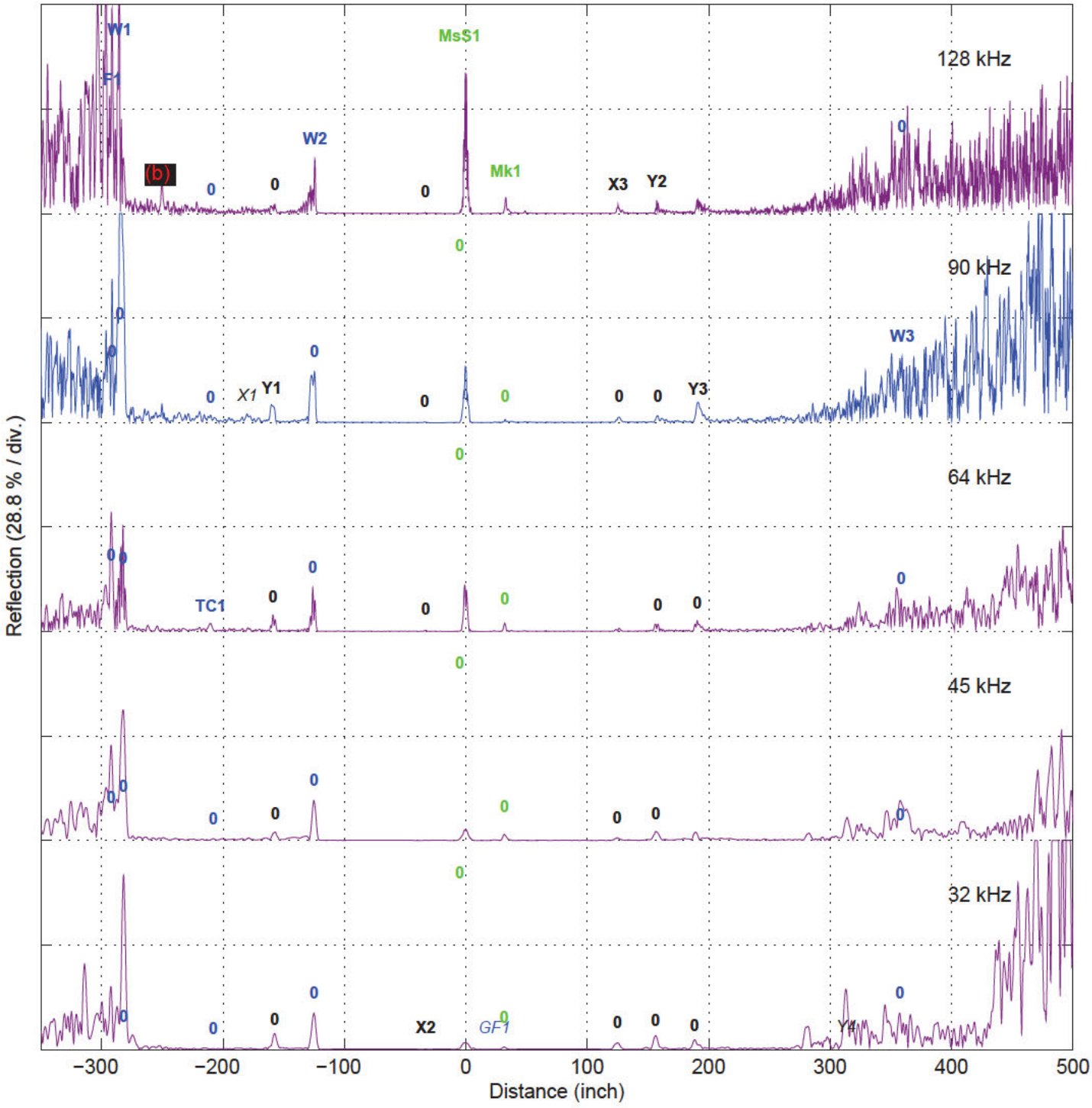
Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-291.38	31.4	Flange;
W1	-285.37	45.1	Weld;
(b)	-250.16	5.6	Pipe Support;
TC1	-210.32	1.5	T-Connection;
X1	-180.09	1.7	Directionality;
Y1	-160.04	4.0	Multiple Reflection;
W2	-124.37	15.0	Weld;
X2	-33.16	0.5	Directionality; |MsS-X|=33.16; Mk1 (31.47, 0.58)
MsS1	0.00	--	Initial Pulse;
GF1	23.20	0.4	Geometric Feature; Wall attenuation
Mk1	32.86	--	Marker;
X3	125.45	2.4	Directionality; W2 (125.03, 0.91);
Y2	157.27	3.1	Multiple Reflection;
Y3	191.03	3.7	Multiple Reflection;
Y4	312.99	0.7	Multiple Reflection; |MsS-X|=312.99; Y3-W2 (313.45, 0.08)
W3	359.29	18.1	Weld;

[redacted]

GW-B13





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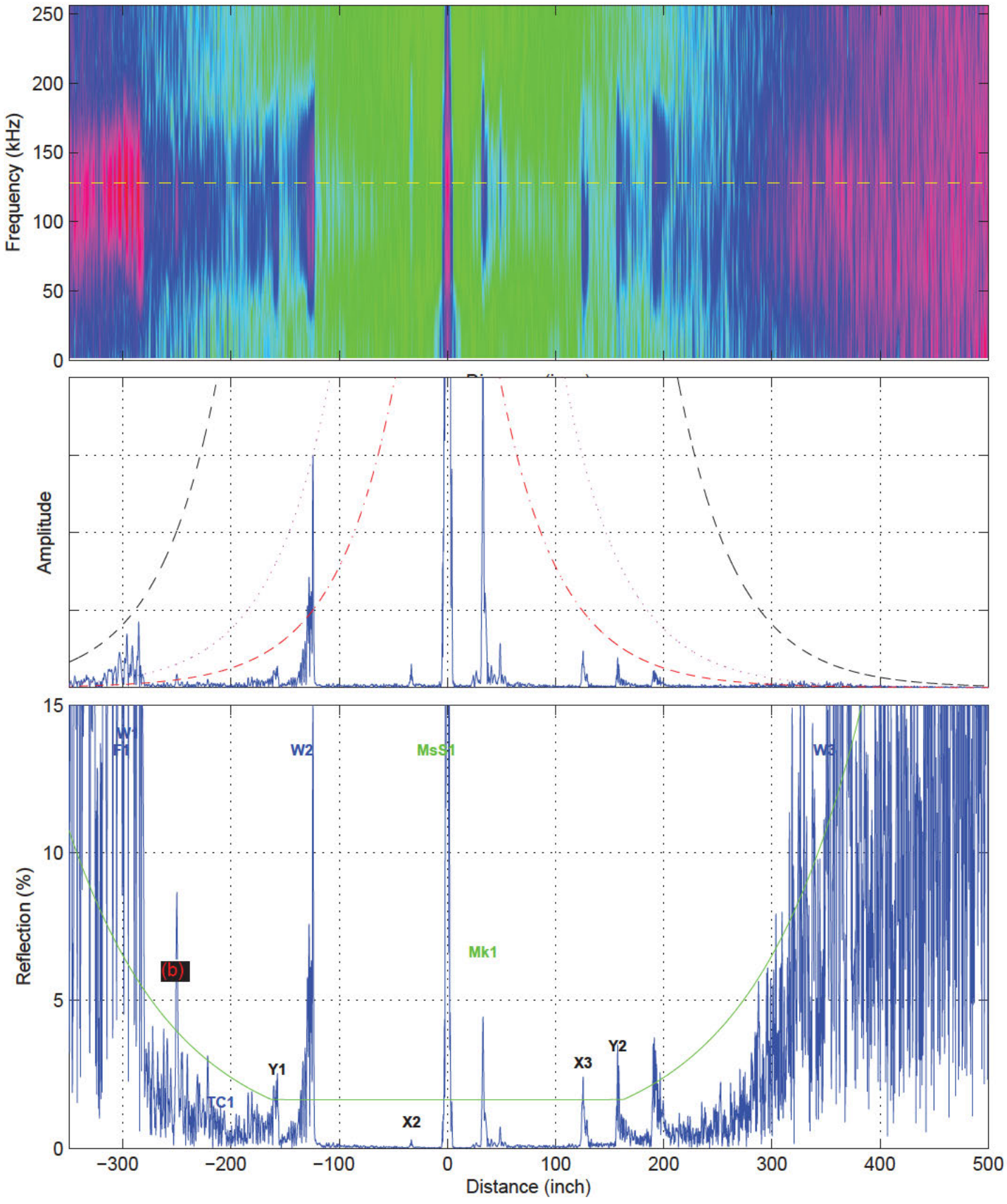
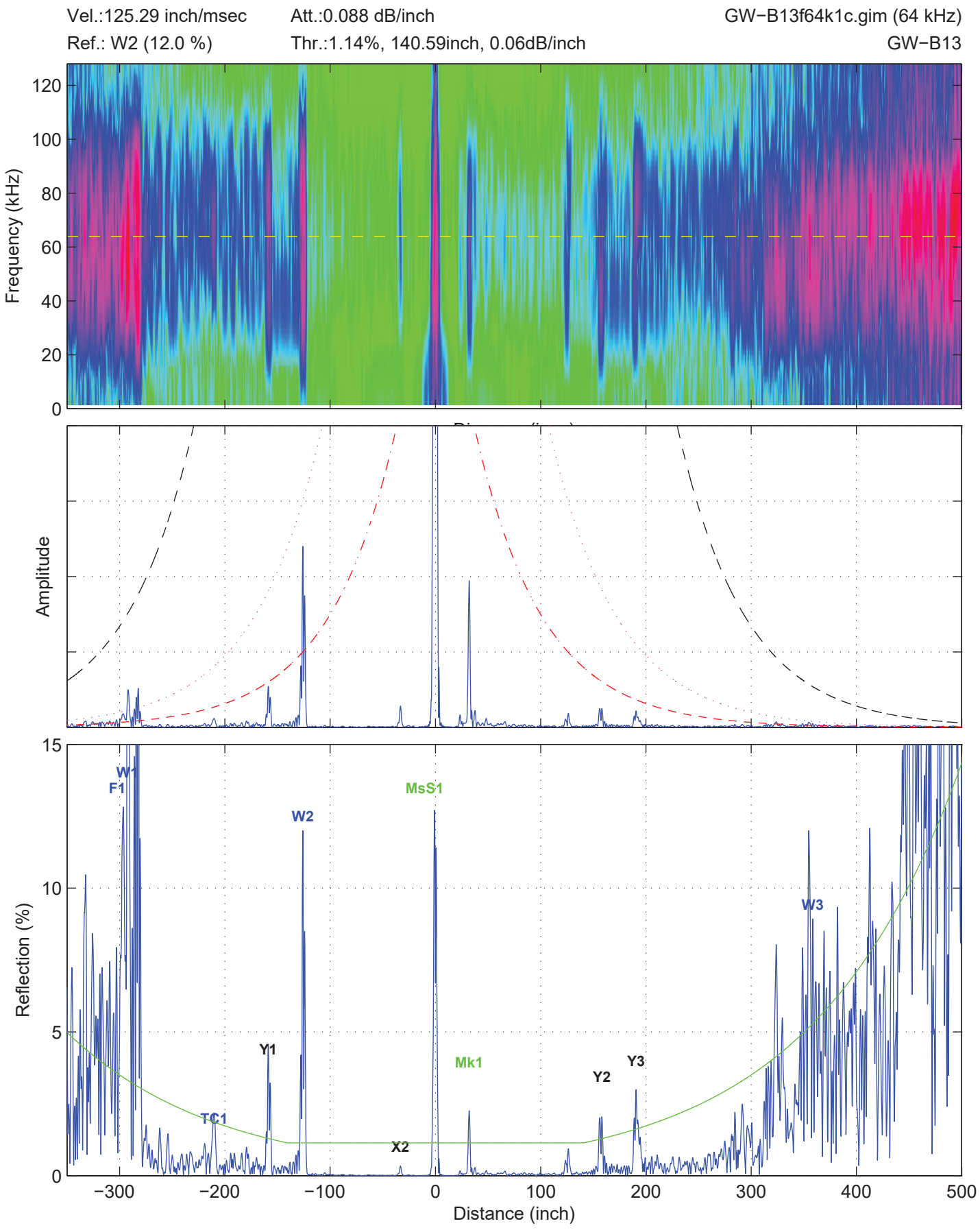
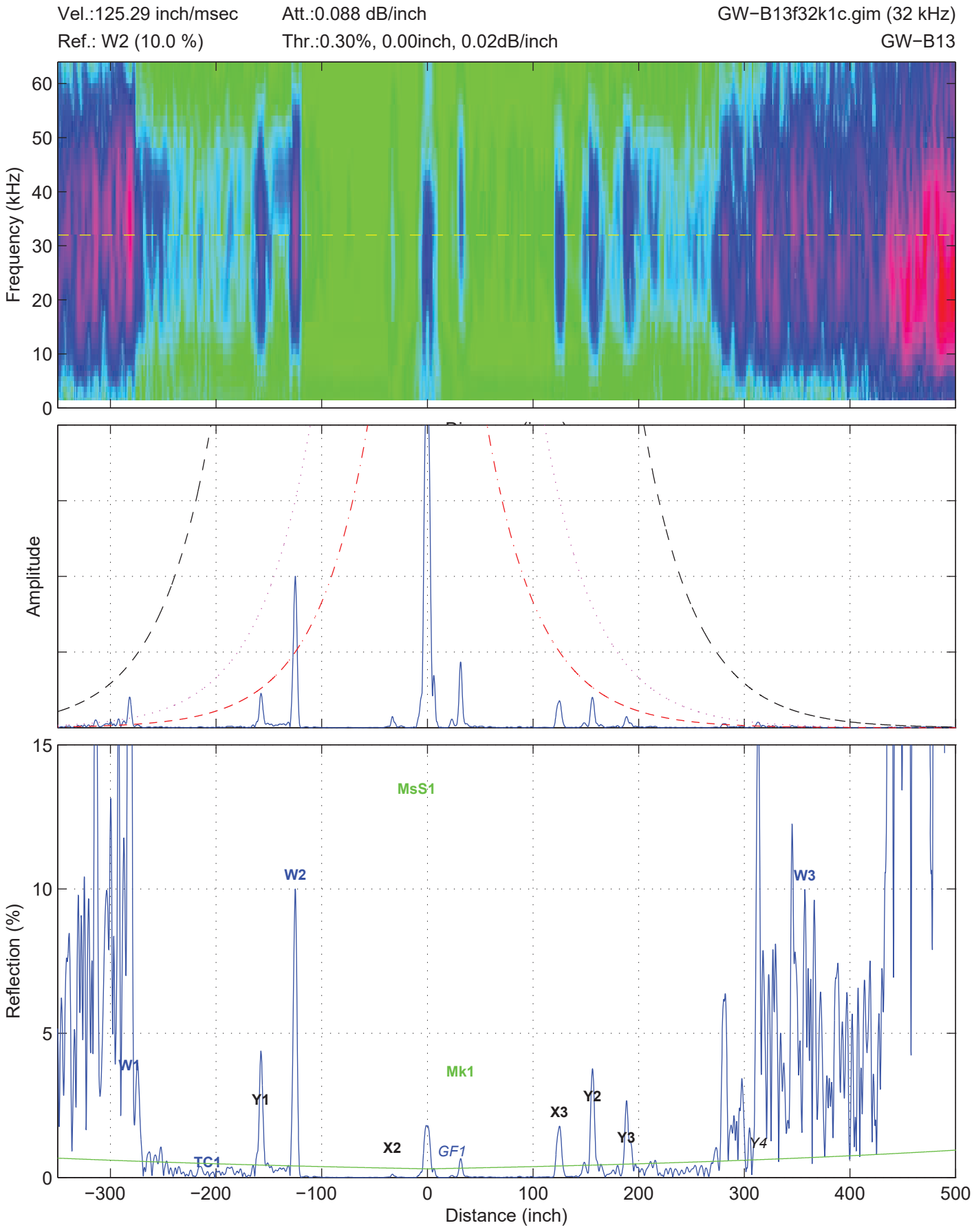
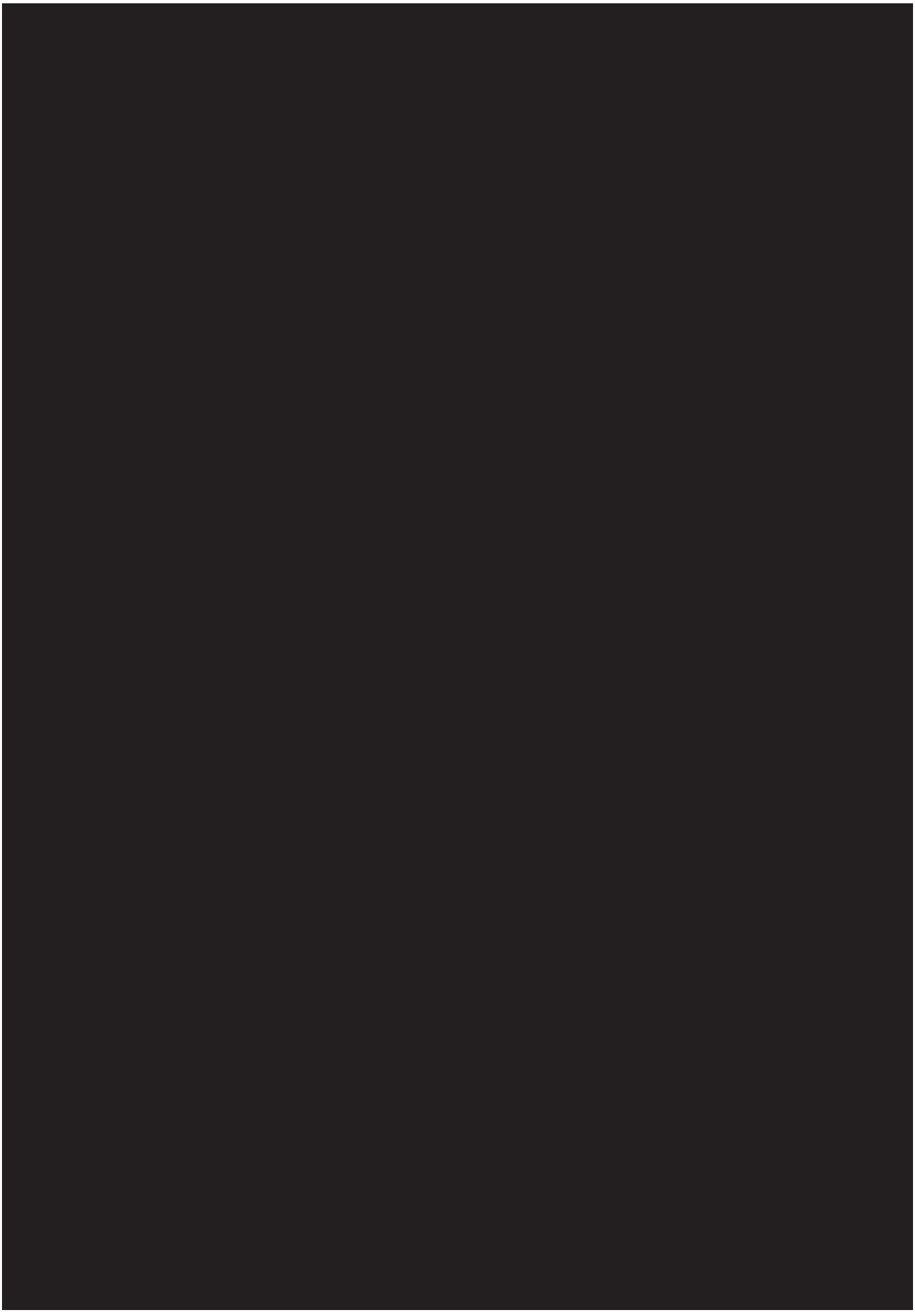

Vel.:125.29 inch/msec
Att.:0.088 dB/inch
GW−B13f128k1c.gim (128 kHz)
Ref.: W2 (15.0 %)
Thr.:1.65%, 163.05inch, 0.09dB/inch
GW−B13
Frequency (kHz)
250
200
150
100
50
0
Amplitude
Reflection (%)
15
10
5
0
W1
F1
W2
MsS1
W3
(b)
Mk1
Y1
TC1
X2
X3
Y2
−300
−200
−100
0
100
200
300
400
500
Distance (inch)


Vel.:125.29 inch/msec
Att.:0.088 dB/inch
GW−B13f64k1c.gim (64 kHz)
Ref.: W2 (12.0 %)
Thr.:1.14%, 140.59inch, 0.06dB/inch
GW−B13
Frequency (kHz)
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
W1
F1
W2
MsS1
W3
Y1
Mk1
Y2
Y3
TC1
X2
−300
−200
−100
0
100
200
300
400
500
Distance (inch)


Vel.:125.29 inch/msec
Att.:0.088 dB/inch
GW−B13f32k1c.gim (32 kHz)
Ref.: W2 (10.0 %)
Thr.:0.30%, 0.00inch, 0.02dB/inch
GW−B13
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
MsS1
W1
W2
W3
Y1
Y2
Y3
Y4
X2
X3
Mk1
GF1
TC1



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(b) (3) (A)

GW-B13; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW-B14
Pipe Size: (b) (3) (A) , 0.250-inch-wall
Inspector: (b) (6)
Analyzer: (b) (6)
Client: AB&A (US Navy)

Date: 28-Mar-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -253.8 to 400.8 inch

Test Pipe: Aboveground; Painted; 80°F JP 5-carrying pipe; 0.237, 0.242, 0.241, 0.243-inch wall; Supported with Steel

Note:

Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-260.82	12.9	Flange;
W1	-248.42	12.1	Weld;
TC1	-147.32	3.5	T-Connection;
W2	-102.35	15.0	Weld;
X1	-46.10	0.5	Directionality; |MsS-X|=46.04; Mk1 (44.57, 0.72)
MsS1	0.31	--	Initial Pulse;
Mk1	44.87	--	Marker;
Y1	60.58	1.9	Multiple Reflection;
X2	104.03	2.8	Directionality; |MsS-X|=103.53; W2 (102.85, 3.18)
Y2	147.63	4.5	Multiple Reflection; |MsS-X|=147.13; TC1 (147.82, 1.41)
X3	191.85	2.8	Directionality;
X4	249.98	5.2	Directionality; |MsS-X|=249.48; W1 (248.92, 4.86)
Y3	294.80	8.3	Multiple Reflection;
X5	338.90	10.7	Directionality;
W3	378.36	3.4	Weld;
TC2	443.41	17.1	T-Connection;

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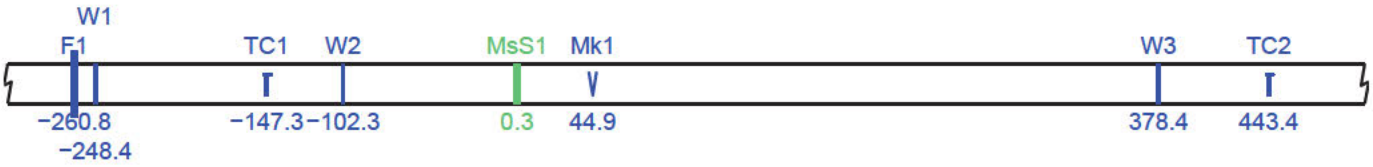
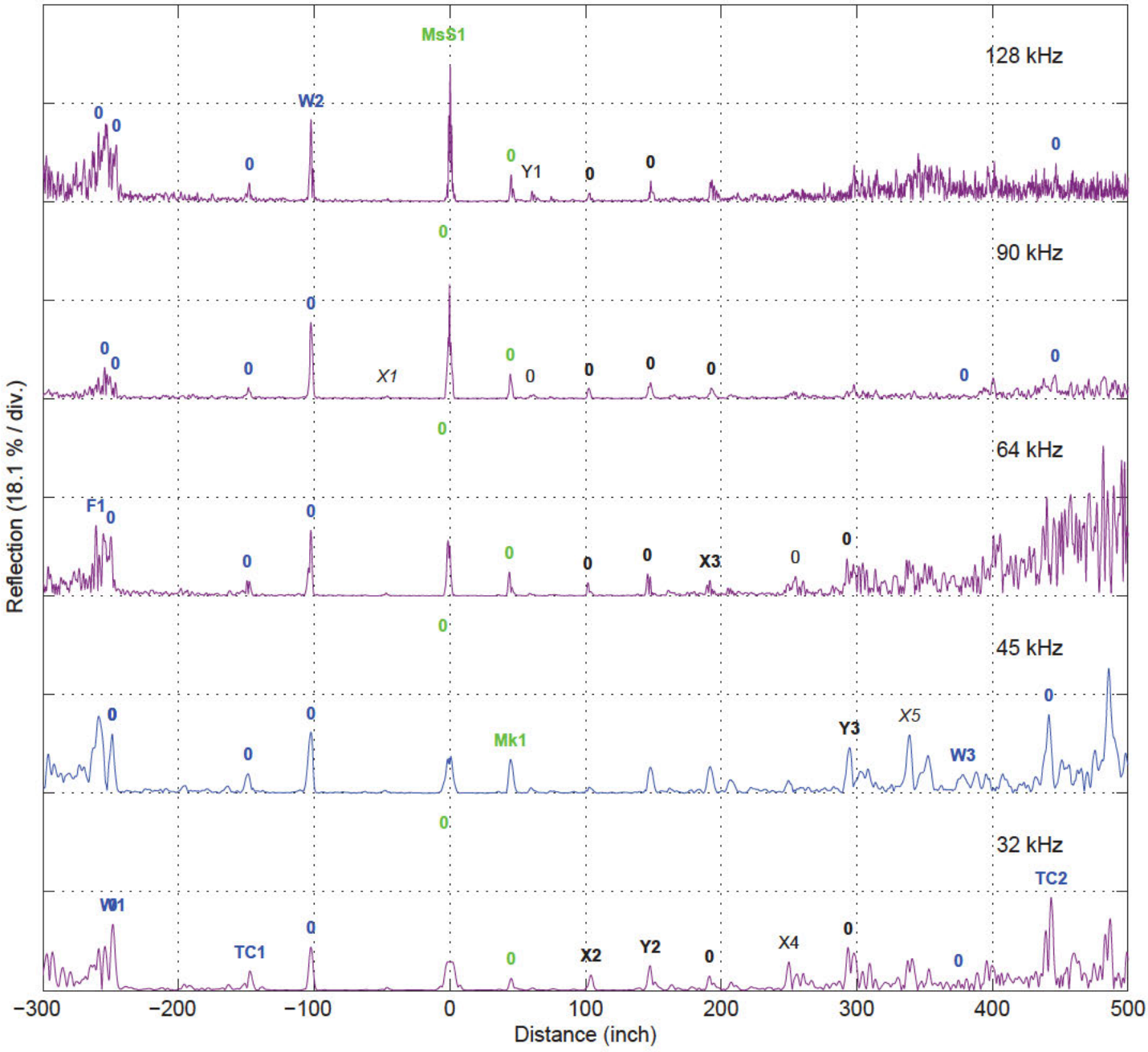
GW−B14





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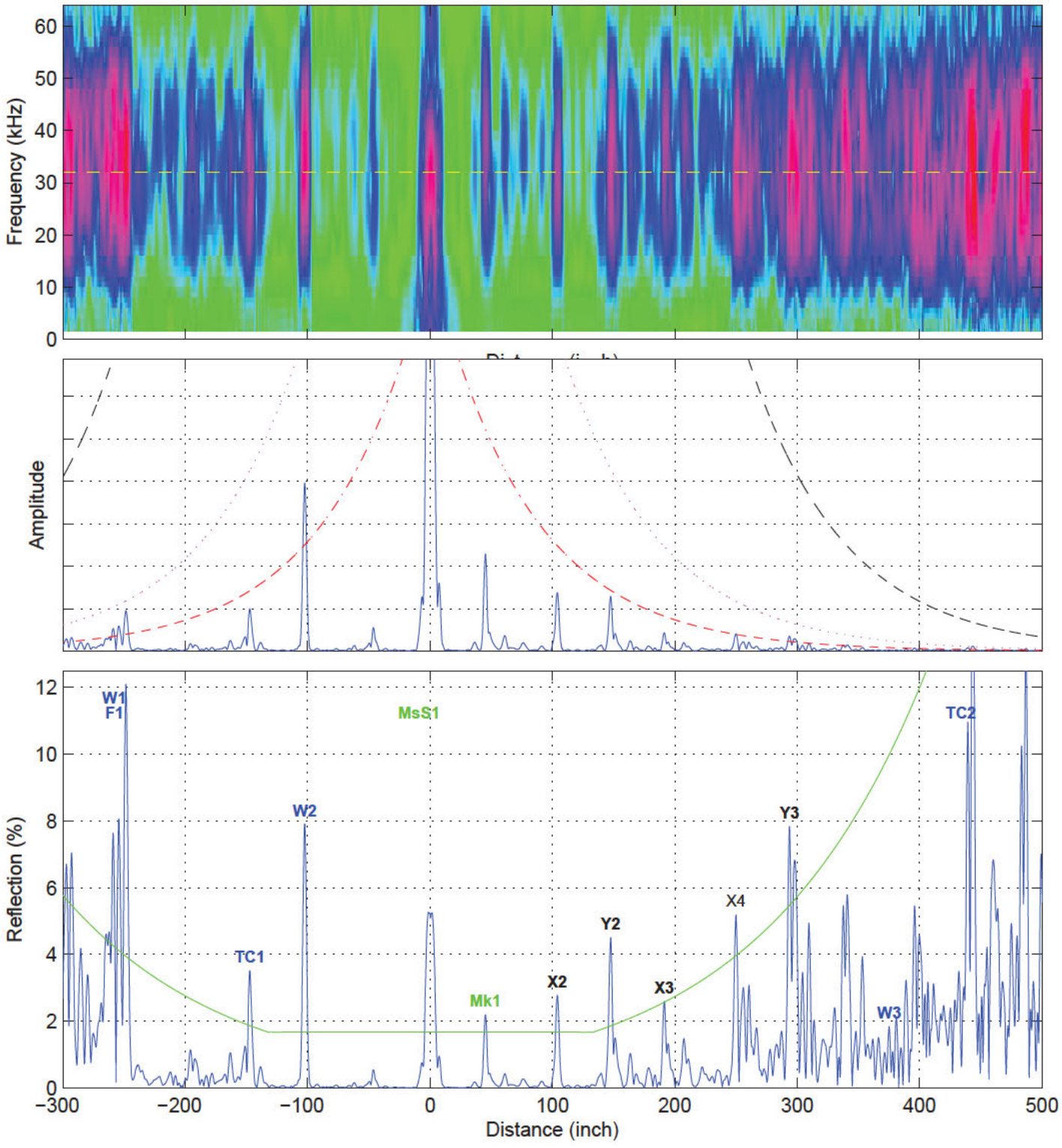
Vel.:125.28 inch/msec
Ref.: W2 (7.9 %)
Att.:0.055 dB/inch
Thr.:1.67%, 132.30inch, 0.06dB/inch
GW–B14f32k1c.gim (32 kHz)
GW–B14



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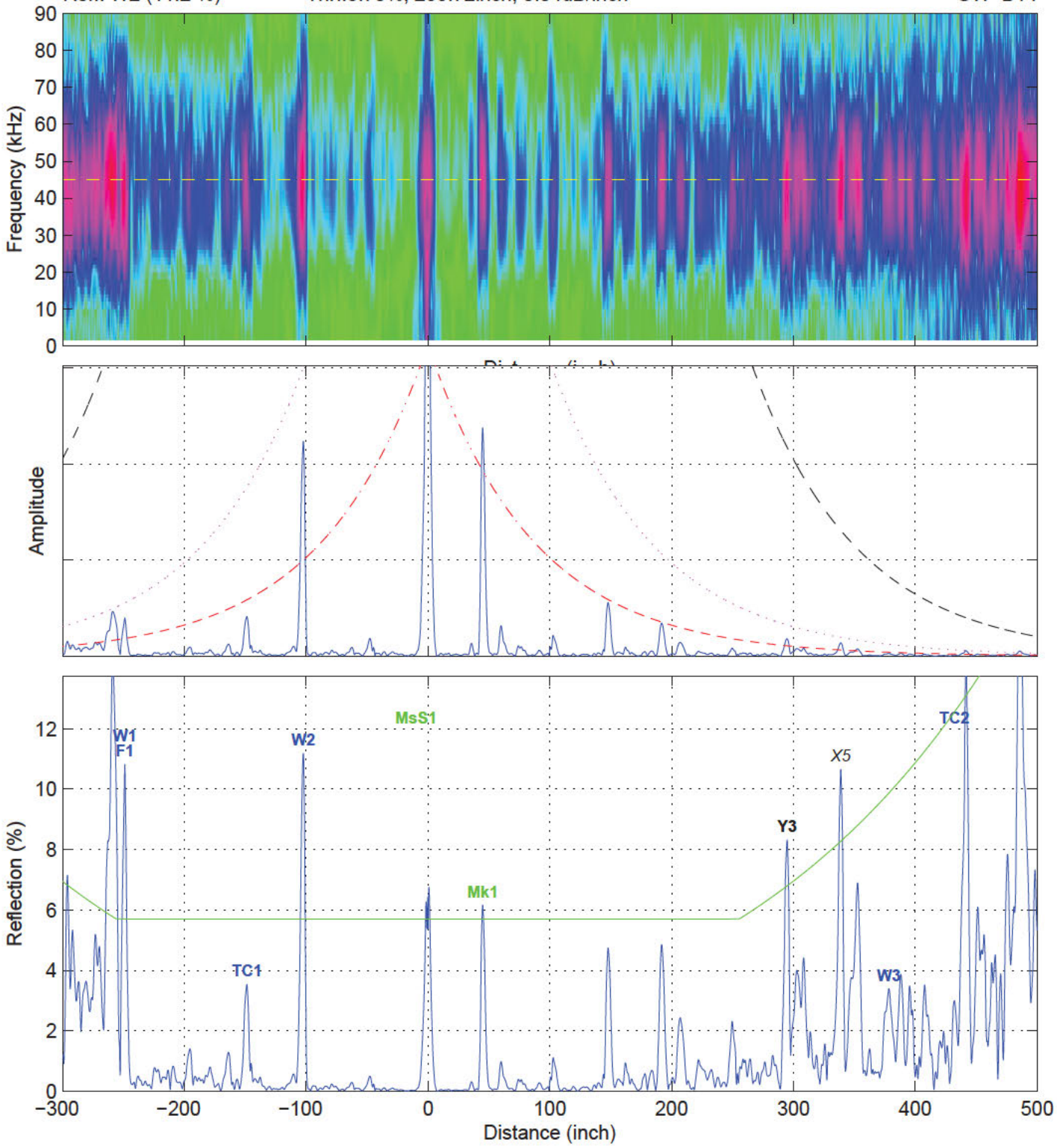
Vel.:125.28 inch/msec
Ref.: W2 (11.2 %)
Att.:0.055 dB/inch
Thr.:5.70%, 255.72inch, 0.04dB/inch
GW−B14f45k1c.gim (45 kHz)
GW−B14



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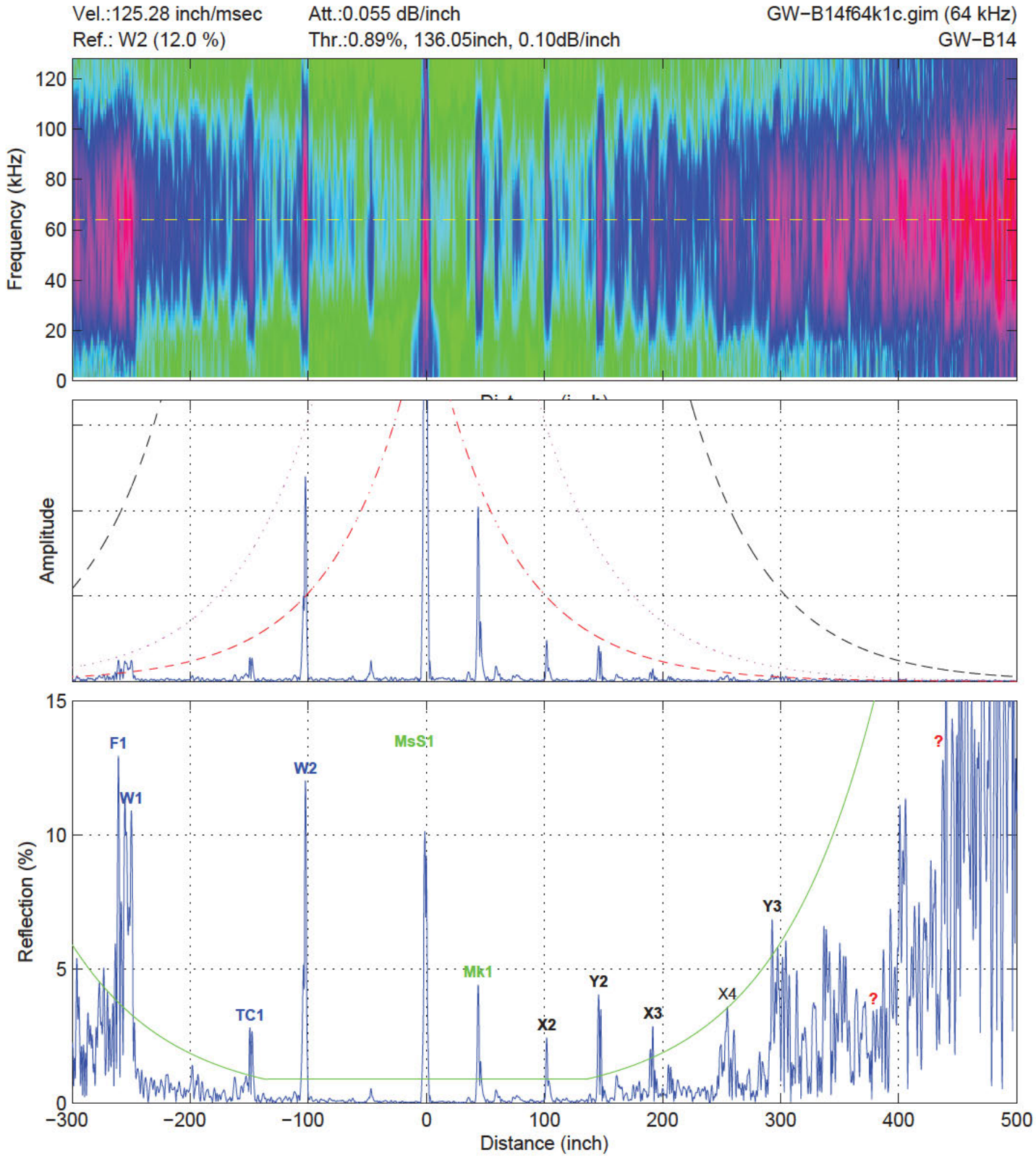

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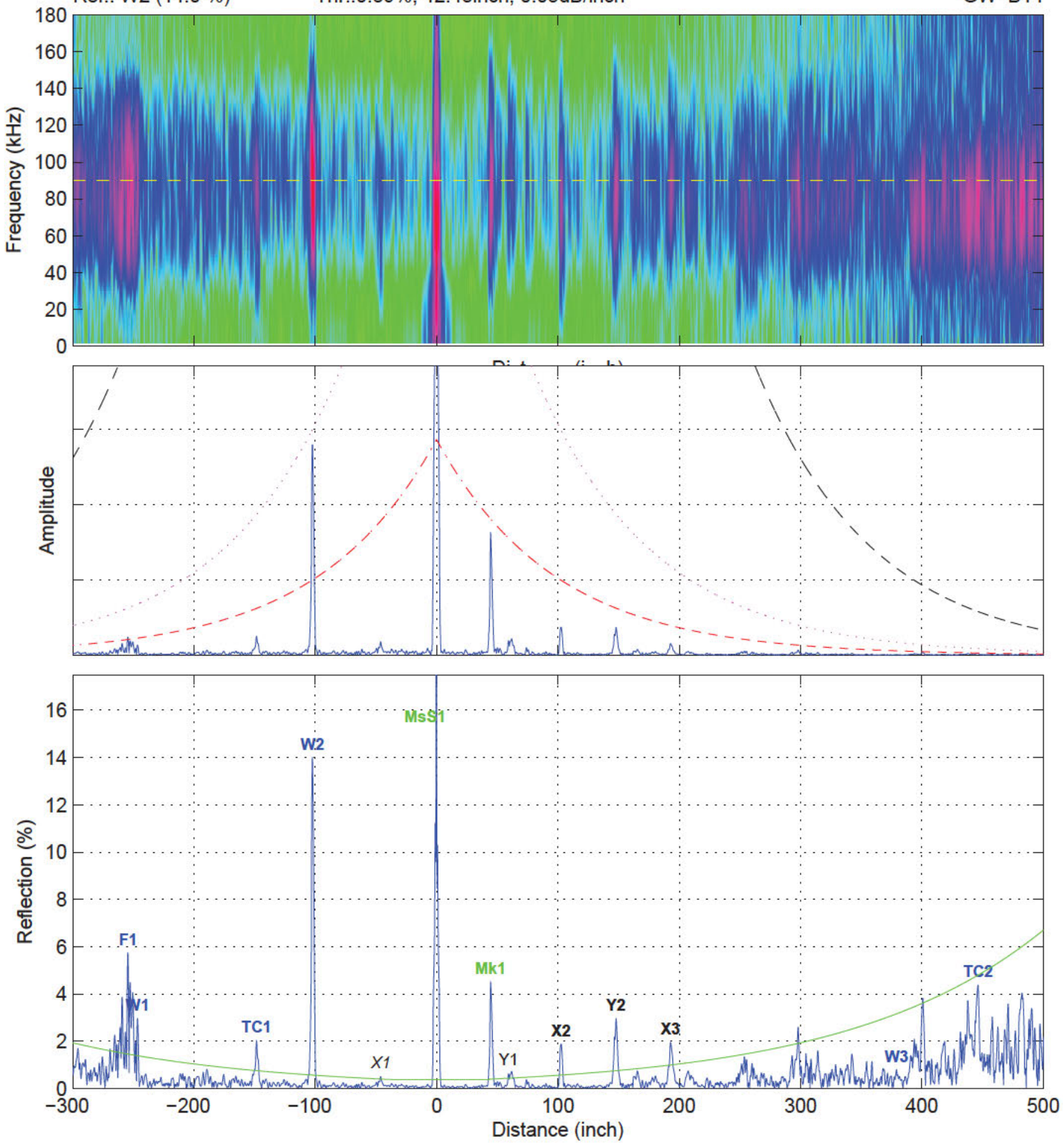
Vel.:125.28 inch/msec Att.:0.055 dB/inch GW−B14f90k1c.gim (90 kHz)
Ref.: W2 (14.0 %) Thr.:0.39%, 42.43inch, 0.05dB/inch GW−B14



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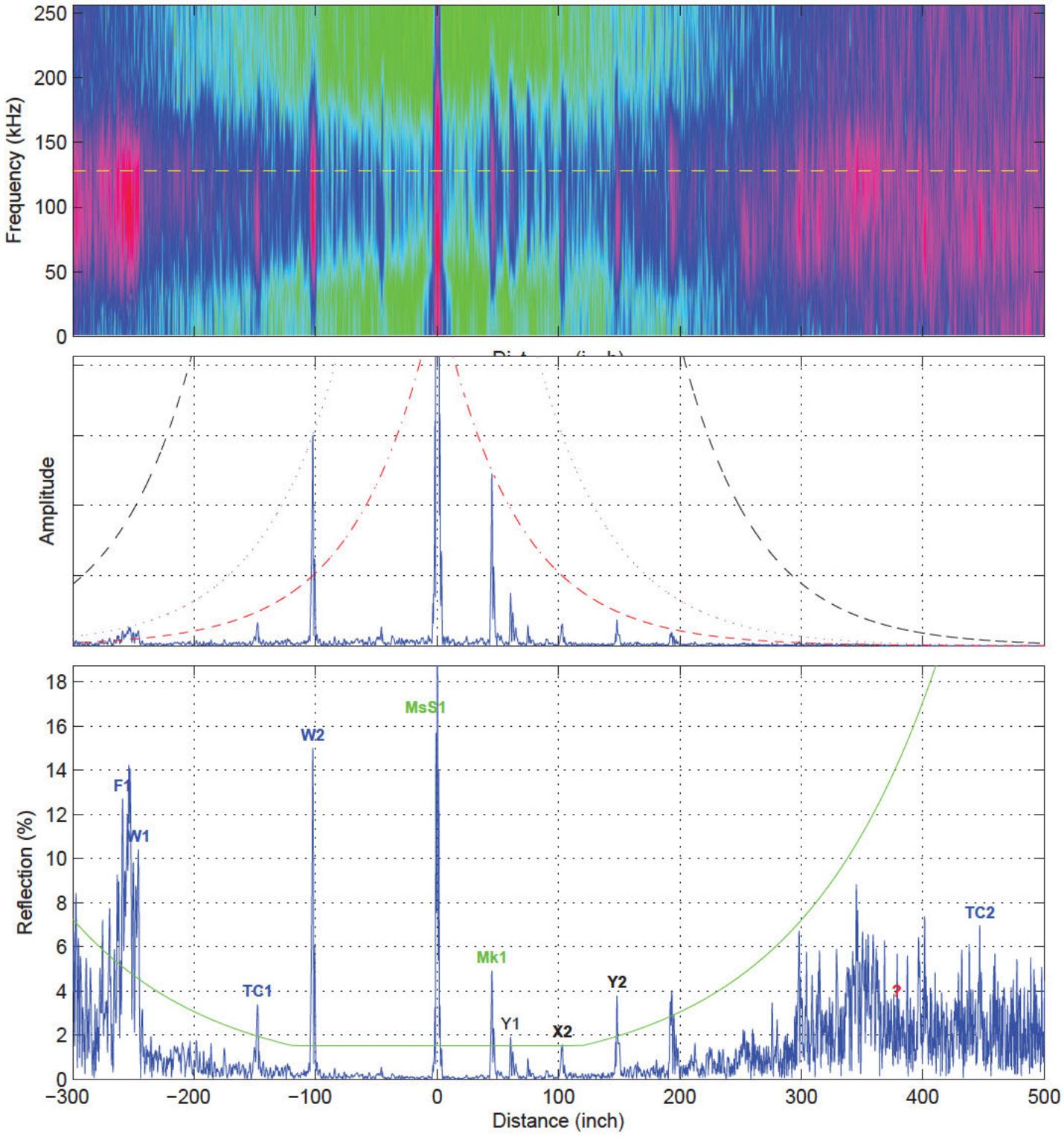
Vel.:125.28 inch/msec
Ref.: W2 (15.0 %)
Att.:0.055 dB/inch
Thr.:1.53%, 119.63inch, 0.07dB/inch
GW–B14f128k1c.gim (128 kHz)
GW–B14



(b) (3) (A)

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(b) (3) (A)

GW-B14; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

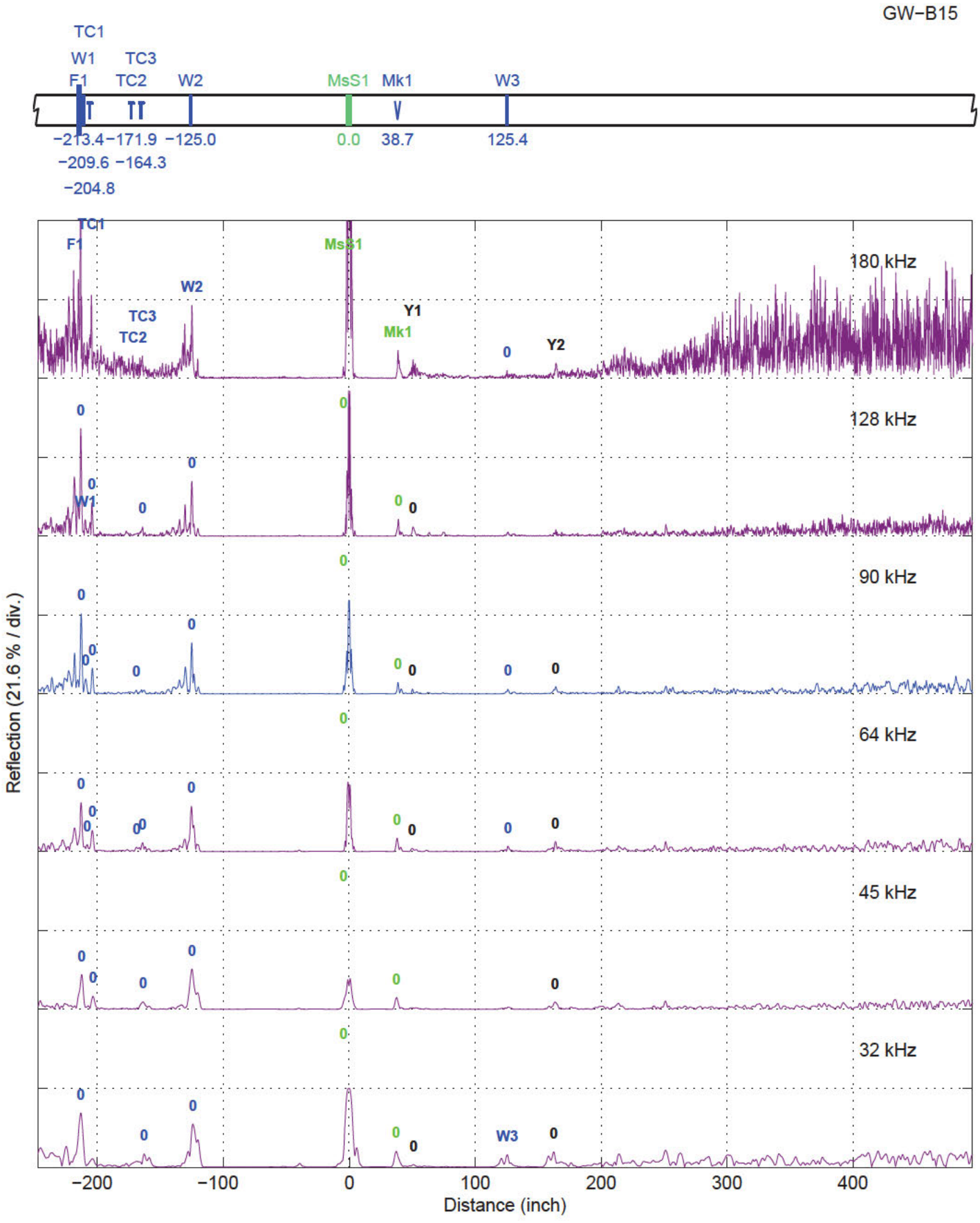
Site:	RH PPG	Date:	28−Mar−2022
Pipe ID/Location:	GW−B15	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.405−inch−wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	−245.4 to 471.4 inch

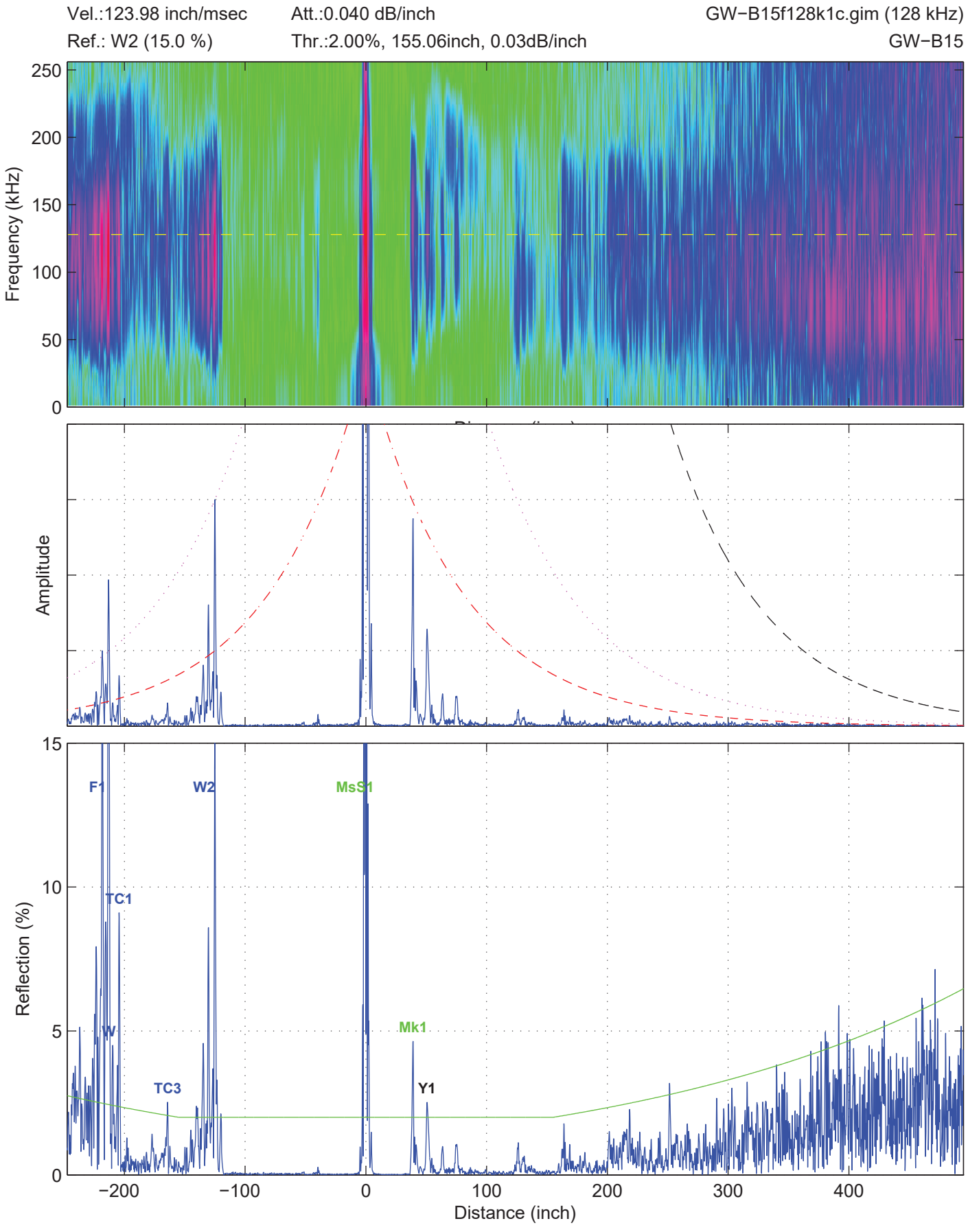
Test Pipe: Aboveground; Painted; 81 °F F76−carrying pipe; 0.405, 0.395, 0.396, 0.401−inch wall; Supported with Steel

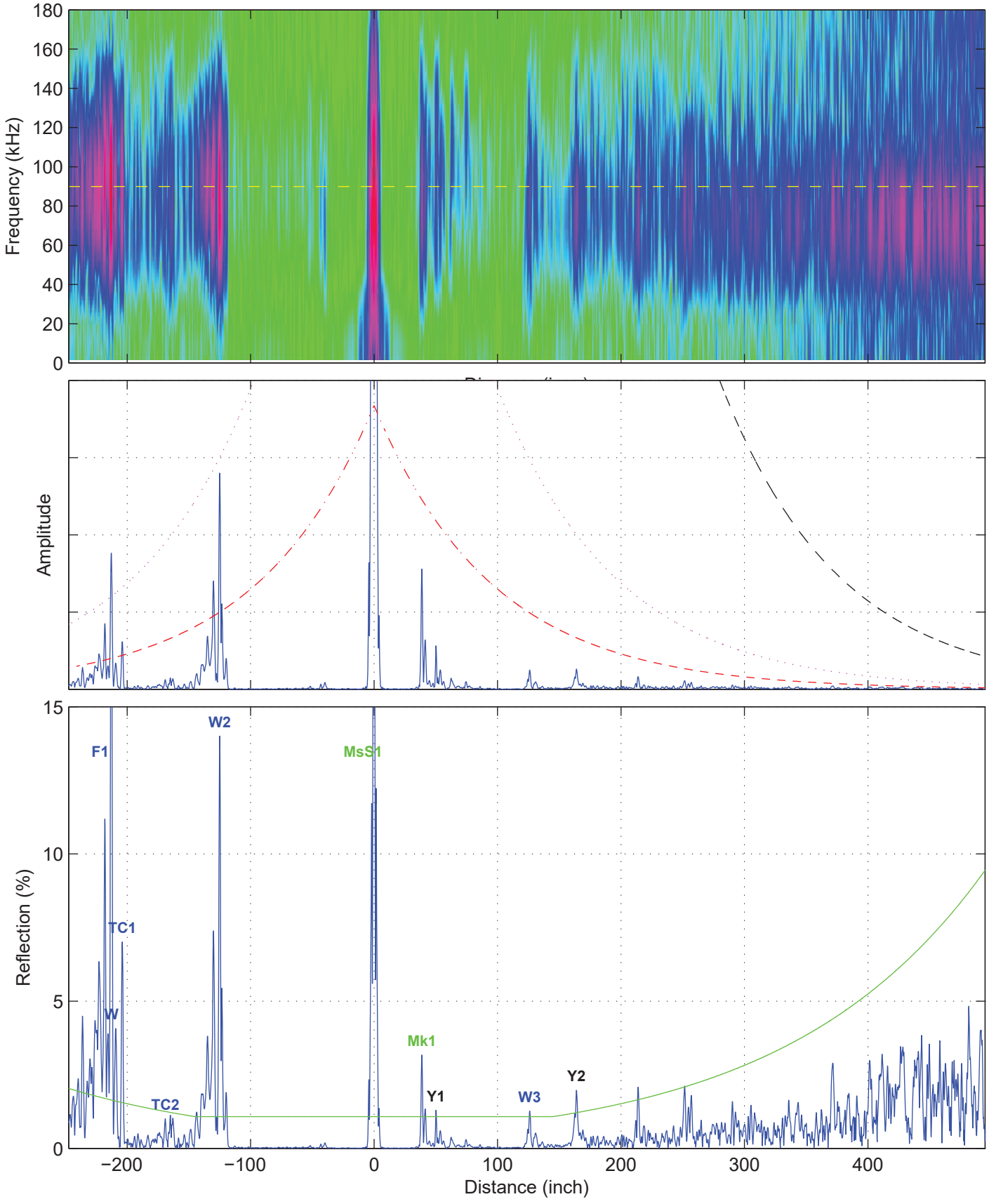
Note:

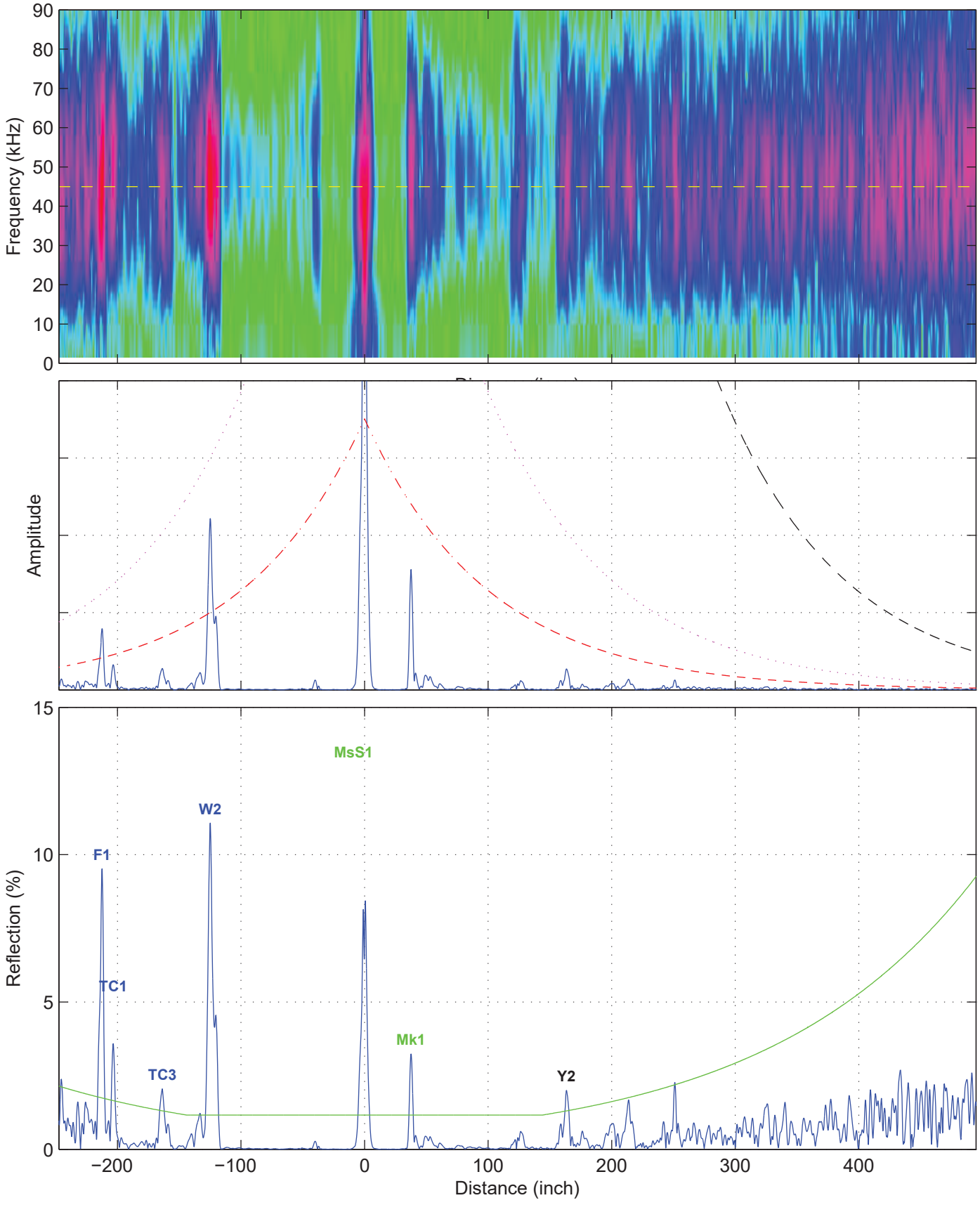
Summary: No indication is found within the inspection range.

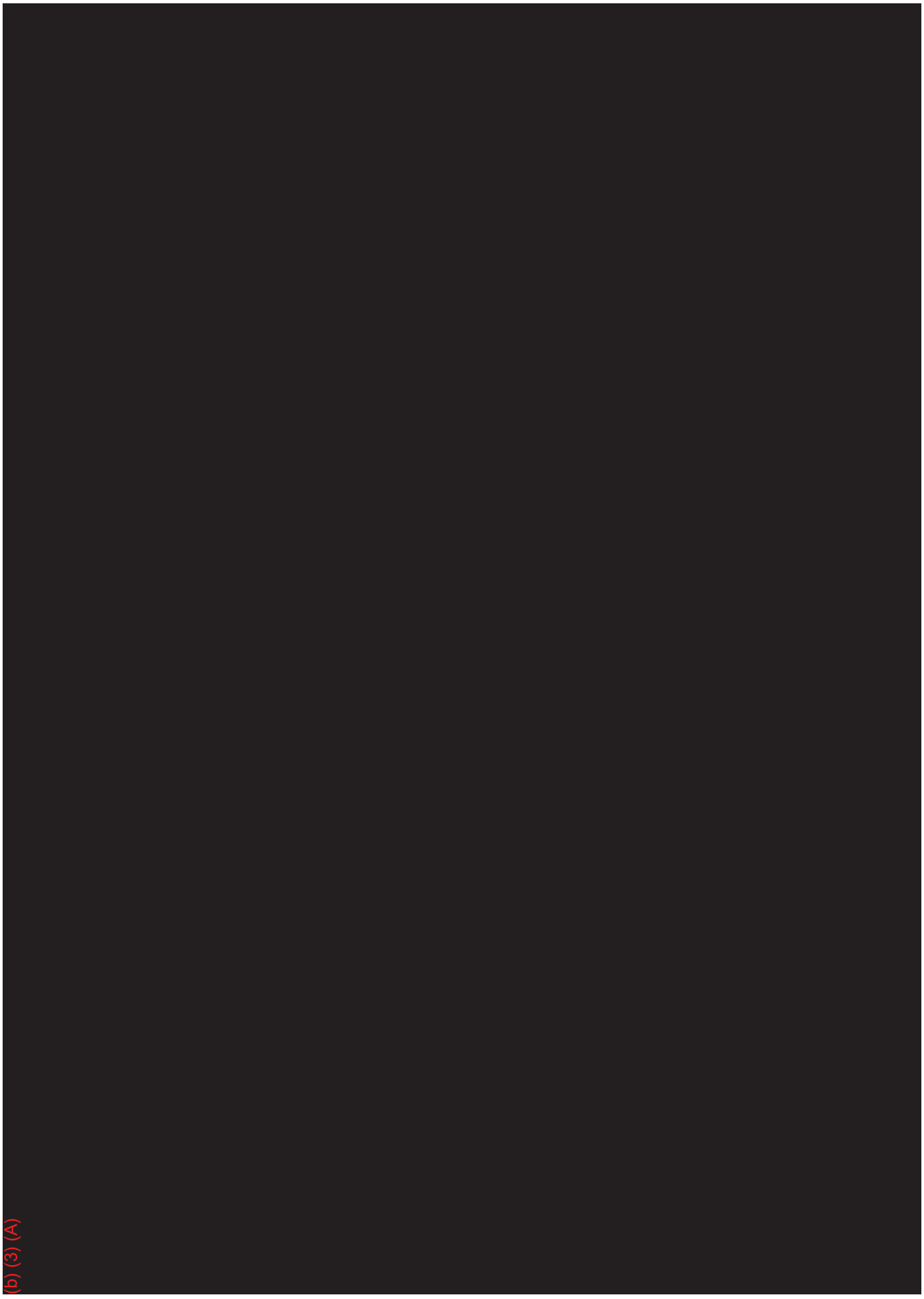
Sym.	Dist.(inch)	% Refl.	Comment
F1	−213.35	70.1	Flange;
W1	−209.56	4.5	Weld; Flange Weld
TC1	−204.80	22.8	T−Connection; Q22 (209.93, 0.94);
TC2	−171.94	6.3	T−Connection; 4"
TC3	−164.25	6.2	T−Connection; 6"
W2	−124.95	20.0	Weld;
MsS1	0.00	−−	Initial Pulse;
Mk1	38.71	−−	Marker; Metal ring (anchor) 8" inside concrete
Y1	50.61	5.1	Multiple Reflection;
W3	125.43	3.4	Weld;
Y2	164.05	4.2	Multiple Reflection; |MsS−X|=164.05; TC2 (169.10, 0.11)


GW-B15
TC1
W1
F1
TC3
TC2
W2
MsS1
Mk1
W3
−213.4
−209.6
−204.8
−171.9
−164.3
−125.0
0.0
38.7
125.4
180 kHz
128 kHz
90 kHz
64 kHz
45 kHz
32 kHz
Y1
Y2
Reflection (21.6 % / div.)
−200
−100
0
100
200
300
400
Distance (inch)


Vel.:123.98 inch/msec
Att.:0.040 dB/inch
GW−B15f128k1c.gim (128 kHz)
Ref.: W2 (15.0 %)
Thr.:2.00%, 155.06inch, 0.03dB/inch
GW−B15
Frequency (kHz)
250
200
150
100
50
0
Amplitude
Reflection (%)
15
10
5
0
F1
W2
MsS1
TC1
W
TC3
Mk1
Y1
−200
−100
0
100
200
300
400
Distance (inch)


Vel.:123.98 inch/msec
Att.:0.040 dB/inch
GW−B15f90k1c.gim (90 kHz)
Ref.: W2 (14.0 %)
Thr.:1.08%, 144.54inch, 0.05dB/inch
GW−B15
Frequency (kHz)
180
160
140
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
F1
W2
MsS1
TC1
TC2
Mk1
Y1
W3
Y2
−200
−100
0
100
200
300
400
Distance (inch)


Vel.:123.98 inch/msec
Att.:0.040 dB/inch
GW−B15f45k1c.gim (45 kHz)
Ref.: W2 (11.0 %)
Thr.:1.16%, 143.84inch, 0.05dB/inch
GW−B15
Frequency (kHz)
Amplitude
Reflection (%)
MsS1
W2
F1
TC1
TC3
Mk1
Y2
Distance (inch)



(b) (3) (A)

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(b) (3) (A)

GW-B15; Concrete penetration at bulkhead; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW−B16
Pipe Size: (b) (3) (A) , 0.405−inch−wall
Inspector: (b) (6)
Analyzer: (b) (6)
Client: AB&A (US Navy)

Date: 28−Mar−2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: −603.5 to 601.9 inch

Test Pipe: Aboveground; Painted; 74°F F76−carrying pipe; 0.398, 0.401, 0.395, 0.399−inch wall; Supported with Steel

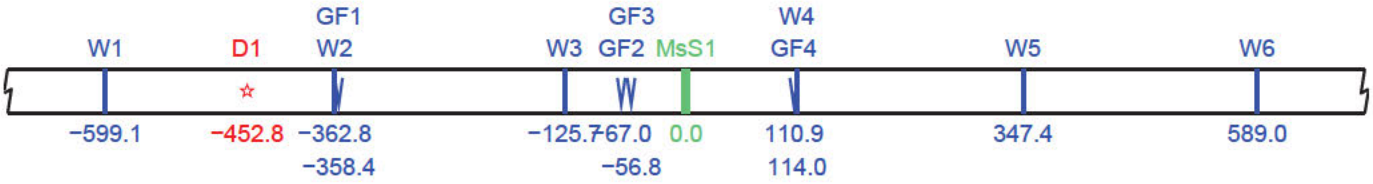
Note:

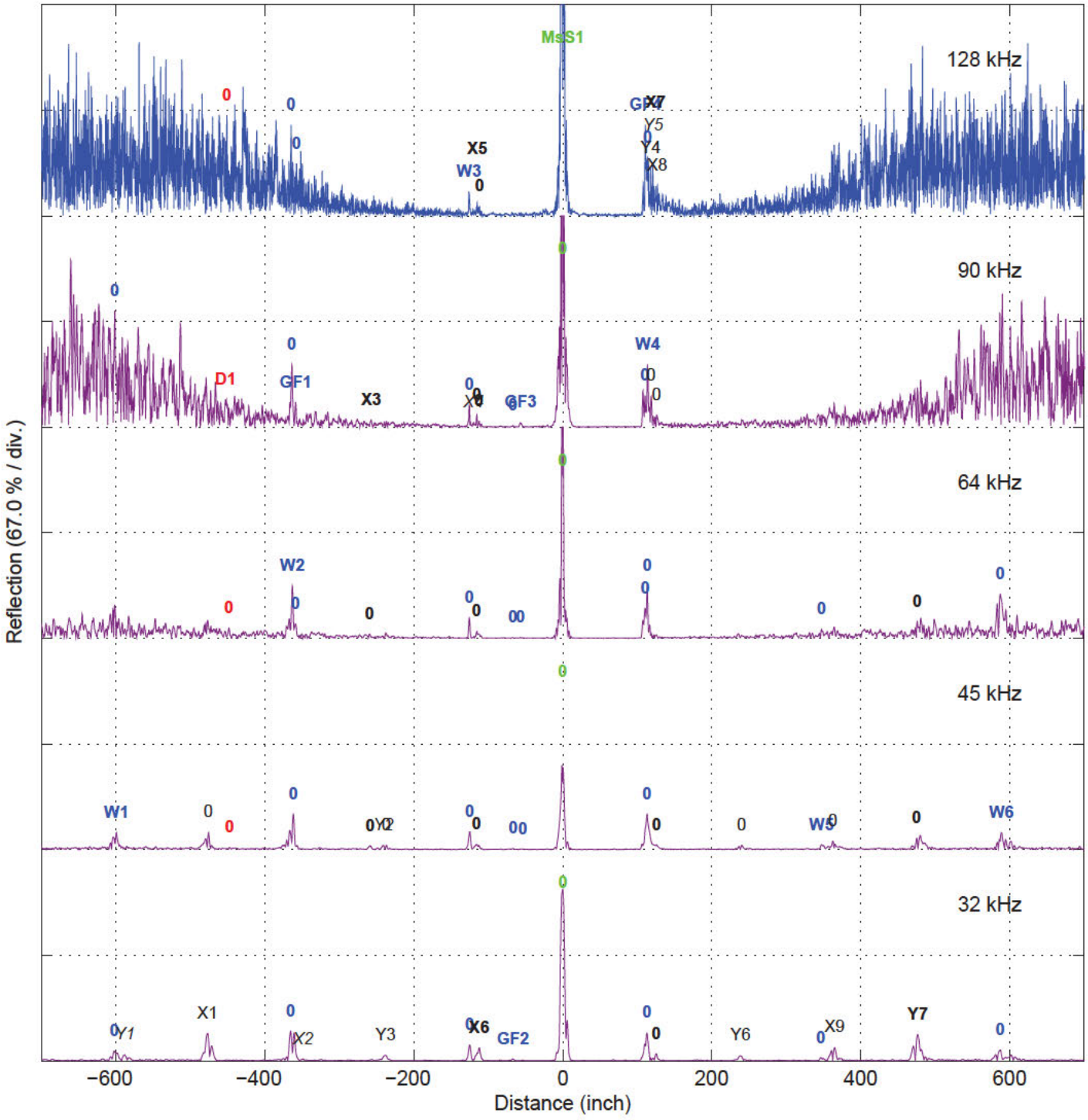
Summary: No indication is found within the inspection range other than the corrosion area located 447" to 467" from sensor is visible on lower frequencies (see report body for UTT and pit sizes).

Sym.	Dist.(inch)	% Refl.	Comment
W1	−599.14	10.7	Weld;
Y1	−587.71	3.7	Multiple Reflection; |MsS−X|=587.71; X1−W4 (589.77, 5.95)
X1	−476.74	17.4	Directionality; |MsS−X|=476.74; W2−W4 (474.87, 4.80)
D1	−452.77	17.5	Defect; 32−% wall loss;
W2	−362.80	33.2	Weld;
GF1	−358.42	15.6	Geometric Feature; W3−Q4−W3 (362.43, 1.30);
X2	−348.67	1.1	Directionality; |MsS−X|=348.67; W5 (346.61, 0.95)
X3	−257.01	4.5	Directionality;
Y2	−240.83	2.6	Multiple Reflection; |MsS−X|=240.83; W3−W4 (238.06, 2.36)
Y3	−237.82	3.4	Multiple Reflection; |MsS−X|=237.82; W3−W4 (238.06, 2.36)
W3	−125.74	15.0	Weld;
X4	−119.88	2.7	Directionality; |MsS−X|=119.88; Y4 (118.80, 9.45)
X5	−114.83	8.3	Directionality; |MsS−X|=114.83; W4 (113.97, 19.18)
X6	−112.11	8.1	Directionality; |MsS−X|=112.11; W4 (113.97, 19.18)
GF2	−66.98	1.0	Geometric Feature; Pipe Wrap
GF3	−56.77	2.8	Geometric Feature;
MsS1	0.00	−−	Initial Pulse;
GF4	110.94	57.7	Geometric Feature;
W4	113.97	39.6	Weld;
Y4	118.13	29.8	Multiple Reflection; |MsS−X|=118.13; W4−GF4−W4 (117.39, 7.93)
Y5	120.86	32.1	Multiple Reflection;
X7	124.70	18.8	Directionality; |MsS−X|=124.70; W3 (124.75, 4.93)
X8	127.18	18.9	Directionality; |MsS−X|=127.18; W3 (125.33, 6.78)
Y6	238.87	3.1	Multiple Reflection; |MsS−X|=238.87; W4−W3 (238.06, 2.36)
W5	347.36	3.0	Weld; W4−W3−W4 (352.30, 1.41);
X9	365.09	8.3	Directionality; |MsS−X|=365.09; W2 (365.28, 9.19)
Y7	476.55	16.6	Multiple Reflection; |MsS−X|=476.55; W4−W2 (476.33, 9.92)
W6	589.00	10.7	Weld; W4−W2−W4 (589.85, 3.67);

[redacted]

GW-B16





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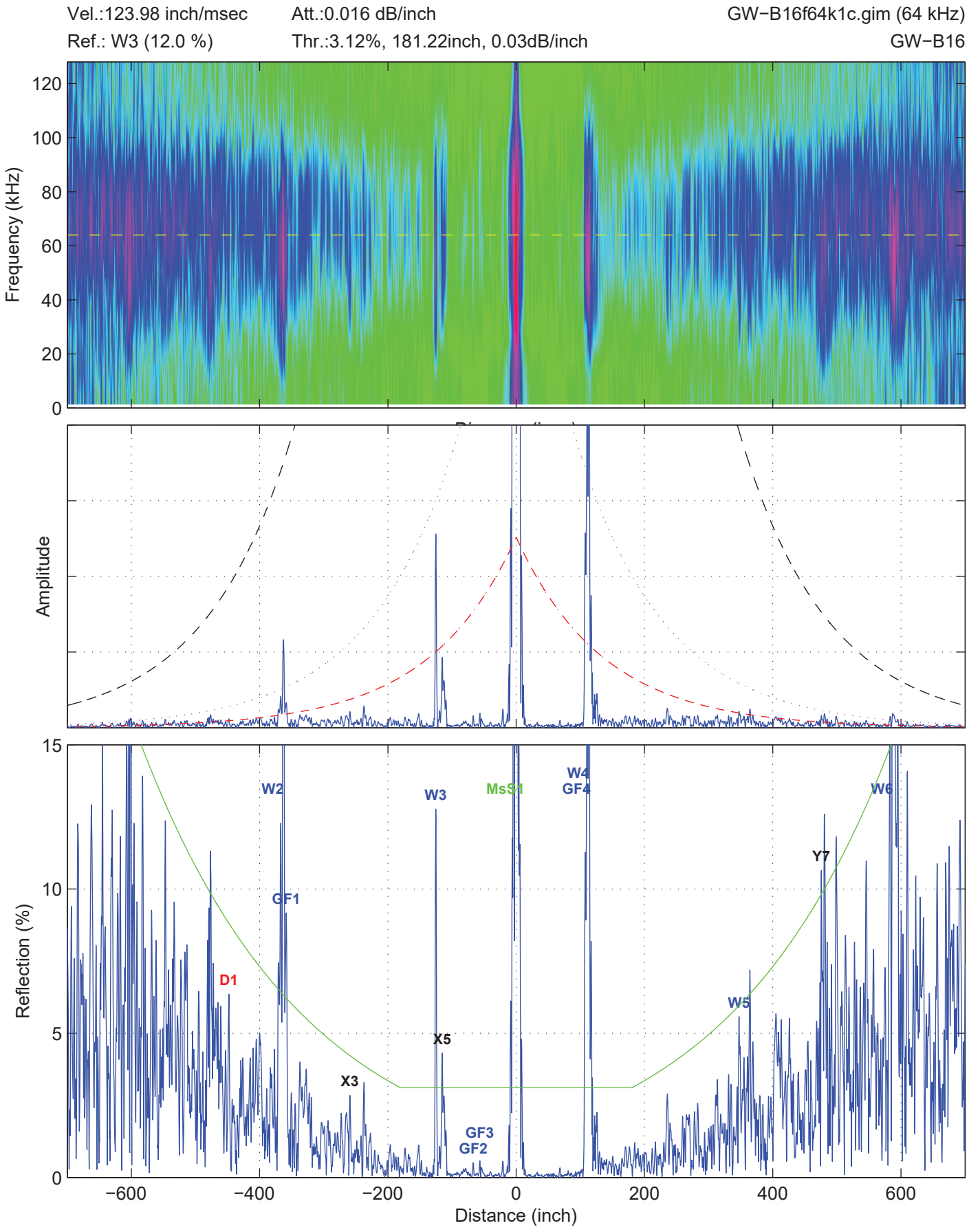
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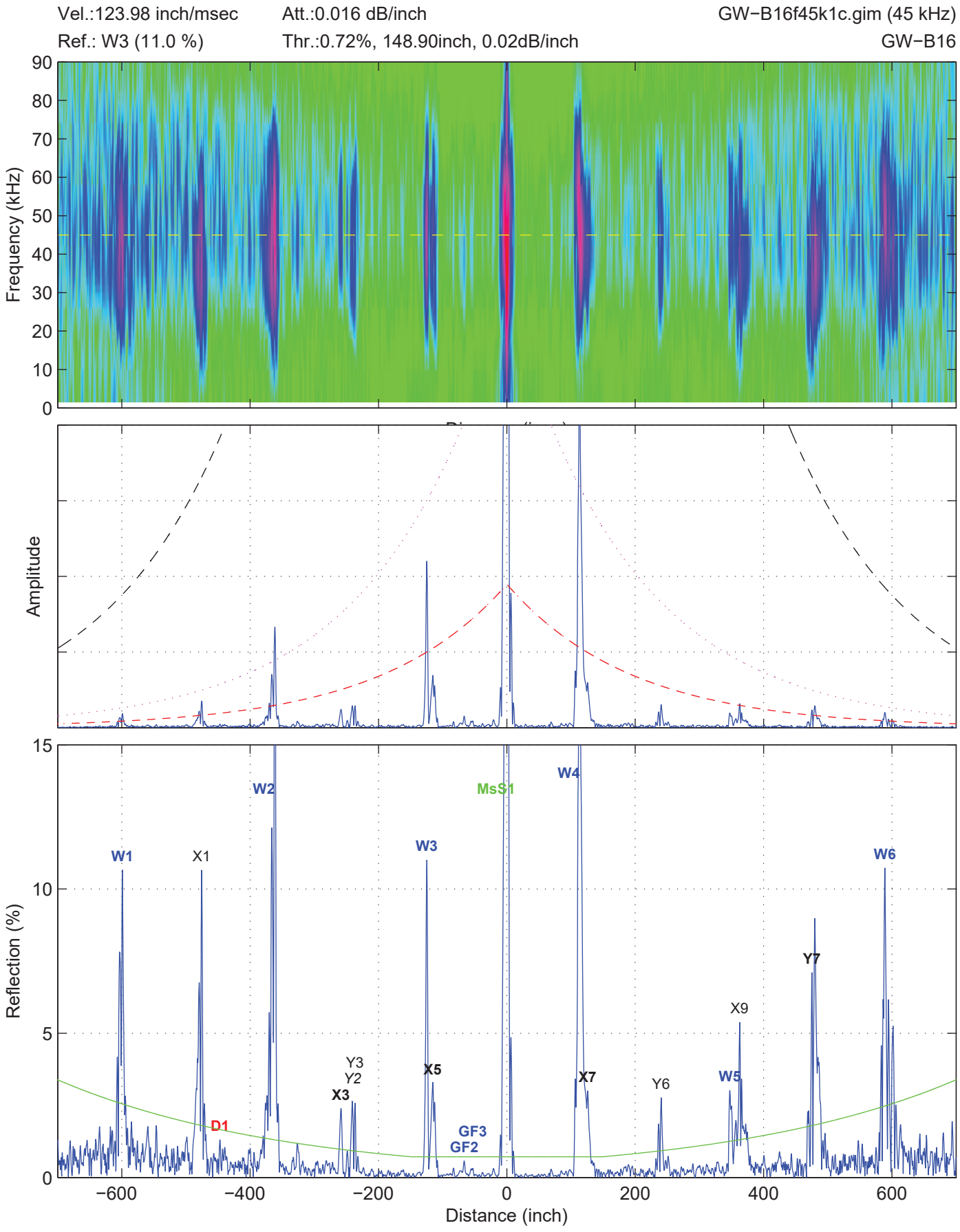
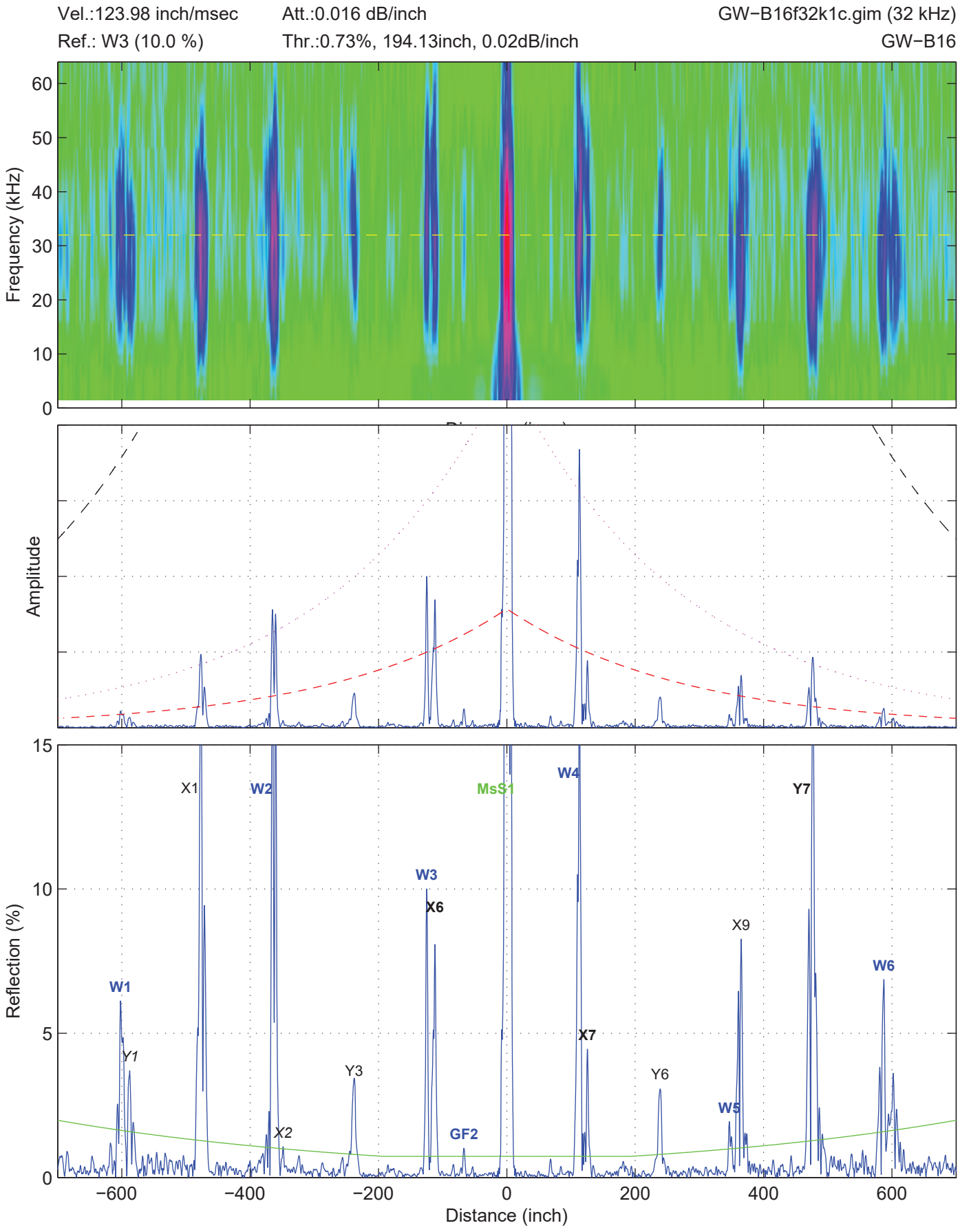
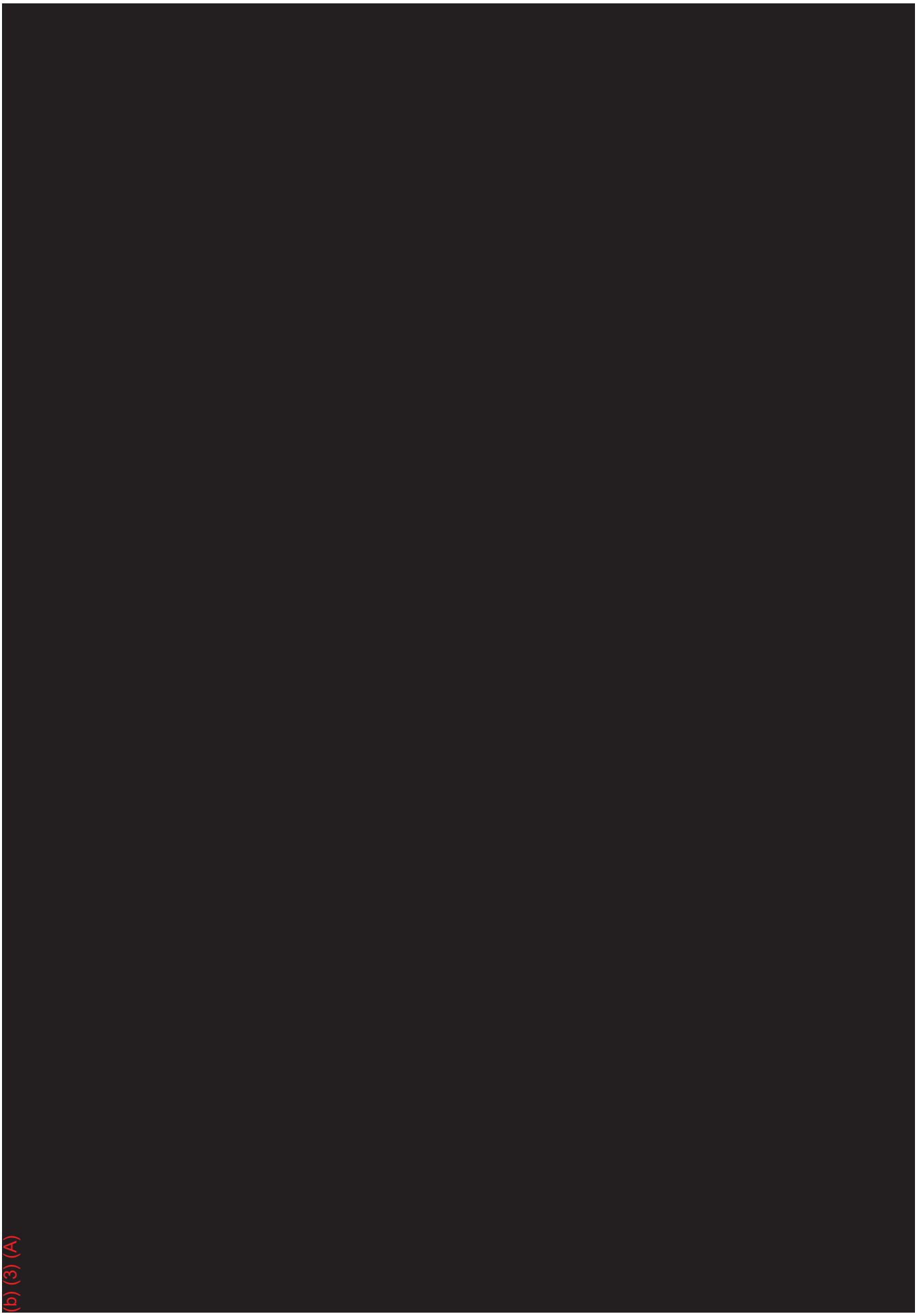
Att.:0.016 dB/inch
GW−B16f64k1c.gim (64 kHz)
Ref.: W3 (12.0 %)
Thr.:3.12%, 181.22inch, 0.03dB/inch
GW−B16
Frequency (kHz)
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
W2
W3
MsS1
W4
GF4
W6
Y7
GF1
D1
W5
X5
X3
GF3
GF2
−600
−400
−200
0
200
400
600
Distance (inch)


Vel.:123.98 inch/msec
Att.:0.016 dB/inch
GW−B16f45k1c.gim (45 kHz)
Ref.: W3 (11.0 %)
Thr.:0.72%, 148.90inch, 0.02dB/inch
GW−B16
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
X1
W2
W3
MsS1
W4
W6
Y7
X9
W5
Y6
X7
X5
Y3
Y2
X3
D1
GF3
GF2


Vel.:123.98 inch/msec
Att.:0.016 dB/inch
GW−B16f32k1c.gim (32 kHz)
Ref.: W3 (10.0 %)
Thr.:0.73%, 194.13inch, 0.02dB/inch
GW−B16
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
X1
W2
MsS1
W4
Y7
W3
X6
X9
W6
W1
Y1
X7
Y3
Y6
W5
X2
GF2



(b) (3) (A)

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(b) (3) (A)

GW-B16; General pipe and saddle inspection; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site:	RH PPG	Date:	28-Mar-2022
Pipe ID/Location:	GW-B17	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.250-inch-wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	-995.3 to 648.2 inch

Test Pipe: Aboveground; Painted; 73°F F24-carrying pipe; 0.244, 0.238, 0.242, 0.244-inch wall; Supported with Steel

Note:

Summary: One location of defect later identified as inactive pitting (approx. 0.050") with some large area of scaling but minimal metal loss. Two area of possible similar magnitude of pitting on some frequency seen under pipe wrap. Wrap removal required to get exact size of pitting depth (marked as M1 and M2).

Sym.	Dist.(inch)	% Refl.	Comment
X1	-590.03	2.2	Directionality; |MsS-X|=590.03; Y9 (588.08, 2.50)
Mk1	-536.40	--	Marker; W1-W4 (536.51, 2.08);
Mk2	-486.78	--	Marker;
W1	-483.90	14.0	Weld;
TC1	-476.77	20.1	T-Connection; Q12-W4 (463.73, 0.79);
X2	-407.52	23.1	Directionality;
Y1	-392.77	14.8	Multiple Reflection; |MsS-X|=392.77; Y8 (385.33, 2.40)
Y2	-363.15	10.4	Multiple Reflection; |MsS-X|=363.15; Y7 (365.40, 1.96)
Y3	-350.77	13.4	Multiple Reflection; Q18 (349.96, 2.33);
Y4	-332.90	13.3	Multiple Reflection; |MsS-X|=332.90; W2-W4 (335.25, 3.95)
D1	-299.15	7.4	Defect; 30-% wall loss; Q19 (298.46, 0.53);
W2	-281.40	22.9	Weld;
W3	-246.03	20.3	Weld;
X3	-54.40	6.6	Directionality; |MsS-X|=54.40; W4 (52.27, 4.26)
MsS1	0.00	--	Initial Pulse;
W4	53.85	15.0	Weld;
Y5	299.96	5.2	Multiple Reflection; |MsS-X|=299.96; D1 (299.15, 2.09)
Y6	352.35	27.5	Multiple Reflection; |MsS-X|=352.35; W4-D1 (353.63, 1.72)
Y7	365.40	6.4	Multiple Reflection; |MsS-X|=365.40; W4-D1 (351.89, 0.23)
Y8	385.33	8.5	Multiple Reflection;
W5	535.83	9.3	Weld; W1-Q11 (536.51, 2.08);
Y9	588.96	9.2	Multiple Reflection; |MsS-X|=588.96; W4-Mk1 (587.98, 1.55)

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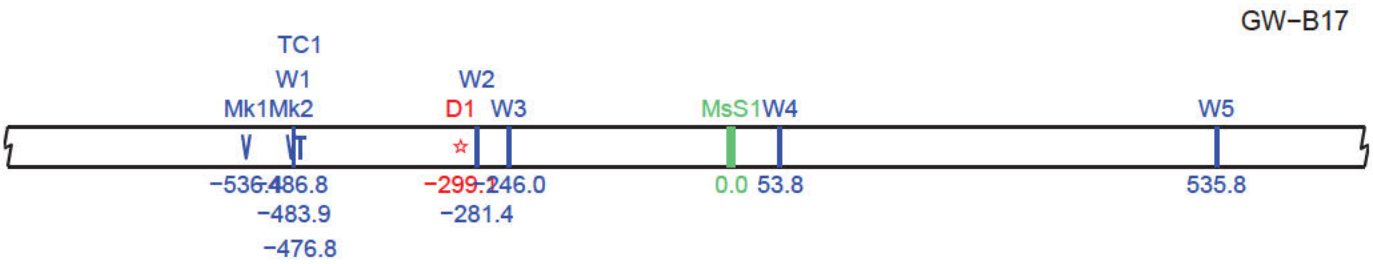
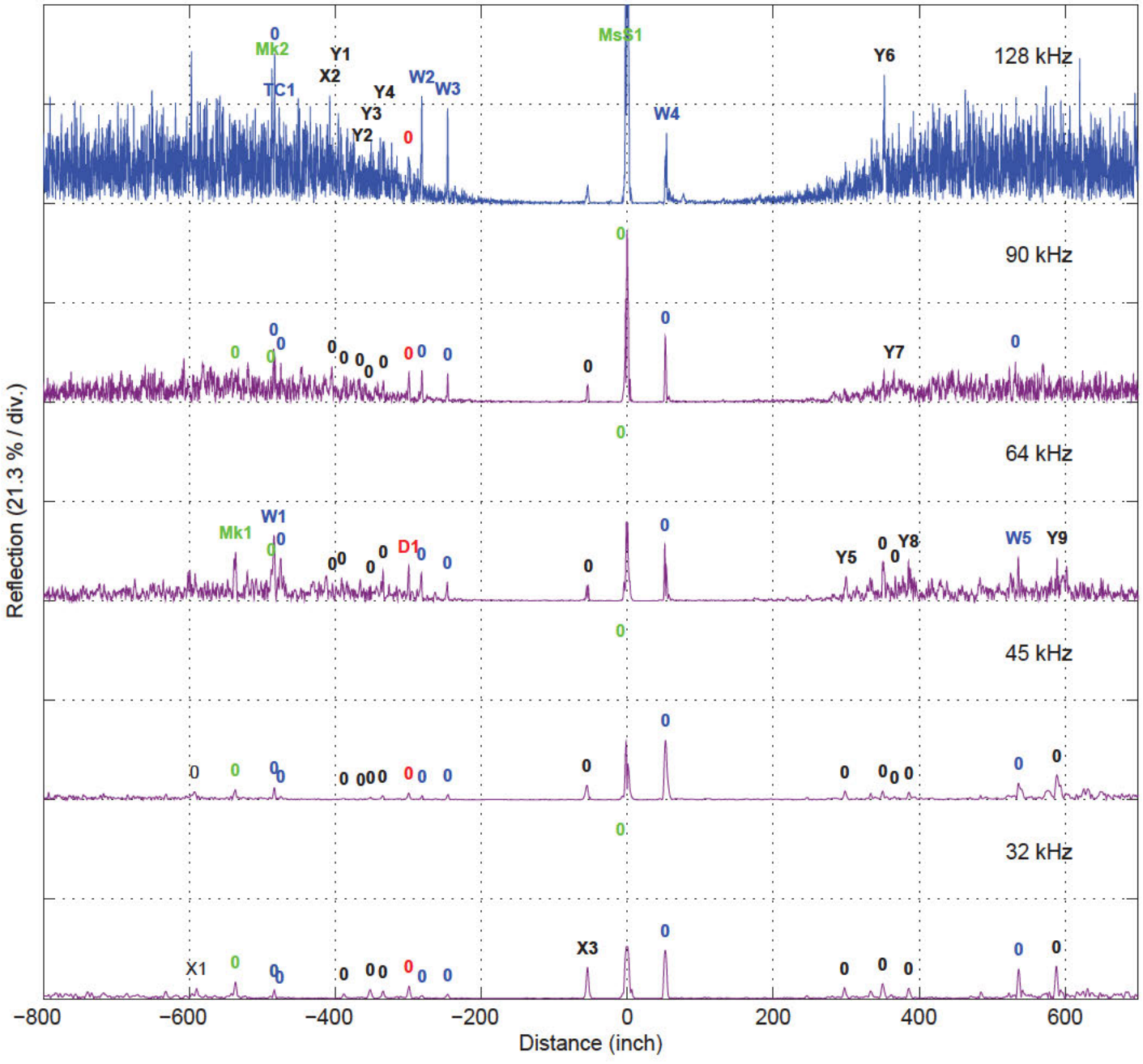
GW−B17





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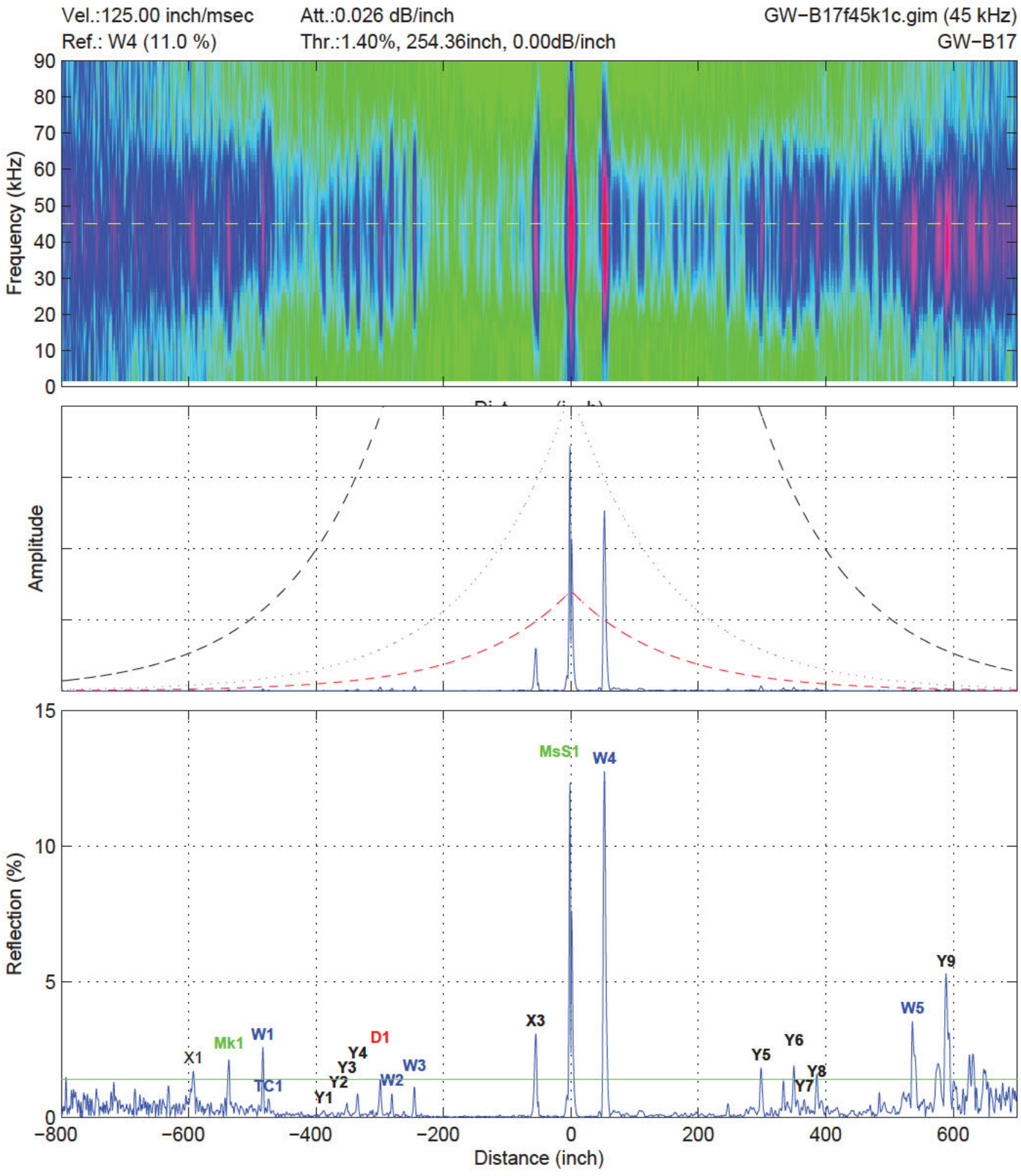

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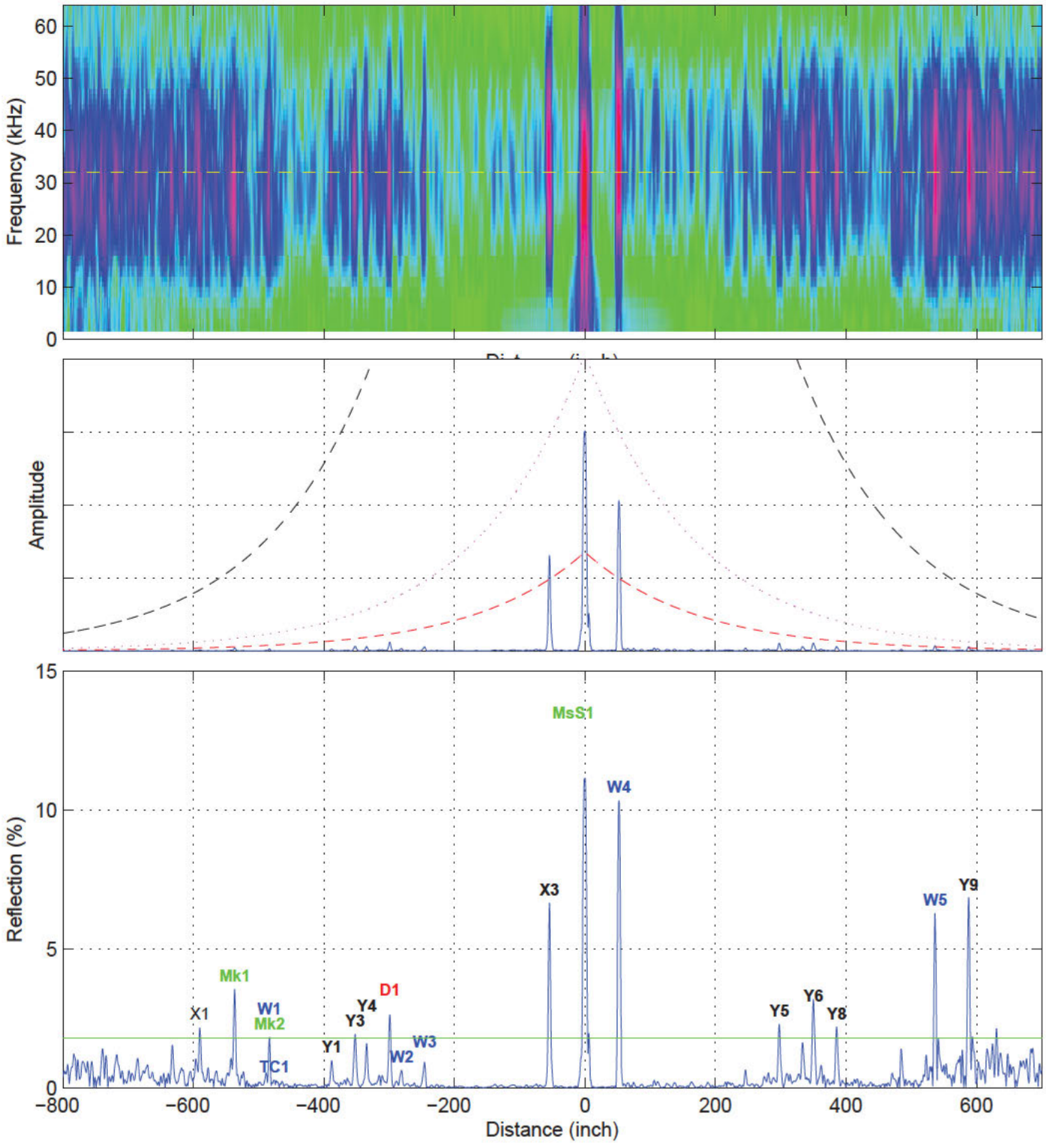
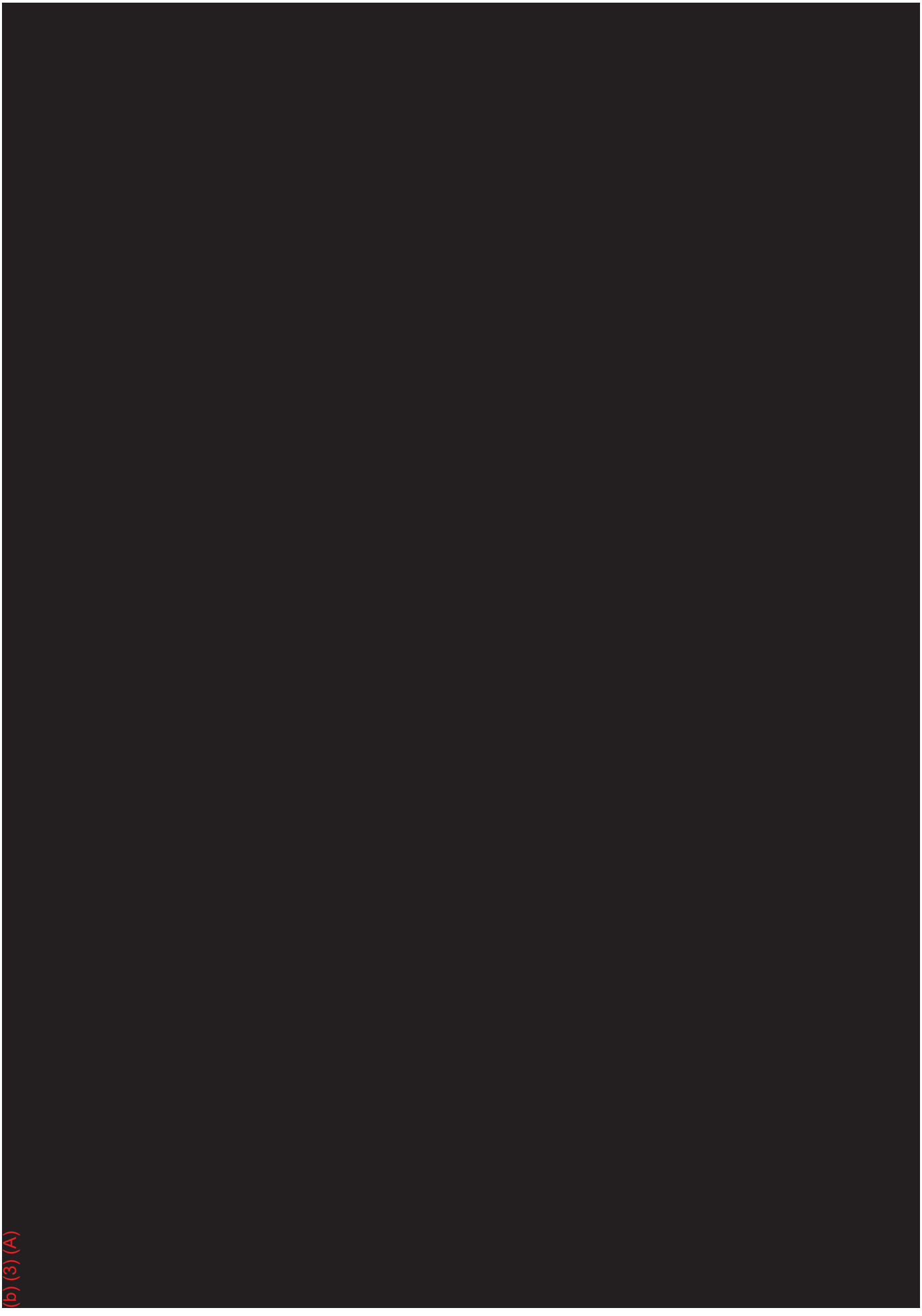
Vel.:125.00 inch/msec Att.:0.026 dB/inch GW–B17f32k1c.gim (32 kHz)
Ref.: W4 (10.0 %) Thr.:1.80%, 19.55inch, 0.00dB/inch GW–B17





(b) (3) (A)

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(b) (3) (A)

GW-B17; General pipe inspection; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site:	RH PPG	Date:	29-Mar-2022
Pipe ID/Location:	GW-B18(SP8)6OC	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) , 0.250-inch-wall	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	(b) (6)	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	-952.6 to 951.6 inch

Test Pipe: Aboveground; Painted; 73°F JP-8-carrying pipe; 0.236, 0.237, 0.241, 0.237-inch wall; Supported with Steel

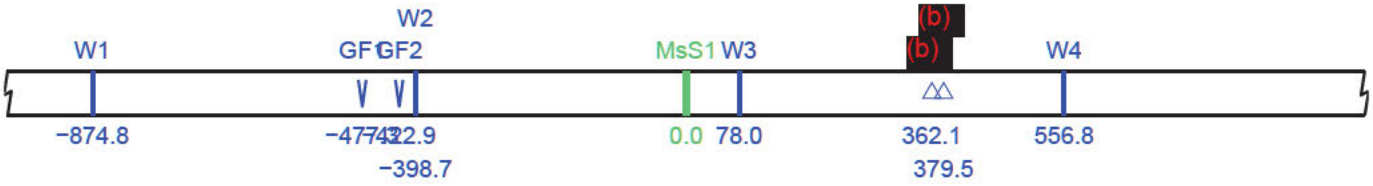
Note:

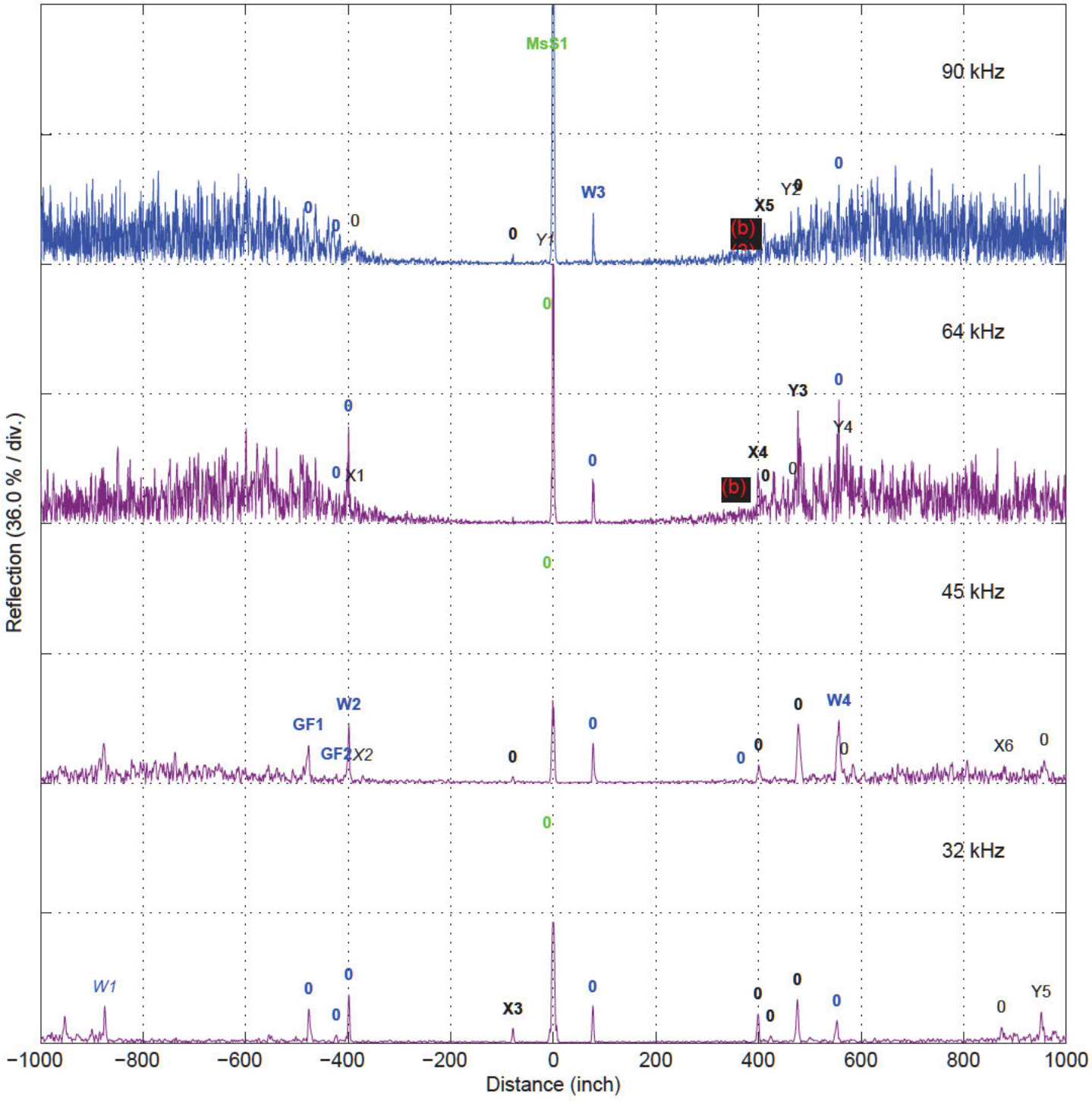
Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
W1	-874.77	10.0	Weld;
GF1	-477.31	10.6	Geometric Feature;
GF2	-422.93	2.4	Geometric Feature; Repair Sleeve
W2	-398.68	16.2	Weld;
X1	-386.52	7.5	Directionality; |MsS-X|=386.52; PS2 (379.58, 0.81)
X2	-371.68	2.1	Directionality; |MsS-X|=371.68; PS1 (365.83, 0.28)
X3	-78.78	3.9	Directionality; |MsS-X|=78.78; W3 (77.08, 4.39)
Y1	-16.61	1.1	Multiple Reflection; |MsS-X|=16.61; ?? (25.90, 0.30)
MsS1	0.00	--	Initial Pulse;
W3	78.03	14.4	Weld;
(b)	362.08	4.5	Pipe Support;
(b)	379.52	4.3	Pipe Support;
X4	398.83	14.1	Directionality; |MsS-X|=398.83; W2 (398.77, 5.78)
X5	411.65	11.8	Directionality; |MsS-X|=411.65; GF2 (423.40, 1.77)
Y2	463.40	15.1	Multiple Reflection; |MsS-X|=463.40; W3-W2 (476.23, 3.22)
Y3	476.83	31.3	Multiple Reflection; |MsS-X|=476.83; W3-W2 (476.23, 3.22)
W4	556.83	17.3	Weld; W1-Q12 (565.14, 2.51);
Y4	565.58	21.0	Multiple Reflection; |MsS-X|=565.58; W3-GF1 (564.89, 0.52)
X6	878.33	4.6	Directionality; |MsS-X|=878.33; W1 (874.77, 4.39)
Y5	951.58	8.4	Multiple Reflection; Q1 (952.65, 3.18);

[redacted]

GW−B18(SP8)6OC





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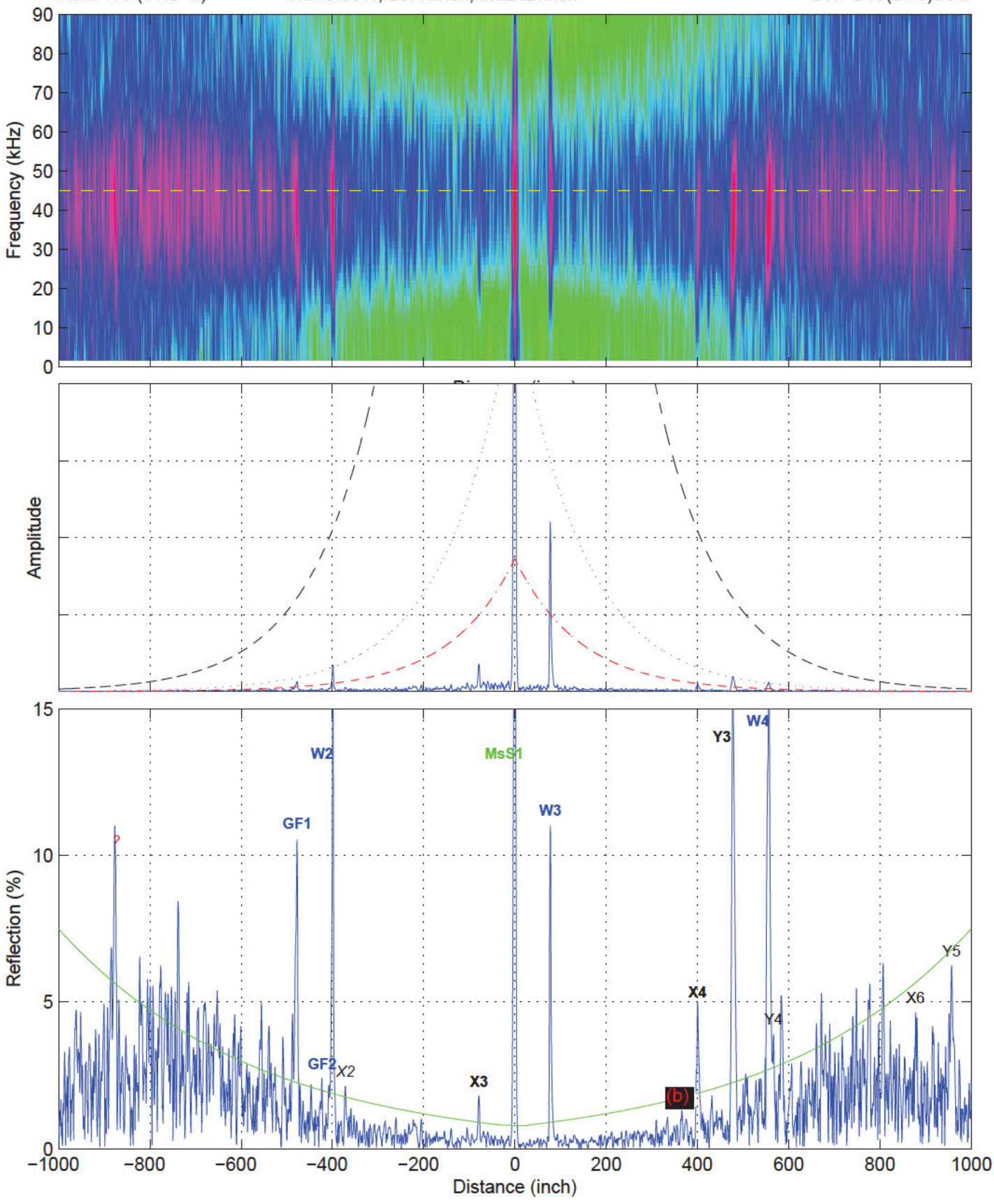
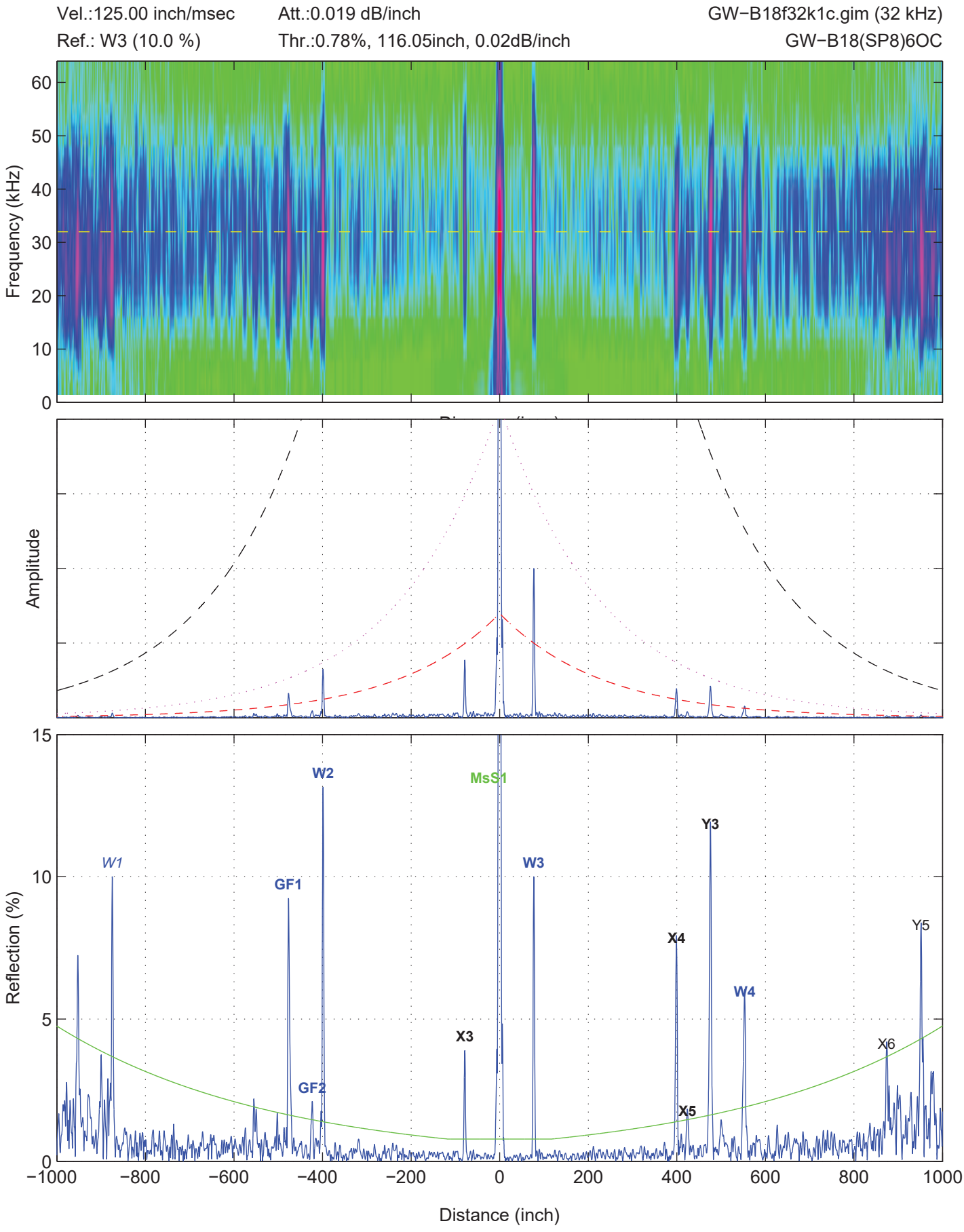
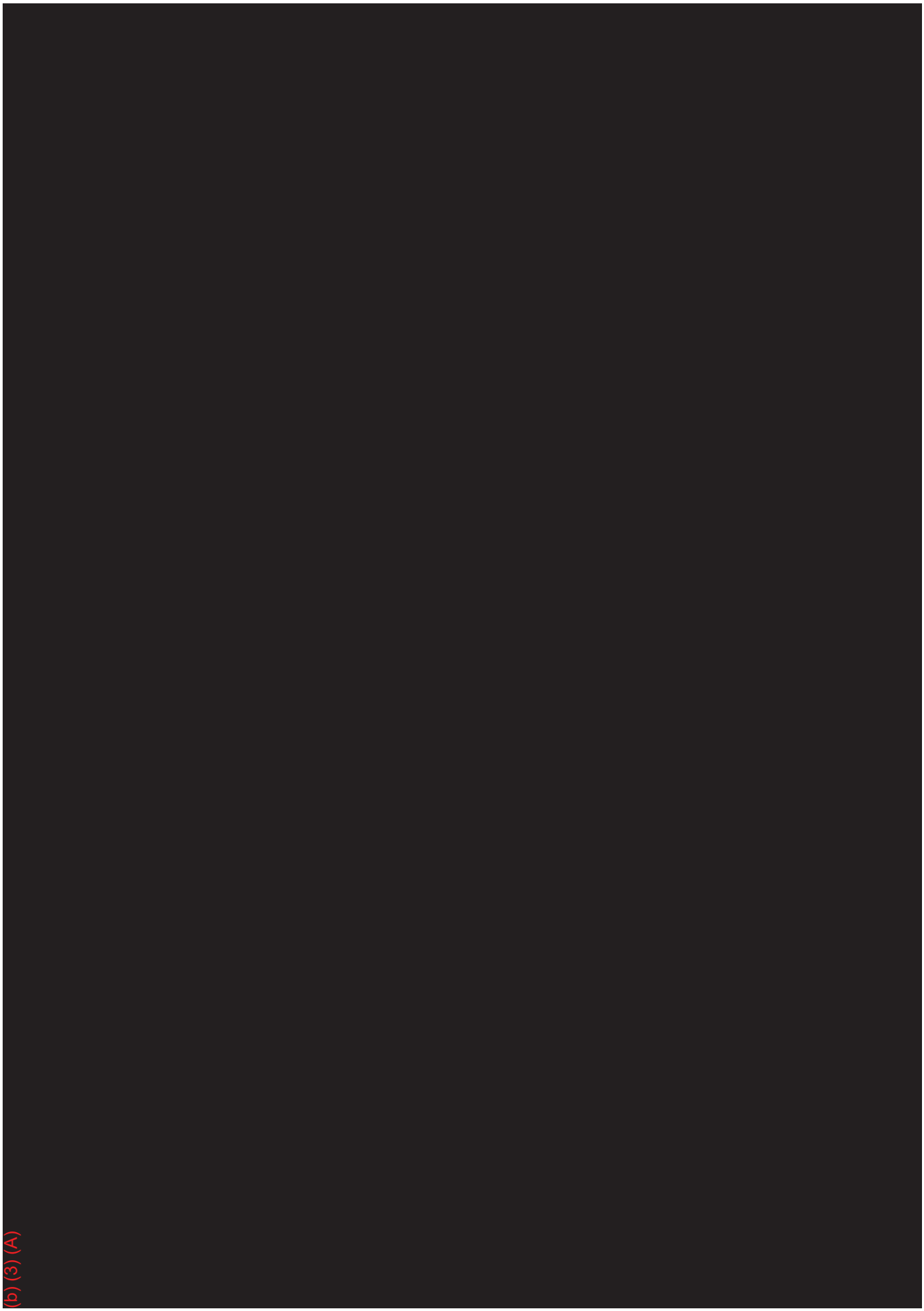

Vel.:125.00 inch/msec
Att.:0.019 dB/inch
GW−B18f45k1c.gim (45 kHz)
Ref.: W3 (11.0 %)
Thr.:0.80%, 28.46inch, 0.02dB/inch
GW−B18(SP8)6OC
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W2
MsS1
W3
GF1
W4
Y3
GF2
X2
X3
X4
Y4
Y5
X6
(b)


Vel.:125.00 inch/msec
Att.:0.019 dB/inch
GW−B18f32k1c.gim (32 kHz)
Ref.: W3 (10.0 %)
Thr.:0.78%, 116.05inch, 0.02dB/inch
GW−B18(SP8)6OC
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
GF1
GF2
MsS1
W3
X3
X4
X5
Y3
W4
X6
Y5



(b) (3) (A)

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(b) (3) (A)

GW-B18; General pipe inspection; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW–B19
Pipe Size: (b) (3) (A), 0.250–inch–wall
Inspector: (b) (6)
Analyzer: (b) (6)
Client: AB&A (US Navy)

Date: 29–Mar–2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: –897.0 to 899.5 inch

Test Pipe: Aboveground; Painted; 73°F F24–carrying pipe; 0.470, 0.247, 0.250, 0.244–inch wall; Supported with Steel

Note:

Summary: No indication is found within the inspection range other than the corrosion area located near pipe support 290 (–480" from sensor) is visible on multiple frequencies (see report body for UTT and pit sizes).

Sym.	Dist.(inch)	% Refl.	Comment
X1	–897.84	7.5	Directionality; |MsS–X|=897.84; Y7 (897.89, 5.73)
W1	–852.43	14.0	Weld;
(b)	–798.84	5.5	Pipe Support; Q7–W6 (798.23, 1.25);
X2	–751.18	10.6	Directionality; |MsS–X|=751.18; W7 (747.64, 6.31)
TC1	–725.59	19.3	T–Connection;
X3	–650.18	6.6	Directionality; |MsS–X|=650.18; Y5 (649.09, 5.63)
Y1	–625.68	7.7	Multiple Reflection;
W2	–610.34	80.0	Weld;
X4	–576.71	8.8	Directionality; |MsS–X|=576.71; W4–W6–W4 (572.69, 0.16)
Y2	–525.46	23.3	Multiple Reflection;
D1	–477.71	31.9	Defect; 33–% wall loss; corrosion area by saddle (0.077" pits)
Y3	–423.71	9.7	Multiple Reflection; |MsS–X|=423.71; W4–W6 (424.13, 5.97)
Y4	–376.21	21.7	Multiple Reflection; |MsS–X|=376.21; W5–W6 (374.61, 4.35)
X5	–274.59	12.3	Directionality; |MsS–X|=274.59; W6 (272.77, 11.56)
(b)	–207.68	0.9	Pipe Support;
GF1	–203.55	2.8	Geometric Feature; W4–W5–W4 (197.46, 0.45);
W3	–202.09	11.5	Weld; W4–W5–W4 (197.46, 0.45);
W4	–149.71	17.4	Weld;
W5	–101.96	15.0	Weld;
MsS1	0.00	––	Initial Pulse;
(b)	98.16	1.0	Pipe Support; W5 (102.09, 3.77);
X6	102.64	5.5	Directionality; |MsS–X|=102.64; W5 (101.84, 7.17)
X7	150.64	4.9	Directionality; |MsS–X|=150.64; W4 (149.84, 6.39)
X8	202.27	7.6	Directionality; |MsS–X|=202.27; W3 (202.09, 8.19)
W6	274.41	28.2	Weld;
GF2	279.41	12.0	Geometric Feature;
X9	376.04	17.2	Directionality; |MsS–X|=376.04; Y4 (375.71, 7.41)
X10	426.16	6.8	Directionality; W6–W4 (423.14, 2.60);
X11	475.14	13.6	Directionality; |MsS–X|=475.14; D1 (475.34, 9.32)
X12	525.77	4.2	Directionality; |MsS–X|=525.77; Y2 (524.71, 4.83)
X13	576.77	4.0	Directionality; |MsS–X|=576.77; X4 (576.71, 6.28)
X14	611.21	6.2	Directionality; |MsS–X|=611.21; W2 (610.30, 6.70)
Y5	649.16	56.8	Multiple Reflection; |MsS–X|=649.16; W6–Y4 (649.51, 3.47)
Y6	697.84	14.5	Multiple Reflection; |MsS–X|=697.84; W6–Y3 (695.86, 0.83)
W7	748.04	56.2	Weld;
GF3	753.79	36.2	Geometric Feature;
X15	799.02	12.6	Directionality; |MsS–X|=799.02; PS1 (798.84, 3.95)
X16	852.02	14.4	Directionality; |MsS–X|=852.02; W1 (850.59, 7.17)
Y7	884.59	17.3	Multiple Reflection; |MsS–X|=884.59; W6–W2 (882.73, 3.95)

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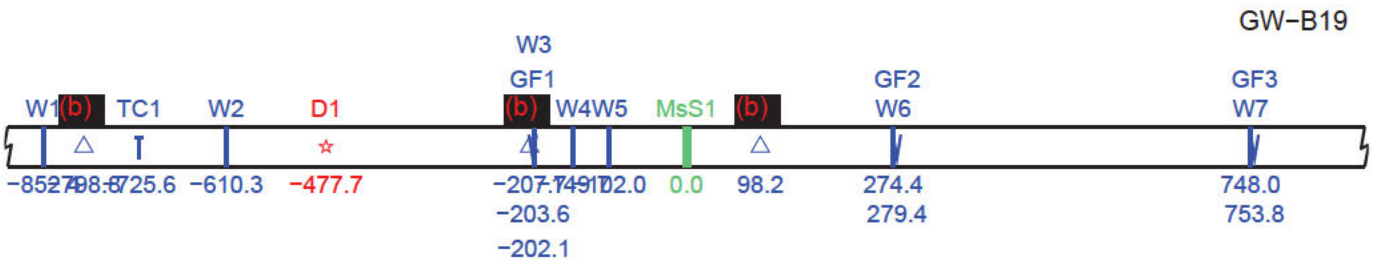
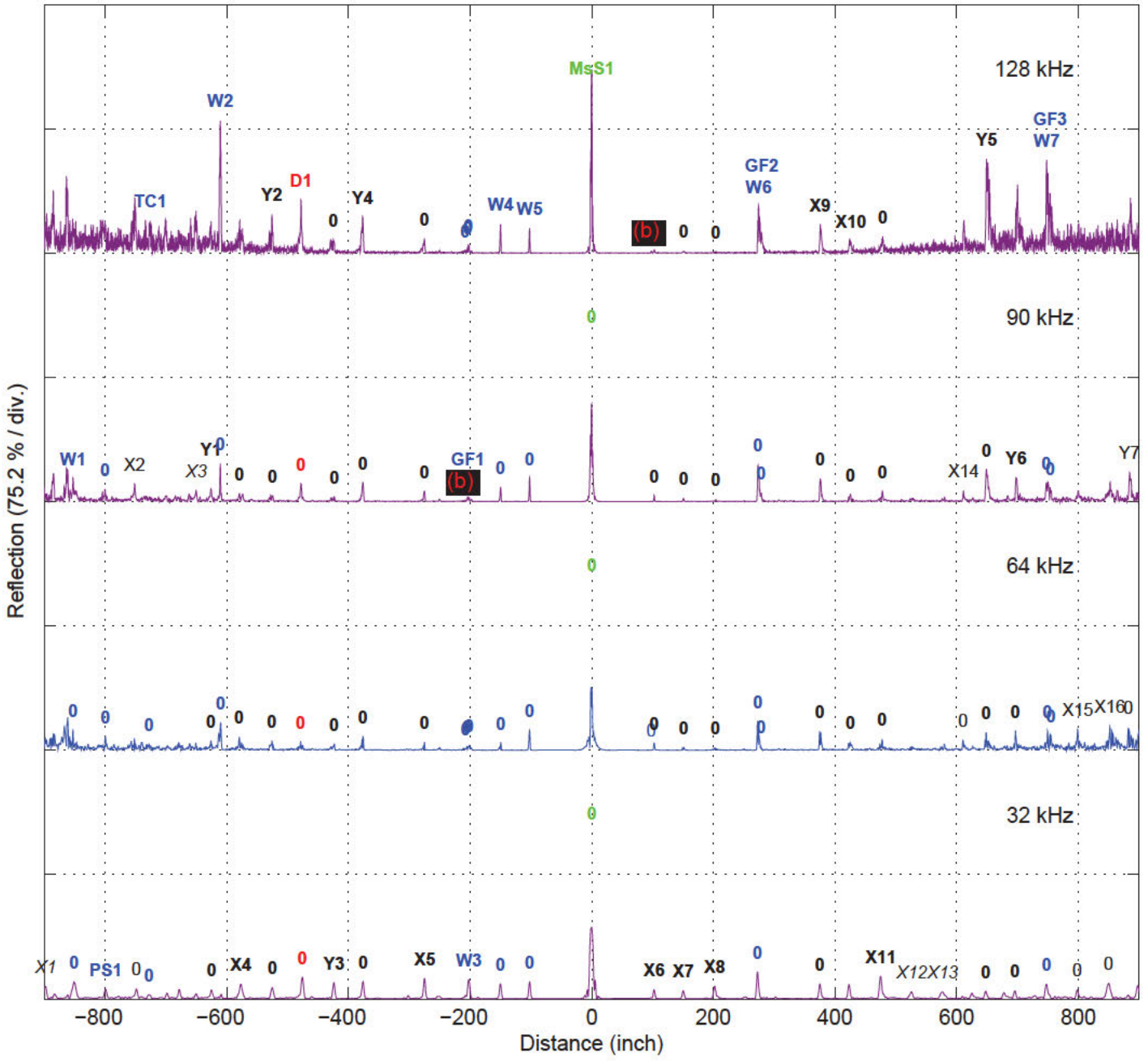
GW−B19





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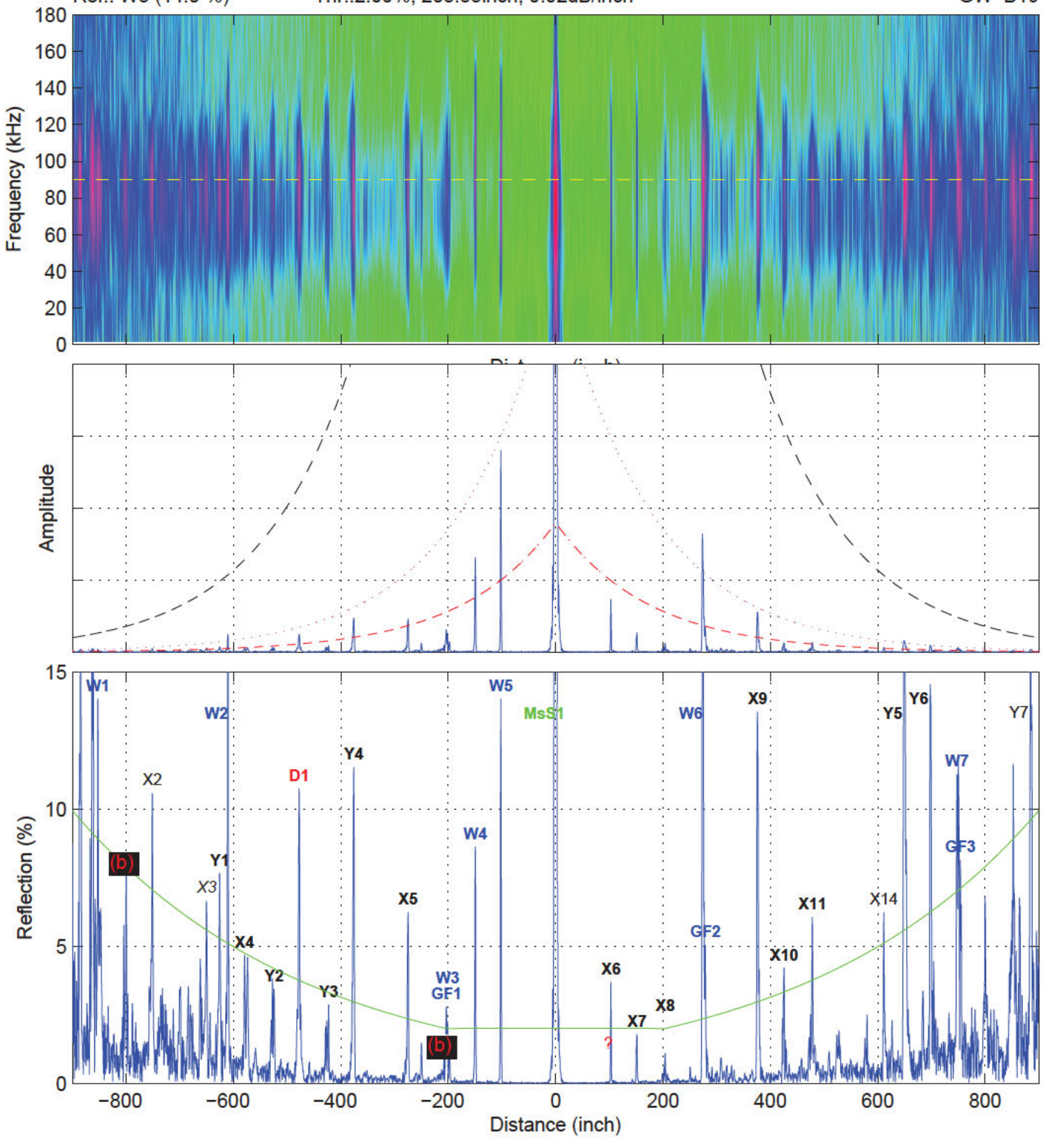
Vel.:125.00 inch/msec
Ref.: W5 (14.0 %)
Att.:0.012 dB/inch
Thr.:2.00%, 203.55inch, 0.02dB/inch
GW–B19f90k1c.gim (90 kHz)
GW–B19



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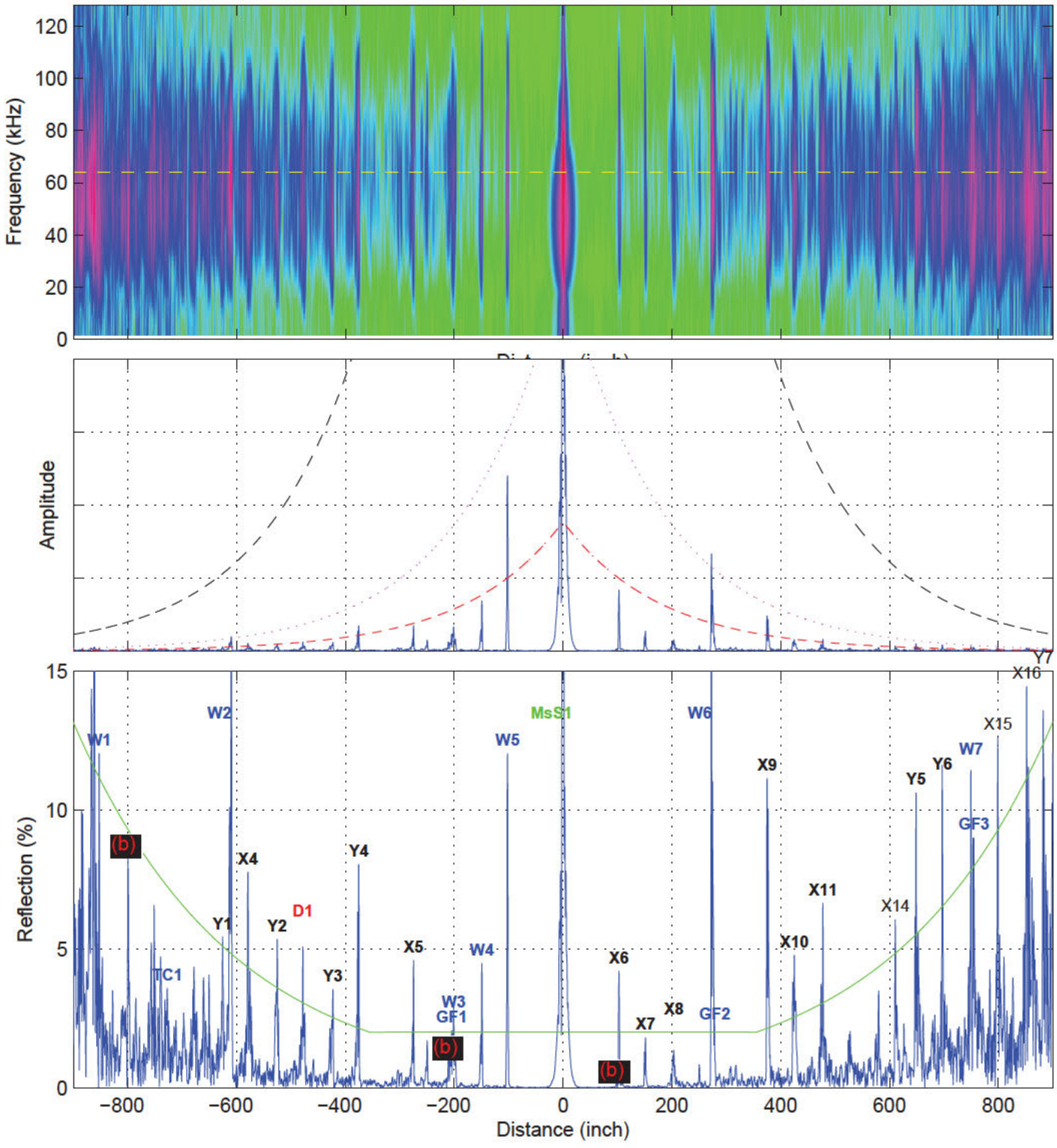
Vel.:125.00 inch/msec
Ref.: W5 (12.0 %)
Att.:0.012 dB/inch
Thr.:2.00%, 354.87inch, 0.03dB/inch
GW−B19f64k1c.gim (64 kHz)
GW−B19



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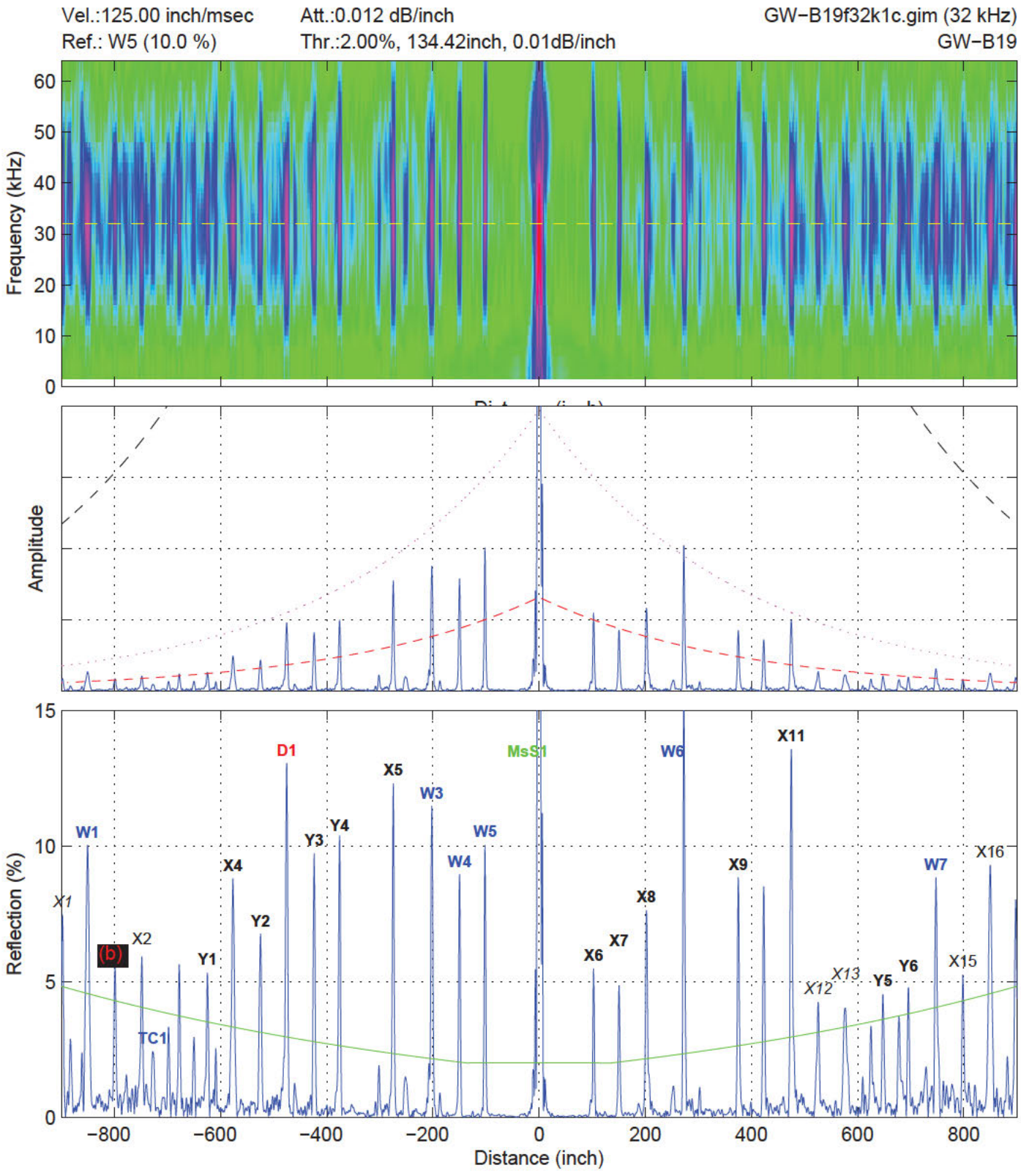

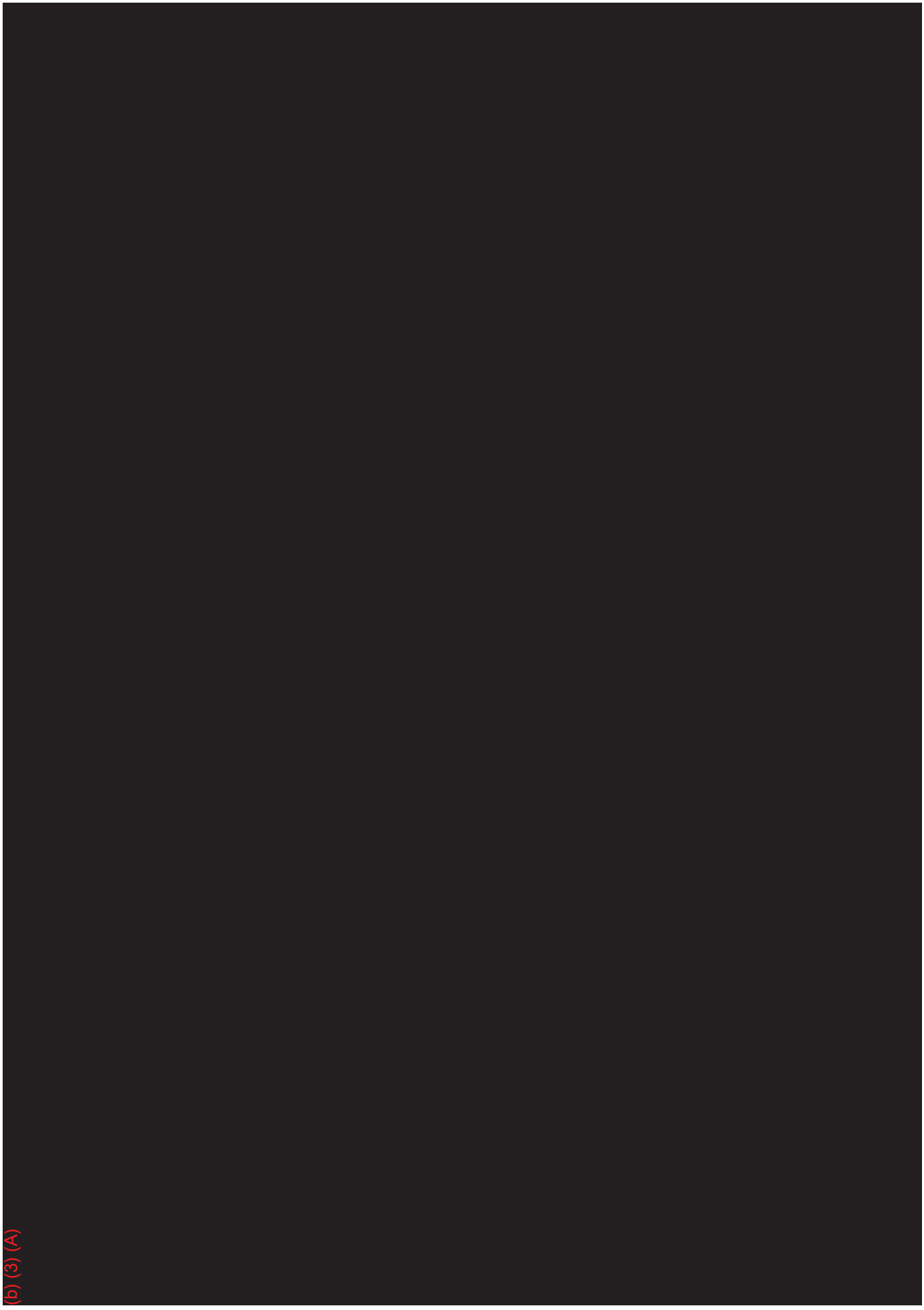

(b) (3) (A)

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GW-B19; General pipe inspection; (Area = Between (b) (3) (A))

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW–B20
Pipe Size: [redacted]
Inspector: Benyam Berhane
Analyzer: Benyam Berhane
Client: AB&A (US Navy)

Date: 29–Mar–2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: –998.1 to 978.3 inch

Test Pipe: [redacted]

Note:

Summary: No indication is found within the inspection range other than the corrosion area located near pipe support 290 and 291 (at –258" and –195" from sensor) is visible on multiple frequencies (see report body for UTT and pit sizes).

Sym.	Dist.(inch)	% Refl.	Comment
W1	–979.34	5.1	Weld; Q48 (978.27, 2.57);
Y1	–954.46	5.7	Multiple Reflection; |MsS–X|=954.46; Y5–W4 (950.48, 0.78)
Y2	–950.46	6.5	Multiple Reflection; |MsS–X|=950.46; Y9 (949.52, 4.34)
W2	–921.46	4.3	Weld;
Mk1	–890.96	––	Marker; Possible Anchor approx. 11" in wall but (Low S/N)
GF1	–877.71	1.9	Geometric Feature; Attenuation at wall
X1	–813.71	3.7	Directionality; |MsS–X|=813.71; W5 (811.39, 3.64)
Y3	–790.55	2.3	Multiple Reflection; |MsS–X|=790.55; GF2–W4 (789.36, 0.43)
Y4	–741.42	2.9	Multiple Reflection; GF3–Q7 (743.26, 0.23);
TC1	–686.59	2.3	T–Connection;
Y5	–614.18	10.5	Multiple Reflection; |MsS–X|=614.18; W3–Y8 (612.86, 2.73)
Y6	–505.96	2.6	Multiple Reflection; |MsS–X|=505.96; ?? (503.41, 0.72)
Y7	–476.43	9.7	Multiple Reflection; |MsS–X|=476.43; Y8 (474.77, 7.12)
GF2	–453.21	2.7	Geometric Feature;
GF3	–402.92	3.6	Geometric Feature; Pipe repair sleeve (48" long) Start
X2	–338.09	5.5	Directionality; |MsS–X|=338.09; W4 (336.77, 6.05)
D1	–253.34	0.8	Defect; 28.3–% wall loss; Pits
D2	–195.59	1.3	Defect; 39.4–% wall loss; Pits
W3	–138.96	15.0	Weld;
MsS1	0.00	––	Initial Pulse;
X3	138.52	6.1	Directionality; |MsS–X|=138.52; W3 (138.09, 6.05)
W4	338.54	15.0	Weld;
X4	404.14	1.6	Directionality; |MsS–X|=404.14; GF3 (403.71, 1.29)
X5	451.89	1.5	Directionality; |MsS–X|=451.89; GF2 (451.84, 1.09)
Y8	476.59	14.4	Multiple Reflection; |MsS–X|=476.59; W4–W3 (474.86, 2.31)
X6	611.96	3.8	Directionality; |MsS–X|=611.96; Y5 (614.49, 0.88)
W5	811.84	8.0	Weld;
Y9	949.52	7.2	Multiple Reflection; |MsS–X|=949.52; W5–W3 (949.48, 1.39)

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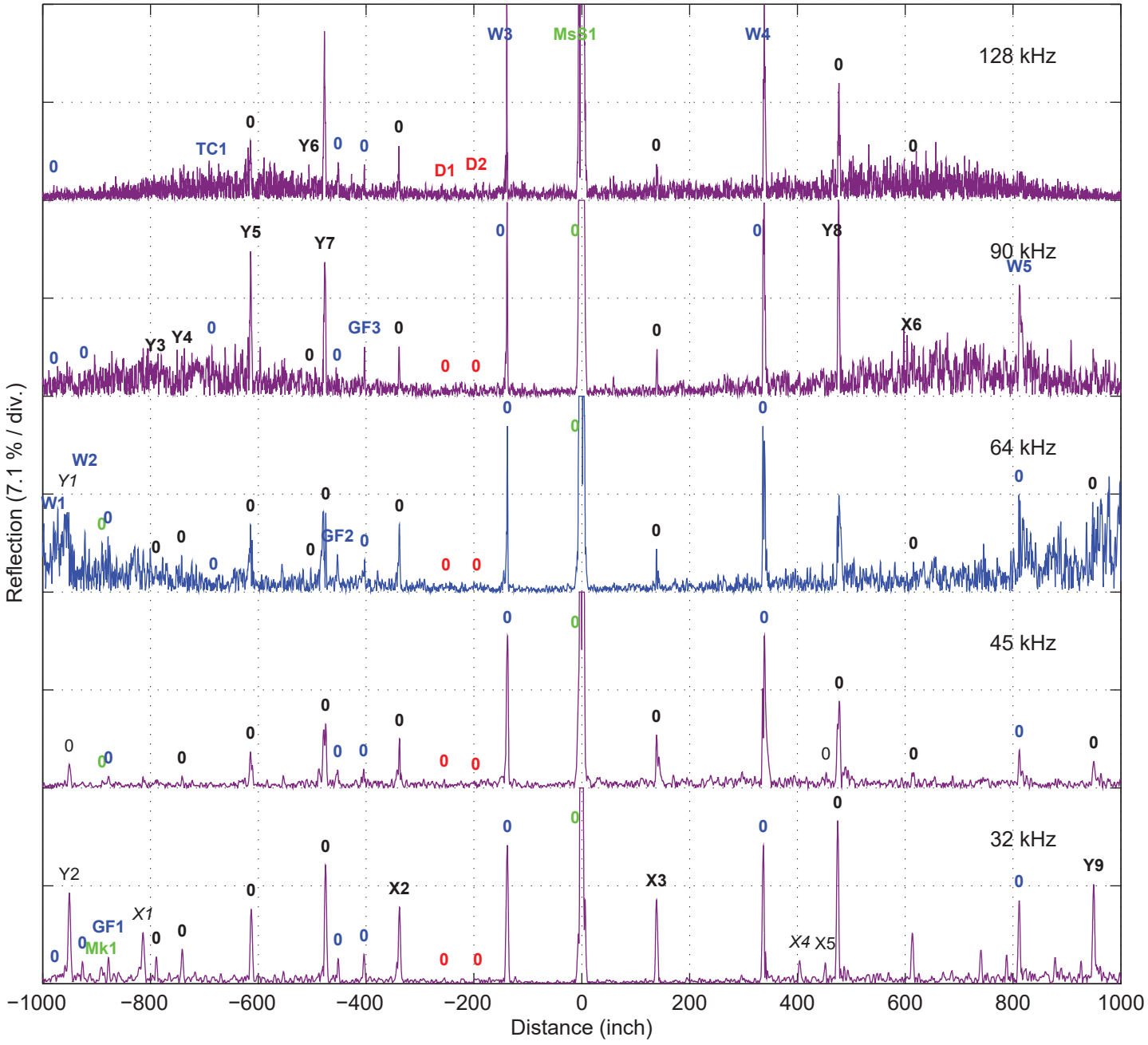
(b) (3) (A)

[redacted]



[redacted]

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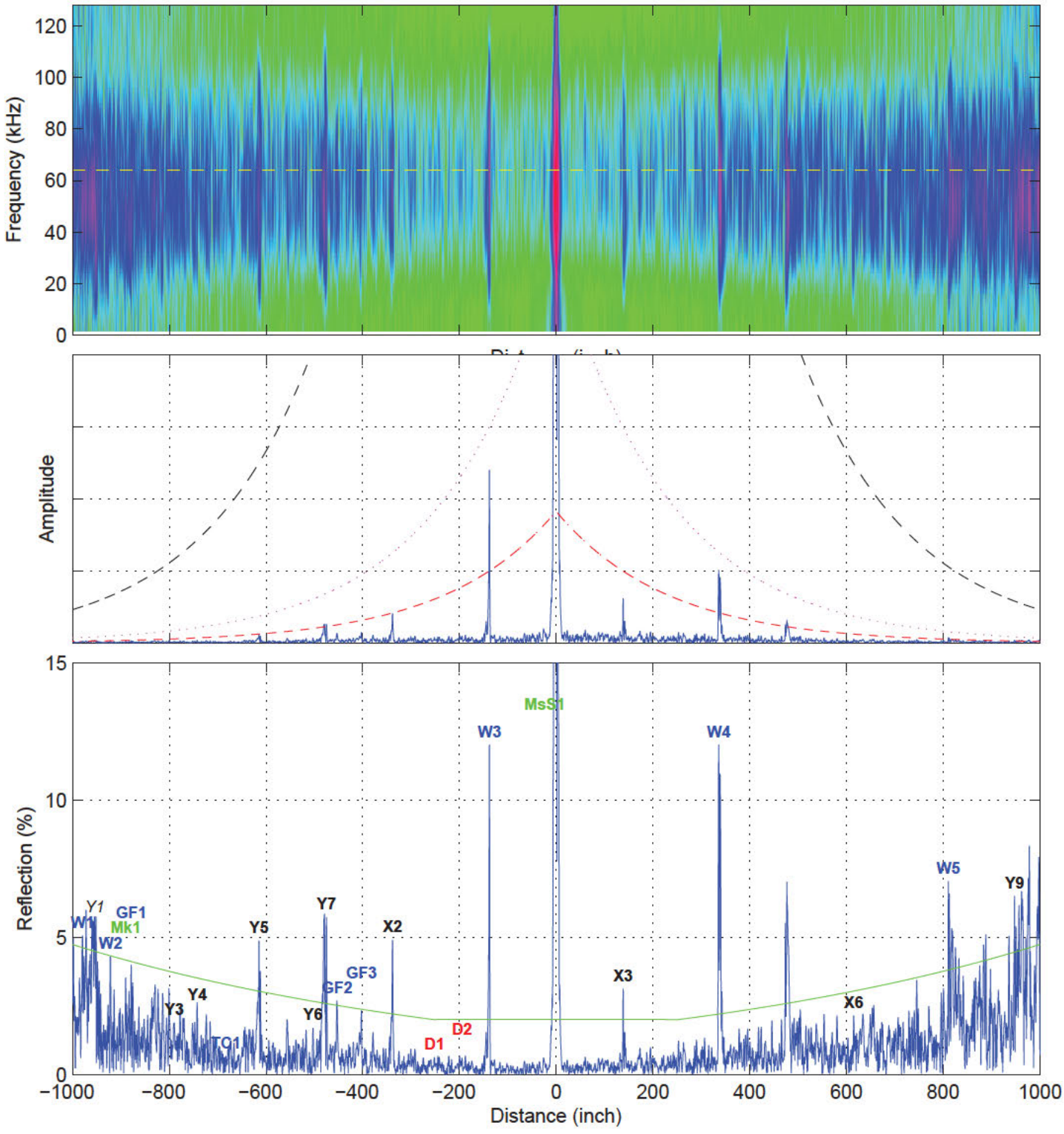
Vel.:125.00 inch/msec
Ref.: W3 (12.0 %)
Att.:0.009 dB/inch
Thr.:2.00%, 251.32inch, 0.01dB/inch
GW-B20f64k1c.gim (64 kHz)
GW-B20



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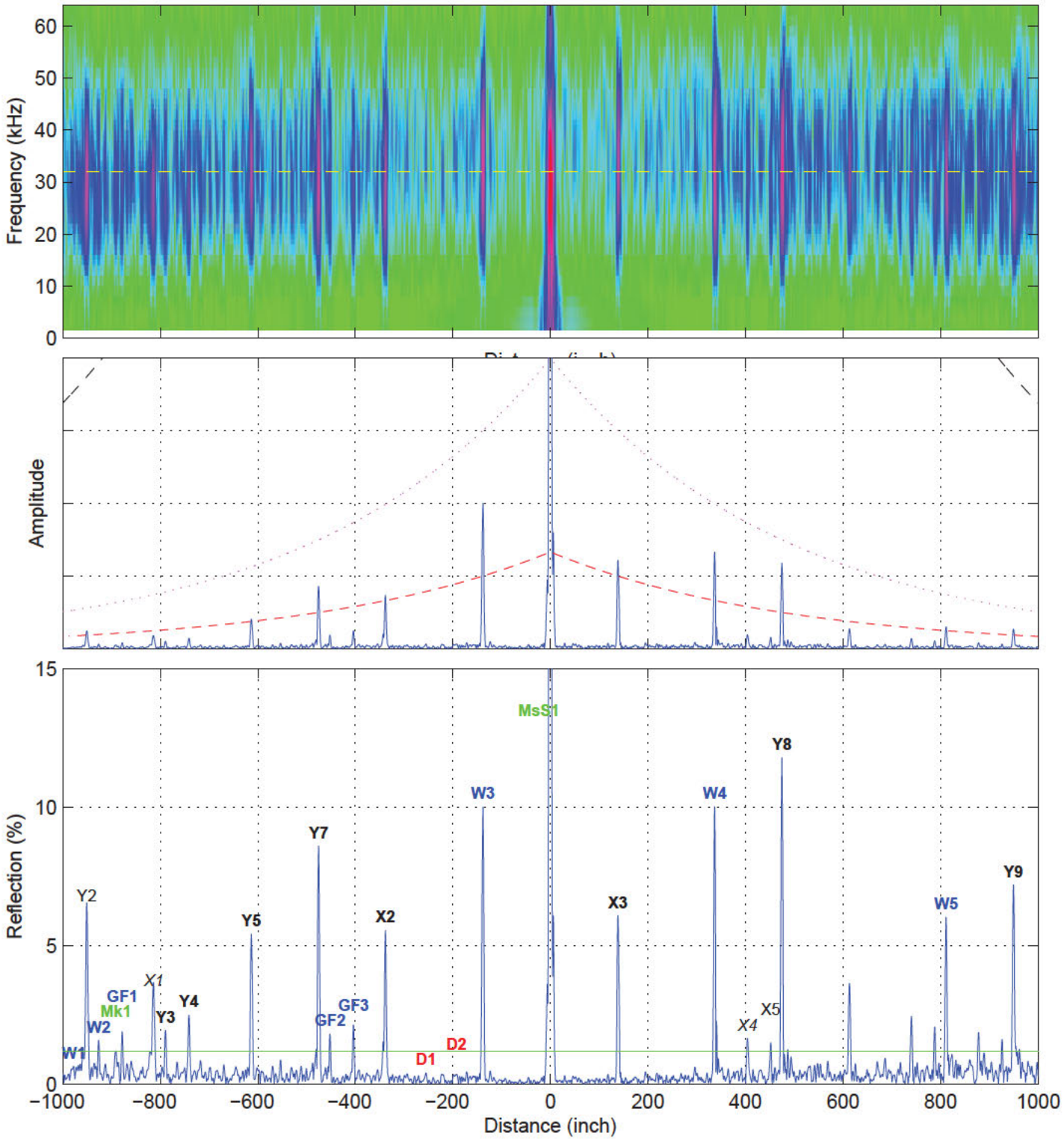
Vel.:125.00 inch/msec
Ref.: W3 (10.0 %)

Att.:0.009 dB/inch
Thr.:1.20%, 165.69inch, 0.00dB/inch

GW−B20f32k1c.gim (32 kHz)
GW−B20



Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[GW - B20]

(b) (3) (A)

3/30/2022
73.3 F

(b) (3) (A)
(Sch. 10, Nom. 0.250)

Remarks/Legend:		Owner:	
BBW - Bell - Bell Weld	A - Pit at - 258"	US Navy - Pearl Harbor, HI	
W - Weld	B - Pit at - 258"		
PS - Pipe Support	C - Pit at - 195"		
		Drawn By: InterSpec, LLC.	Modified By: InterSpec, LLC.
		Date: 3/30/2022 / Rev No : N/A	Scale: N/A
Drawing Title: GW - B20		Description: JP-5 Tunnel Piping	

LRUT REPORT-JBPH, HI-MARCH/2022

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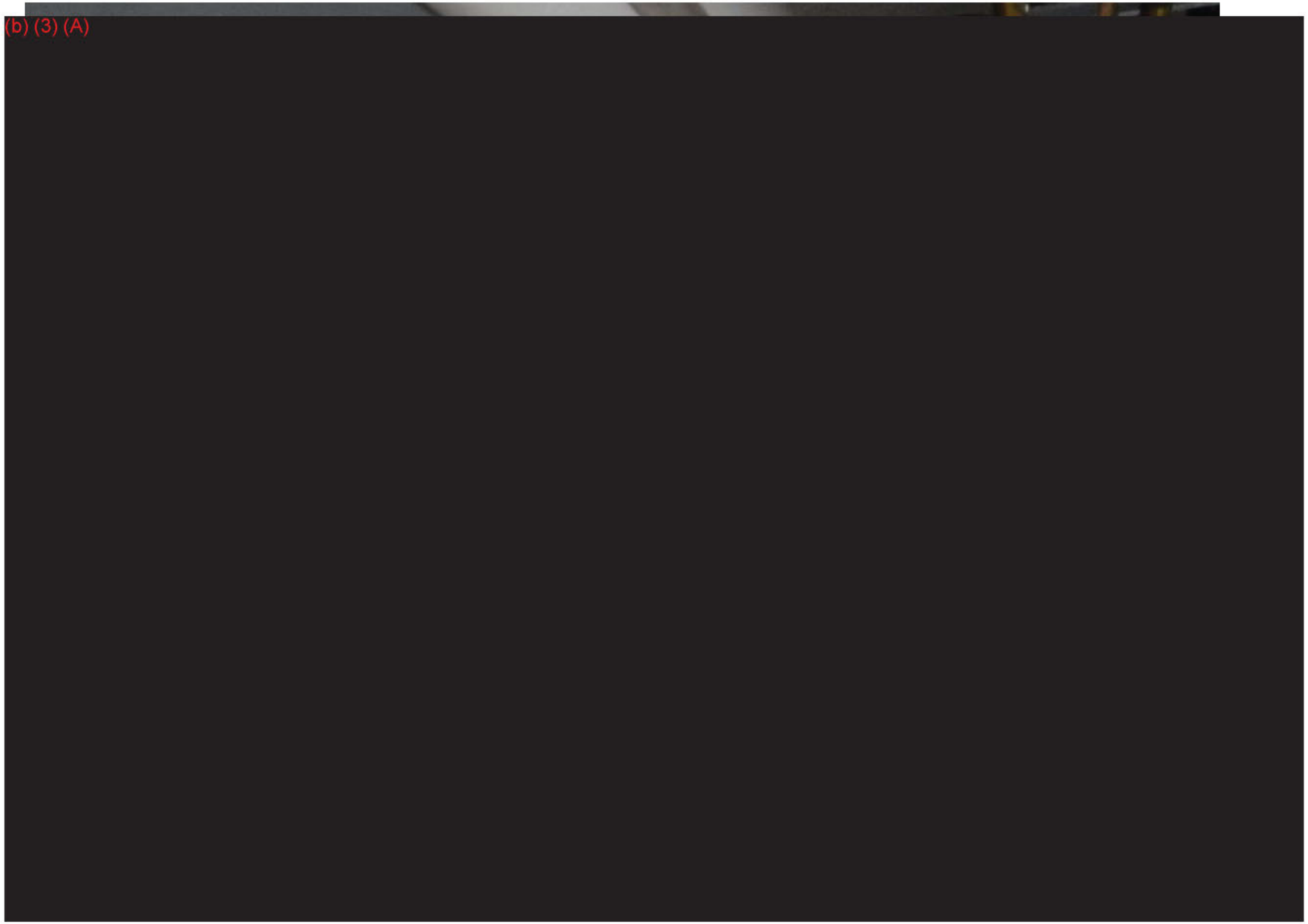
(b) (3) (A)



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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW–B21
Pipe Size: (b) (3) (A)
Inspector: (b) (6)
Analyzer: (b) (6)
Client: AB&A (US Navy)

Date: 30–Mar–2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: –1294.9 to 962.8 inch

Test Pipe: (b) (3) (A)
with Steel

Note:

Summary: Multiple welds in close proximity to each other is producing directionality and multiple reflection signals but one confirmed indication detected at –402" to –411" on this pipe. There is also one indication identified underneath a concrete saddle support (Saddle # 195) that requires prove up (visual, thickness and pit inspection) after pipe is lifted off the saddle support. Indication at saddle area was noted on all frequencies ranges. Item Q1

Sym.	Dist.(inch)	% Refl.	Comment
W2	–744.84	41.0	Weld;
Y2	–715.09	23.7	Multiple Reflection; |MsS–X|=715.09; W5–W9 (714.48, 5.15)
TC1	–667.84	10.2	T–Connection;
X1	–625.46	17.9	Directionality; |MsS–X|=625.46; GF4–W9–GF4 (628.19, 0.70)
X2	–618.71	10.8	Directionality;
X3	–576.96	7.9	Directionality; |MsS–X|=576.96; W10 (575.14, 5.04)
Y3	–518.46	11.4	Multiple Reflection; |MsS–X|=518.46; GF2–W3–GF2 (518.71, 1.34)
GF2	–513.71	18.0	Geometric Feature;
W3	–508.71	41.1	Weld;
W4	–485.34	11.3	Weld;
TC2	–480.59	18.4	T–Connection; Q12–W4 (463.73, 0.79);
D1	–402.46	5.7	Defect; 50.9–% wall loss; GF2–W3–GF2 (388.32, 0.15);
GF3	–382.09	6.8	Geometric Feature;
W5	–378.34	11.8	Weld;
X4	–337.96	8.6	Directionality; |MsS–X|=337.96; W9 (336.02, 10.98)
W6	–240.96	3.8	Weld;
GF4	–143.84	19.2	Geometric Feature;
W7	–141.46	15.0	Weld;
X5	–97.84	6.0	Directionality; |MsS–X|=97.84; W8 (96.66, 6.40)
MsS1	0.00	––	Initial Pulse;
Q1	34.66	2.2	Indication; 45.0–% wall loss; Indication at saddle area (noted on all frequency)
W8	96.66	47.5	Weld;
X6	144.79	4.7	Directionality; |MsS–X|=144.79; W7 (141.34, 4.98)
Y4	242.29	3.5	Multiple Reflection; |MsS–X|=242.29; W8–GF4 (240.50, 6.83)
GF5	333.79	54.3	Geometric Feature;
W9	336.02	48.5	Weld;
Y5	340.77	21.9	Multiple Reflection;
Y6	362.54	4.9	Multiple Reflection; W2–Q36–W2 (357.10, 0.13);
Y7	372.91	4.4	Multiple Reflection; |MsS–X|=372.91; W5 (378.46, 2.28)
Y8	381.21	4.8	Multiple Reflection; |MsS–X|=381.21; GF3 (382.59, 1.24)
Y9	479.39	13.3	Multiple Reflection; Q30 (478.71, 6.24);
W10	571.21	11.4	Weld; Q42–W2–Q42 (570.91, 14.00);

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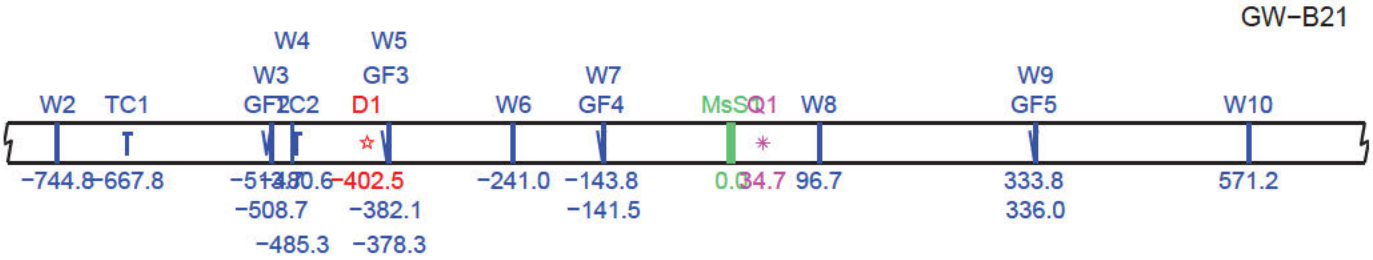
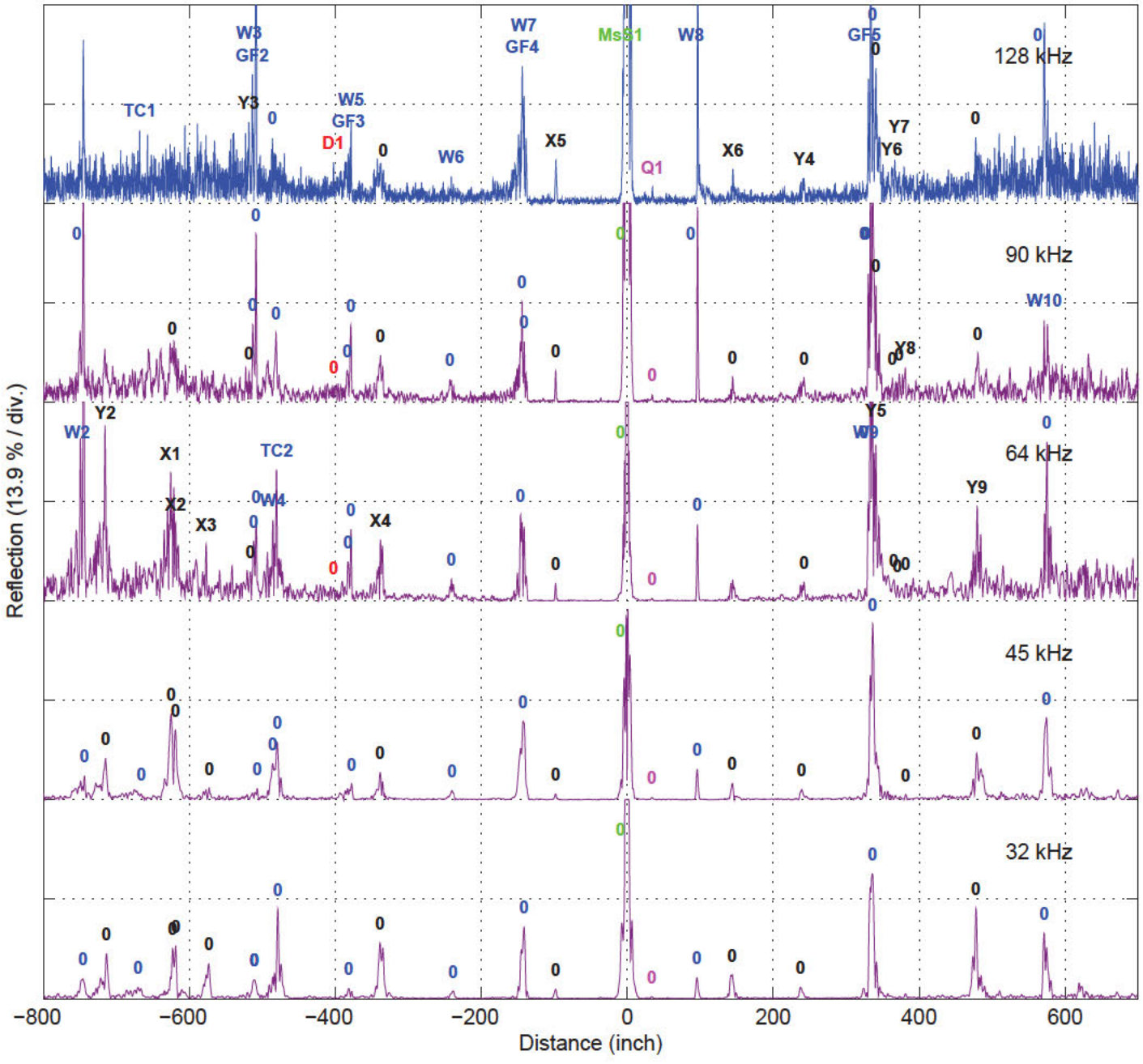
GW−B21





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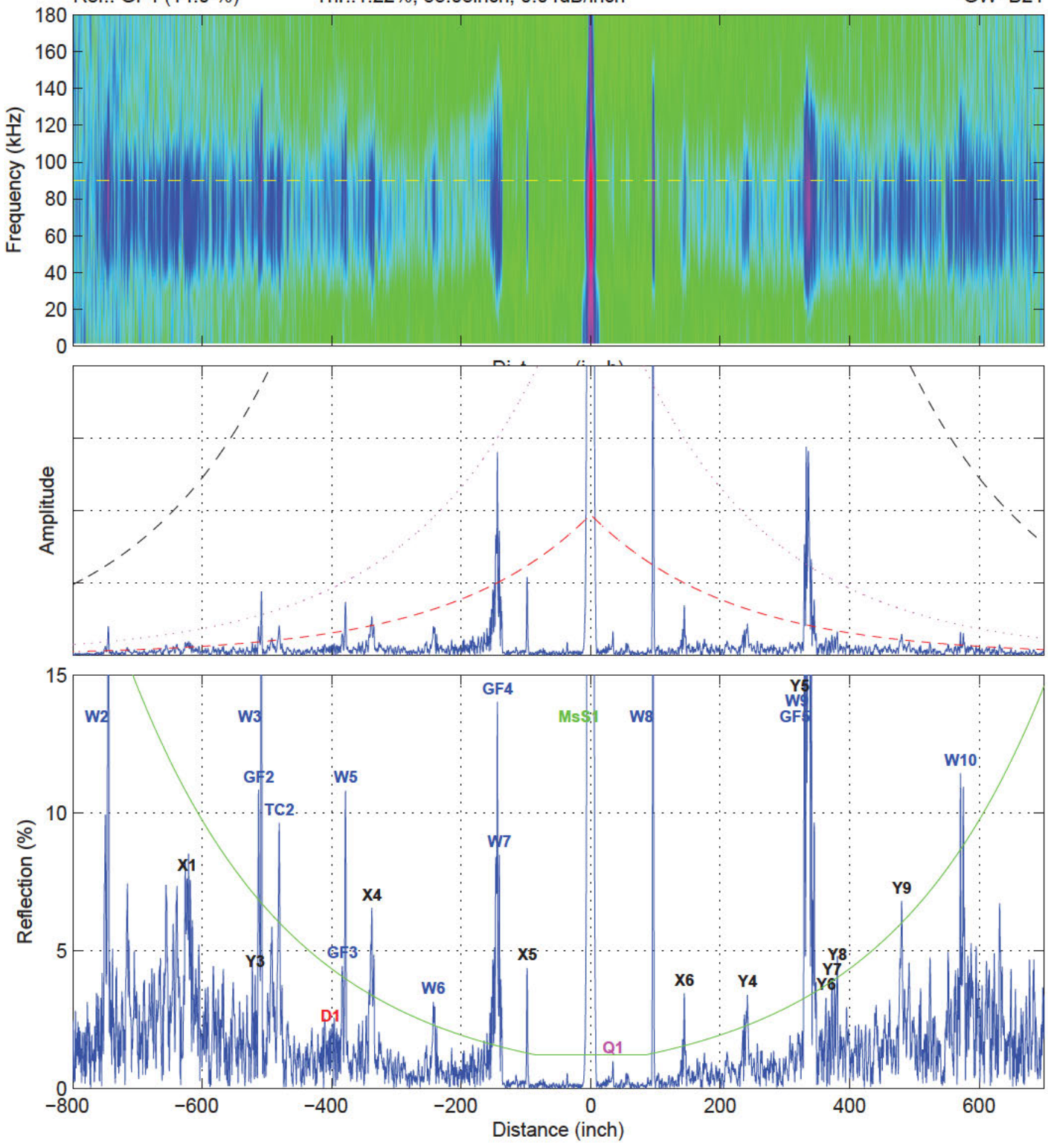
Vel.:125.00 inch/msec Att.:0.018 dB/inch GW−B21f90k1c.gim (90 kHz)
Ref.: GF4 (14.0 %) Thr.:1.22%, 85.08inch, 0.04dB/inch GW−B21



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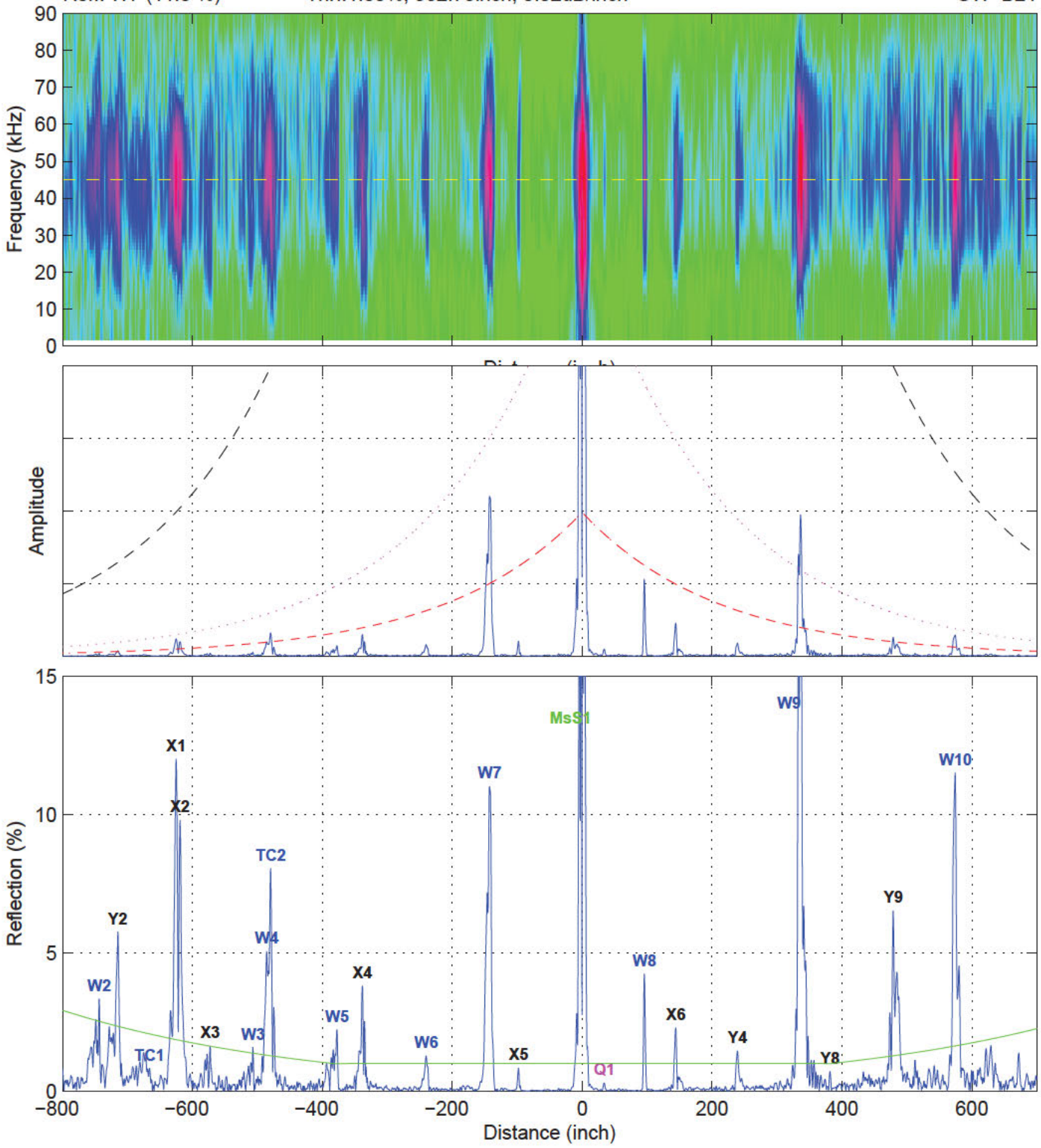
Vel.:125.00 inch/msec
Ref.: W7 (11.0 %)

Att.:0.018 dB/inch
Thr.:1.00%, 382.73inch, 0.02dB/inch

GW−B21f45k1c.gim (45 kHz)
GW−B21



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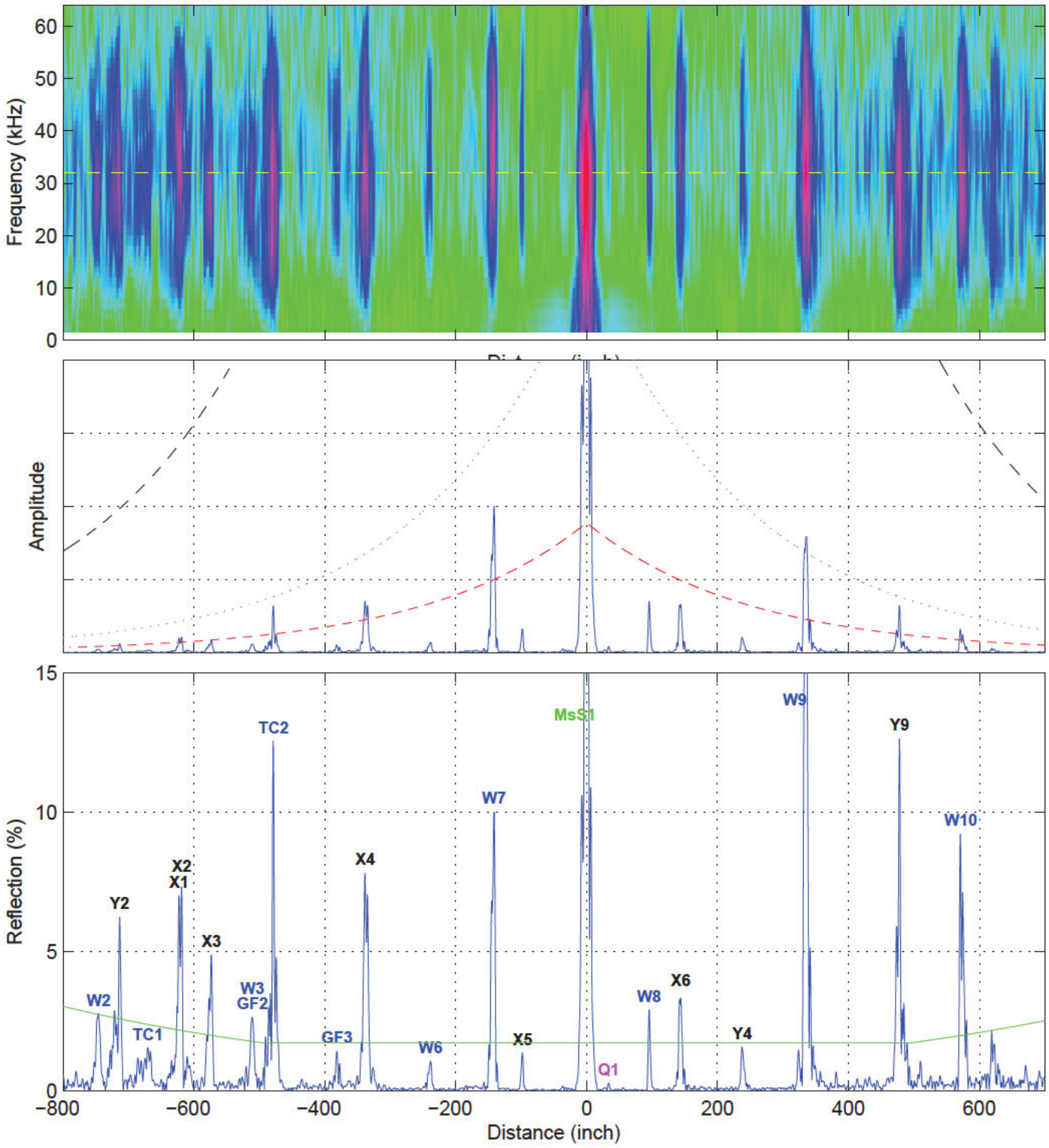
Vel.:125.00 inch/msec
Ref.: W7 (10.0 %)
Att.:0.018 dB/inch
Thr.:1.71%, 492.94inch, 0.02dB/inch
GW-B21f32k1c.gim (32 kHz)
GW-B21



Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[GW - B21]

(b) (3) (A)

73.5 F

(Sch. STD, Nom. 0.375)

Remarks/Legend:
BBW - Bell - Bell Weld
W - Weld
PS - Pipe Support

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	3/30/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
GW - B21

Description:
F-76 Tunnel Piping

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(b) (3) (A)

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW−B22
Pipe Size: (b) (3) (A)
Inspector (b) (6)
Analyzer
AB&A (US Navy)

Date: 30−Mar−2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: −1201.0 to 1204.2 inch

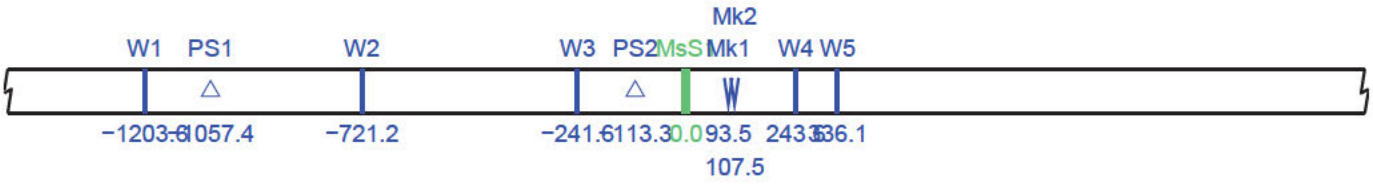
Test Pipe: (b) (3) (A)

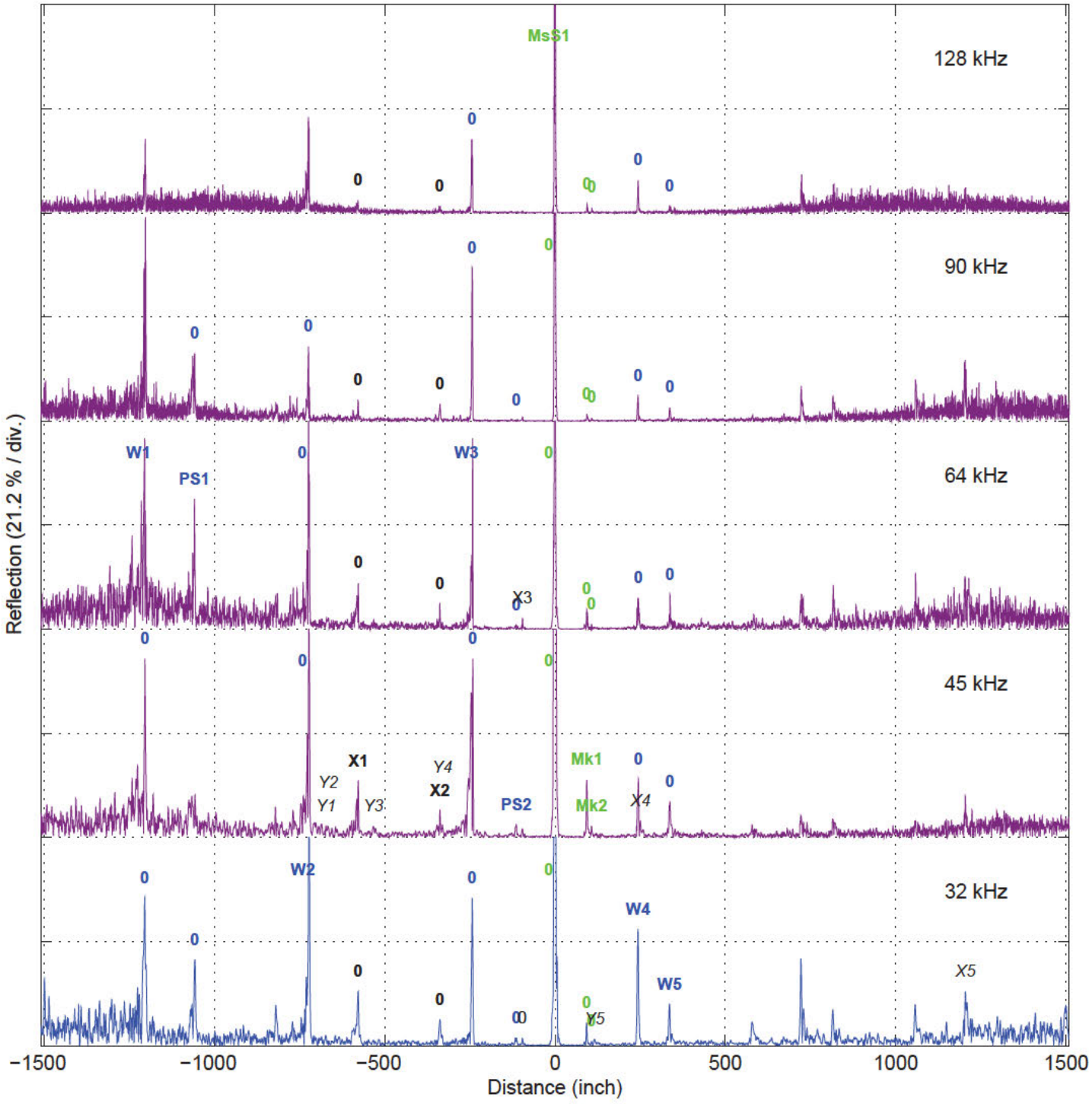
Note:

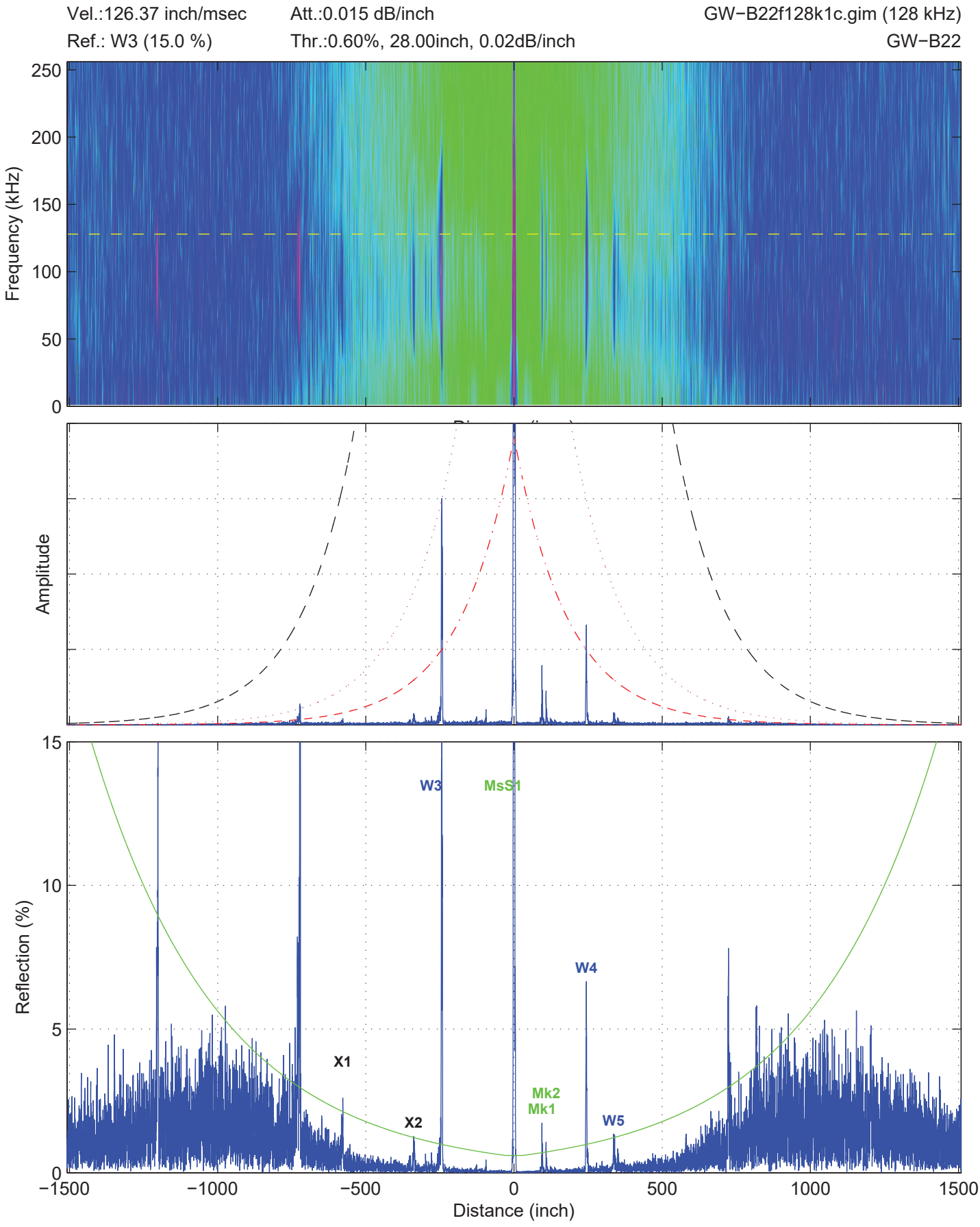
Summary: Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +93.47" and M2 @ +107.5"). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 14" inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 6.5" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M2 are. The section of piping can remain in−service.

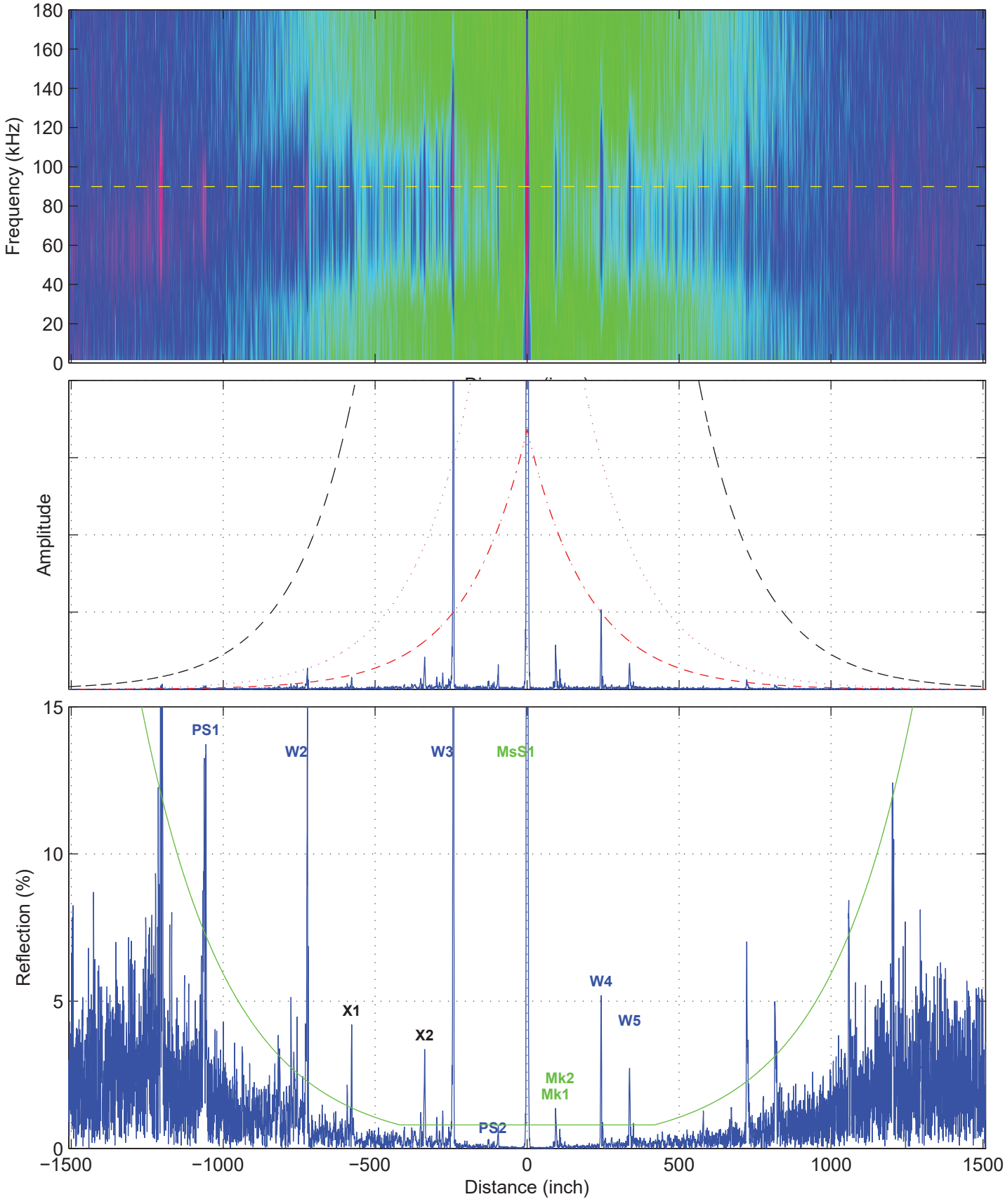
Sym.	Dist.(inch)	% Refl.	Comment
W1	−1203.59	38.9	Weld;
PS1	−1057.38	26.5	Pipe Support;
W2	−721.23	48.1	Weld;
Y1	−671.85	2.3	Multiple Reflection; |MsS−X|=671.85; X1−Mk1 (670.42, 2.18)
Y2	−666.04	2.3	Multiple Reflection; |MsS−X|=666.04; X1−Mk1 (670.42, 2.18)
X1	−576.95	11.5	Directionality; |MsS−X|=576.95; W3−W5 (578.89, 4.29)
Y3	−532.34	2.2	Multiple Reflection;
X2	−337.47	5.5	Directionality;
Y4	−330.01	2.5	Multiple Reflection; |MsS−X|=330.01; W3−Mk1 (334.39, 6.90)
W3	−241.65	38.9	Weld;
PS2	−113.29	2.6	Pipe Support;
X3	−94.93	2.1	Directionality; |MsS−X|=94.93; Mk1 (93.09, 1.95)
MsS1	0.00	−−	Initial Pulse;
Mk1	93.47	−−	Marker;
Mk2	107.50	−−	Marker; PS2 (112.96, 0.04);
Y5	116.22	1.3	Multiple Reflection; |MsS−X|=116.22; PS2 (112.88, 0.65)
W4	243.60	23.7	Weld;
X4	250.68	3.3	Directionality; |MsS−X|=250.68; W3 (245.60, 11.66)
W5	336.11	8.4	Weld;
X5	1204.16	11.0	Directionality; |MsS−X|=1204.16; W1 (1203.47, 12.55)

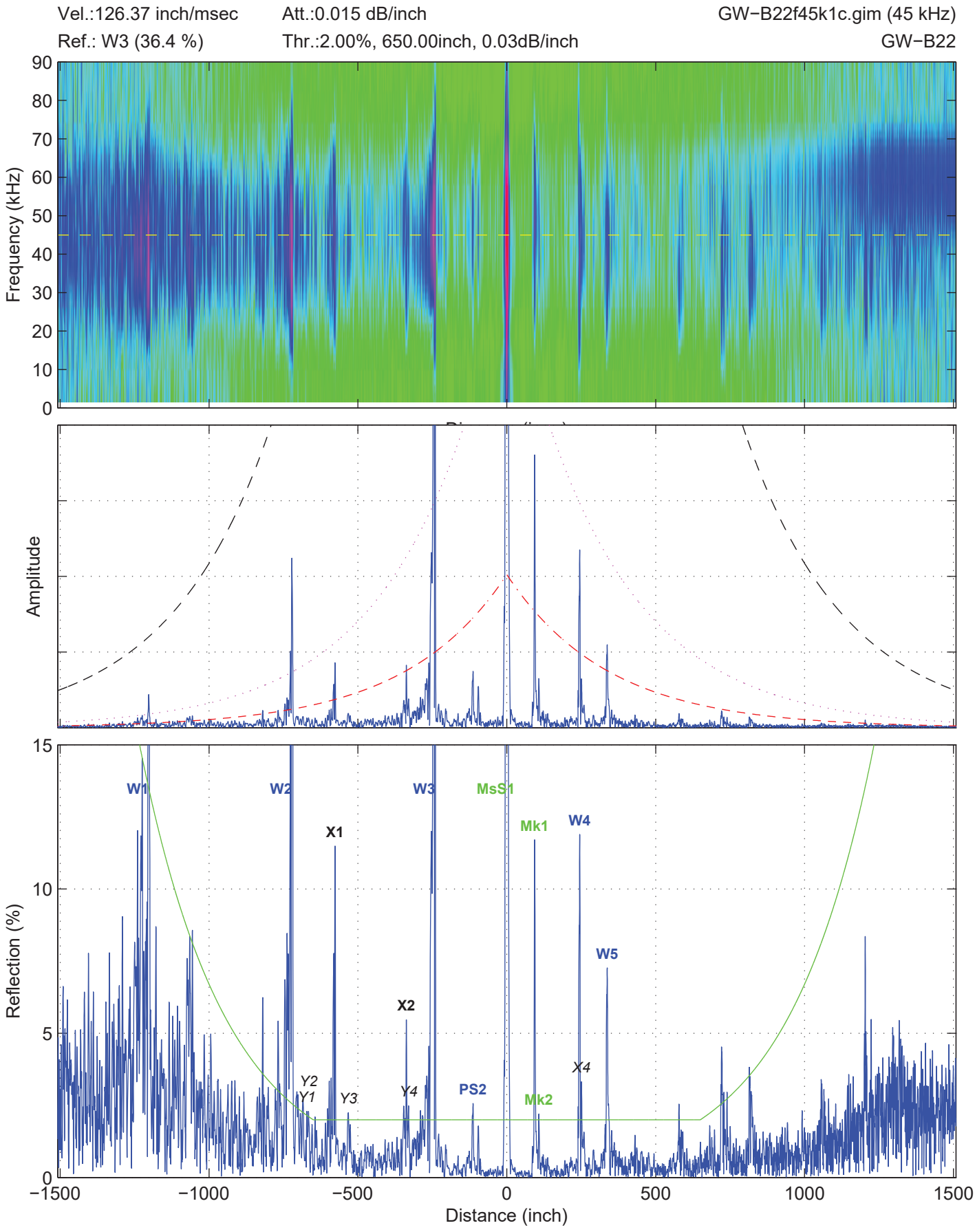
GW-B22

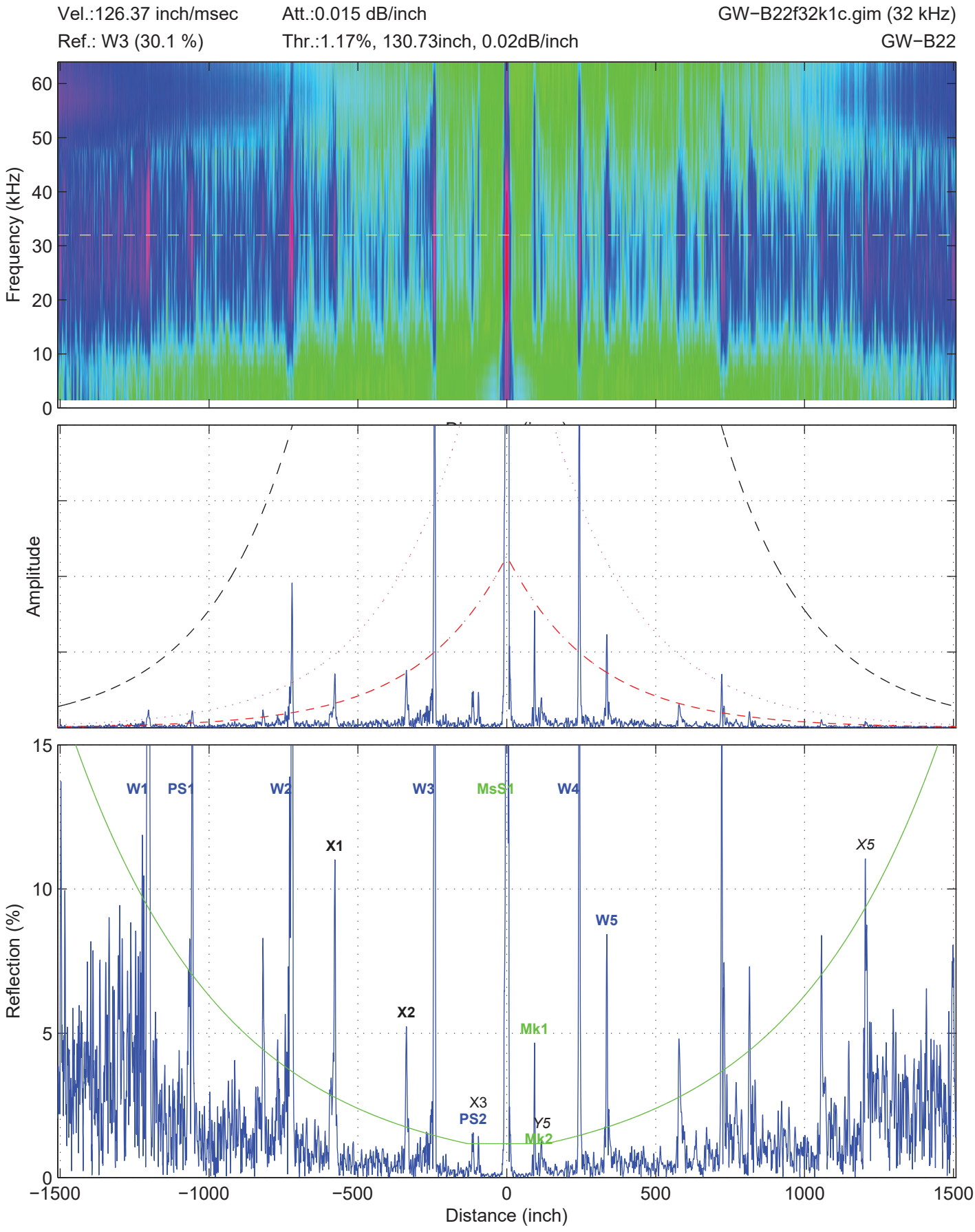

W1
PS1
W2
W3
PS2
MsS1
Mk2
Mk1
W4
W5
−1203.6
1057.4
−721.2
−241.6
113.3
0.0
93.5
107.5
243.3
336.1


128 kHz
90 kHz
64 kHz
45 kHz
32 kHz
MsS1
W1
PS1
W2
W3
PS2
Mk1
Mk2
W4
W5
X1
X2
X3
X4
X5
Y1
Y2
Y3
Y4
Reflection (21.2 % / div.)
−1500
−1000
−500
0
500
1000
1500
Distance (inch)


Vel.:126.37 inch/msec
Att.:0.015 dB/inch
GW−B22f128k1c.gim (128 kHz)
Ref.: W3 (15.0 %)
Thr.:0.60%, 28.00inch, 0.02dB/inch
GW−B22
Frequency (kHz)
250
200
150
100
50
0
Amplitude
Reflection (%)
15
10
5
0
W3
MsS1
W4
X1
X2
Mk2
Mk1
W5
−1500
−1000
−500
0
500
1000
1500
Distance (inch)


Vel.:126.37 inch/msec
Att.:0.015 dB/inch
GW−B22f90k1c.gim (90 kHz)
Ref.: W3 (31.1 %)
Thr.:0.80%, 420.00inch, 0.03dB/inch
GW−B22
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
PS1
W2
W3
MsS1
X1
X2
W4
W5
Mk2
Mk1
PS2


Vel.:126.37 inch/msec
Att.:0.015 dB/inch
GW−B22f45k1c.gim (45 kHz)
Ref.: W3 (36.4 %)
Thr.:2.00%, 650.00inch, 0.03dB/inch
GW−B22
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
W3
MsS1
Mk1
W4
W5
X1
X2
Y1
Y2
Y3
Y4
X4
PS2
Mk2


Vel.:126.37 inch/msec
Att.:0.015 dB/inch
GW−B22f32k1c.gim (32 kHz)
Ref.: W3 (30.1 %)
Thr.:1.17%, 130.73inch, 0.02dB/inch
GW−B22
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
PS1
W2
W3
MsS1
W4
W5
X1
X2
X3
PS2
Mk1
Mk2
Y5
X5

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[GW - B22]

(b) (3) (A)

(b) (3) (A)

3/31/2022
73.3 F

UT: 0.250, 0.250, 0.247, 0.249
(Sch. 10, Nom. 0.250)

Remarks/Legend:

A - Dent/Gouge (0.273") at -413" (3 o'clock)
B - Dent (0.050") at +181" (3 o'clock)

BBW - Bell - Bell Weld
W - Weld
PS - Pipe Support

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	3/31/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
GW - B22

Description:
F-24 Tunnel Piping

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(b) (3) (A)

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Guided Wave Inspection Report

Site:	RH PPG	Date:	30-Mar-2022
Pipe ID/Location:	GW-B23	GWT System:	MsSR3030R 53100
Pipe Size:	(b) (3) (A) [redacted]	Analysis S/W:	V4.1
Inspector:	(b) (6)	Procedure:	GWA 4.01
Analyzer:	[redacted]	Wave Mode:	Torsional Mode
Client:	AB&A (US Navy)	Inspection Range:	-874.7 to 399.0 inch

Test Pipe: (b) (3) (A) [redacted]

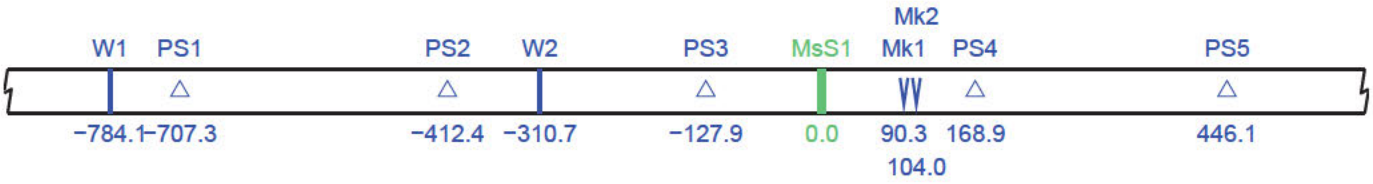
Note:

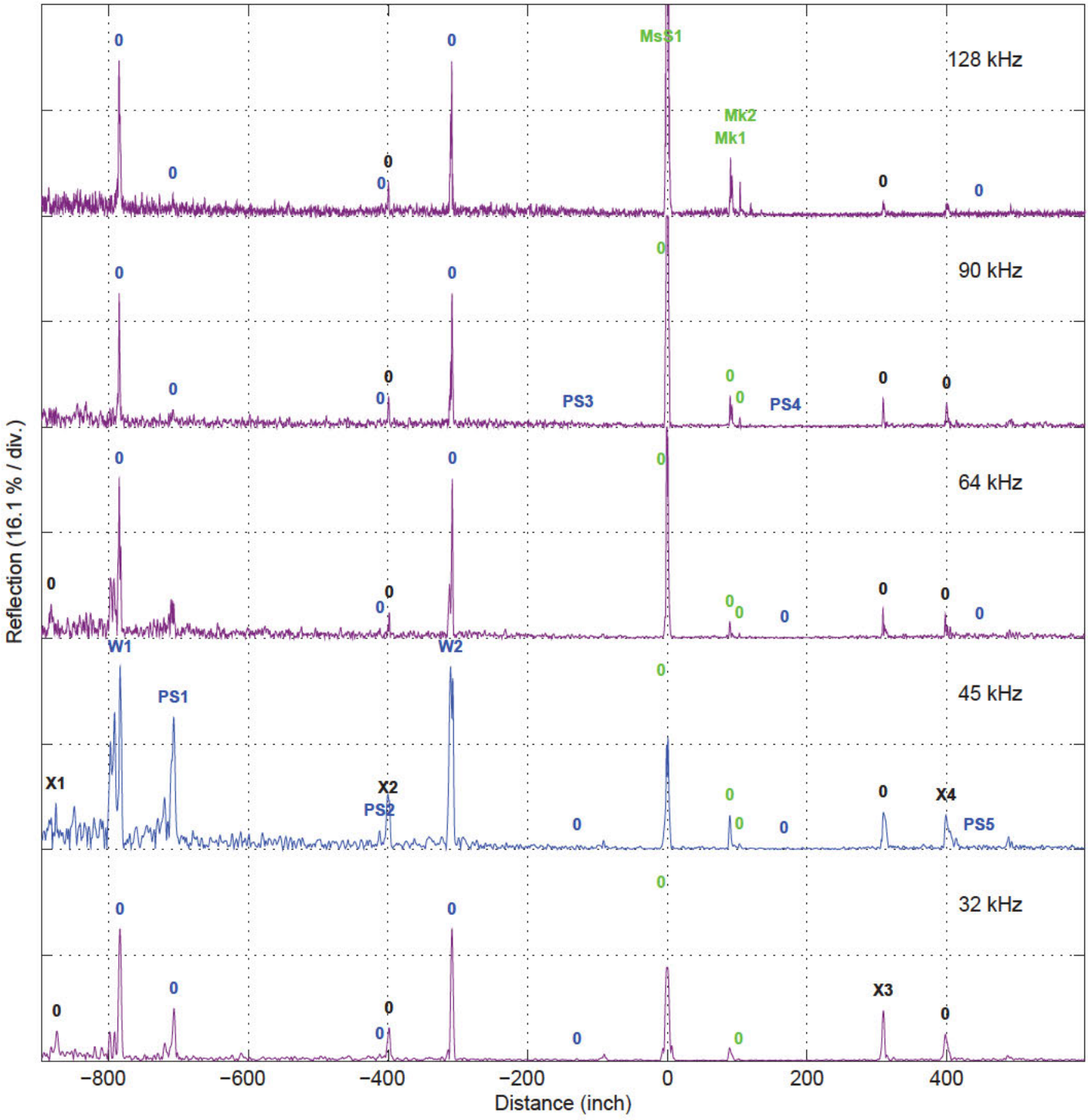
Summary: Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +90" and M2 @ +104"). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 14" inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 6" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M2 are. The section of piping can remain in-service.

Sym.	Dist.(inch)	% Refl.	Comment
X1	-875.97	6.9	Directionality; W1-Q4-W1 (861.86, 0.32);
W1	-784.12	27.7	Weld;
PS1	-707.34	20.1	Pipe Support;
PS2	-412.44	2.8	Pipe Support; Q7 (398.14, 0.64);
X2	-400.38	8.4	Directionality; |MsS-X|=400.38; X4 (398.14, 1.31)
W2	-310.66	27.7	Weld;
PS3	-127.90	0.7	Pipe Support;
MsS1	0.00	--	Initial Pulse;
Mk1	90.32	--	Marker;
Mk2	104.01	--	Marker;
PS4	168.90	0.2	Pipe Support;
X3	309.31	7.5	Directionality; |MsS-X|=309.31; W2 (308.75, 6.60)
X4	399.02	5.2	Directionality; |MsS-X|=399.02; PS2 (412.03, 0.34)
PS5	446.14	0.6	Pipe Support;

[redacted]

GW-B23





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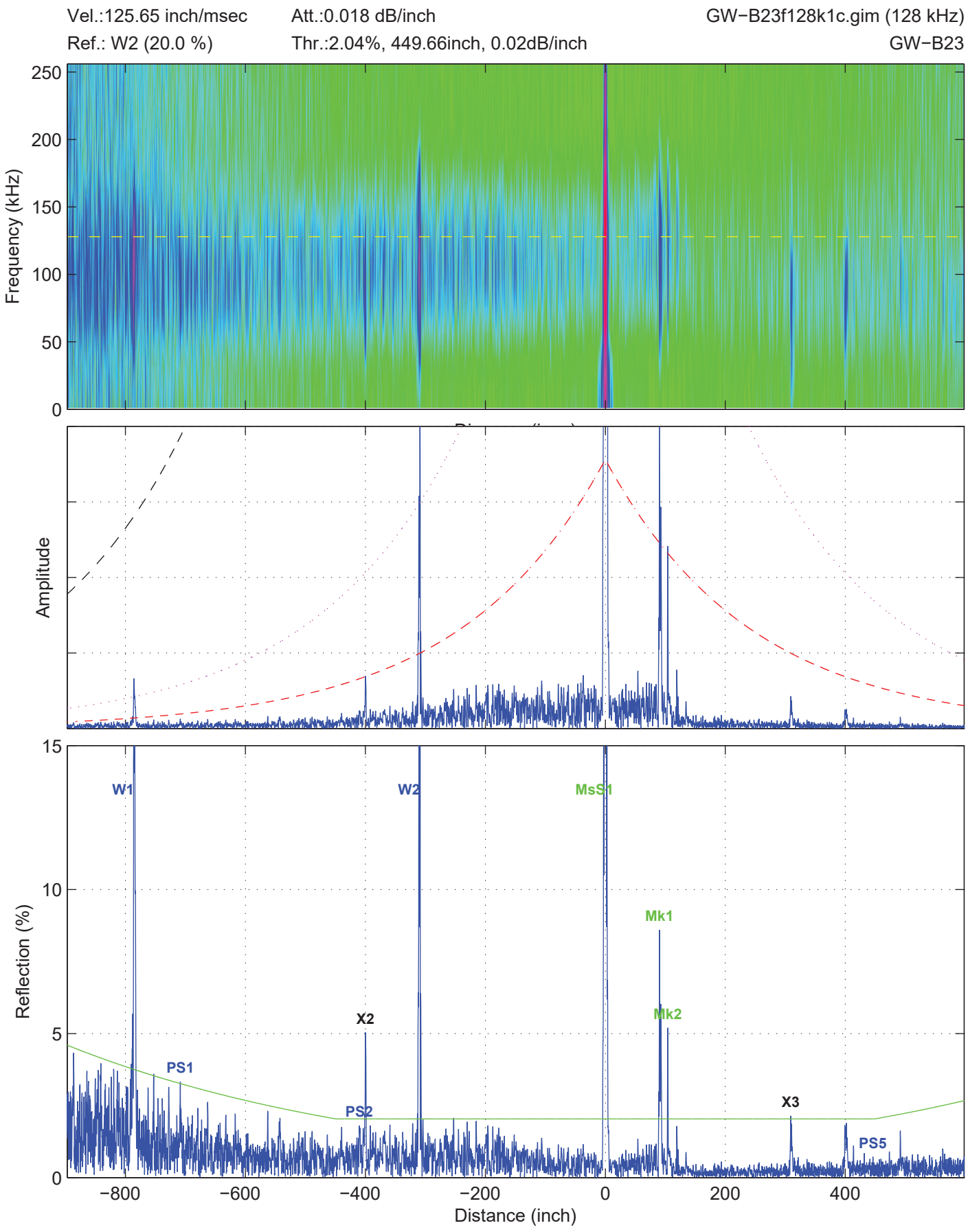
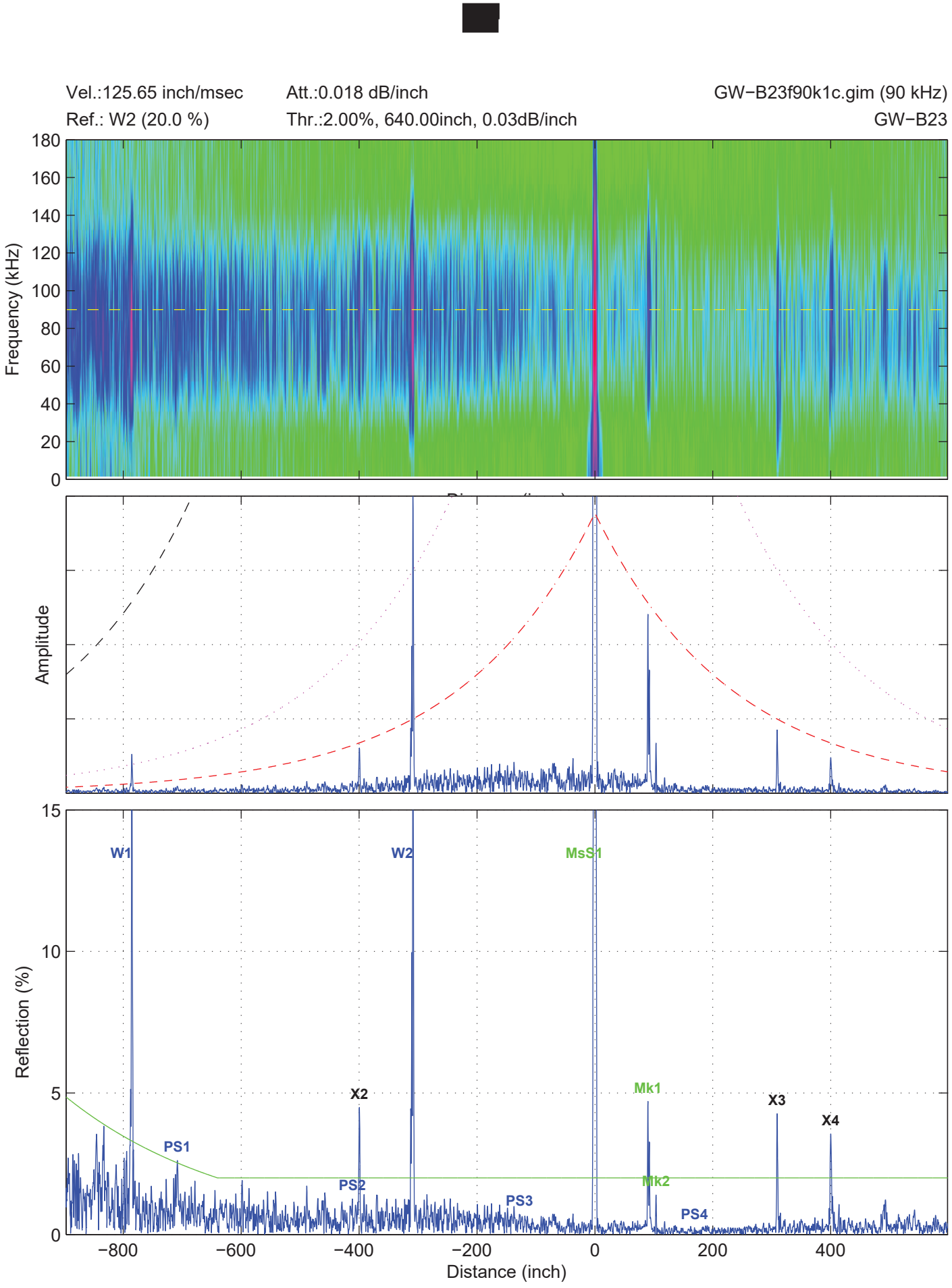

Vel.:125.65 inch/msec
Att.:0.018 dB/inch
GW−B23f128k1c.gim (128 kHz)
Ref.: W2 (20.0 %)
Thr.:2.04%, 449.66inch, 0.02dB/inch
GW−B23
Frequency (kHz)
250
200
150
100
50
0
Amplitude
Reflection (%)
15
10
5
0
W1
W2
MsS1
Mk1
Mk2
X2
X3
PS1
PS2
PS5
−800
−600
−400
−200
0
200
400
Distance (inch)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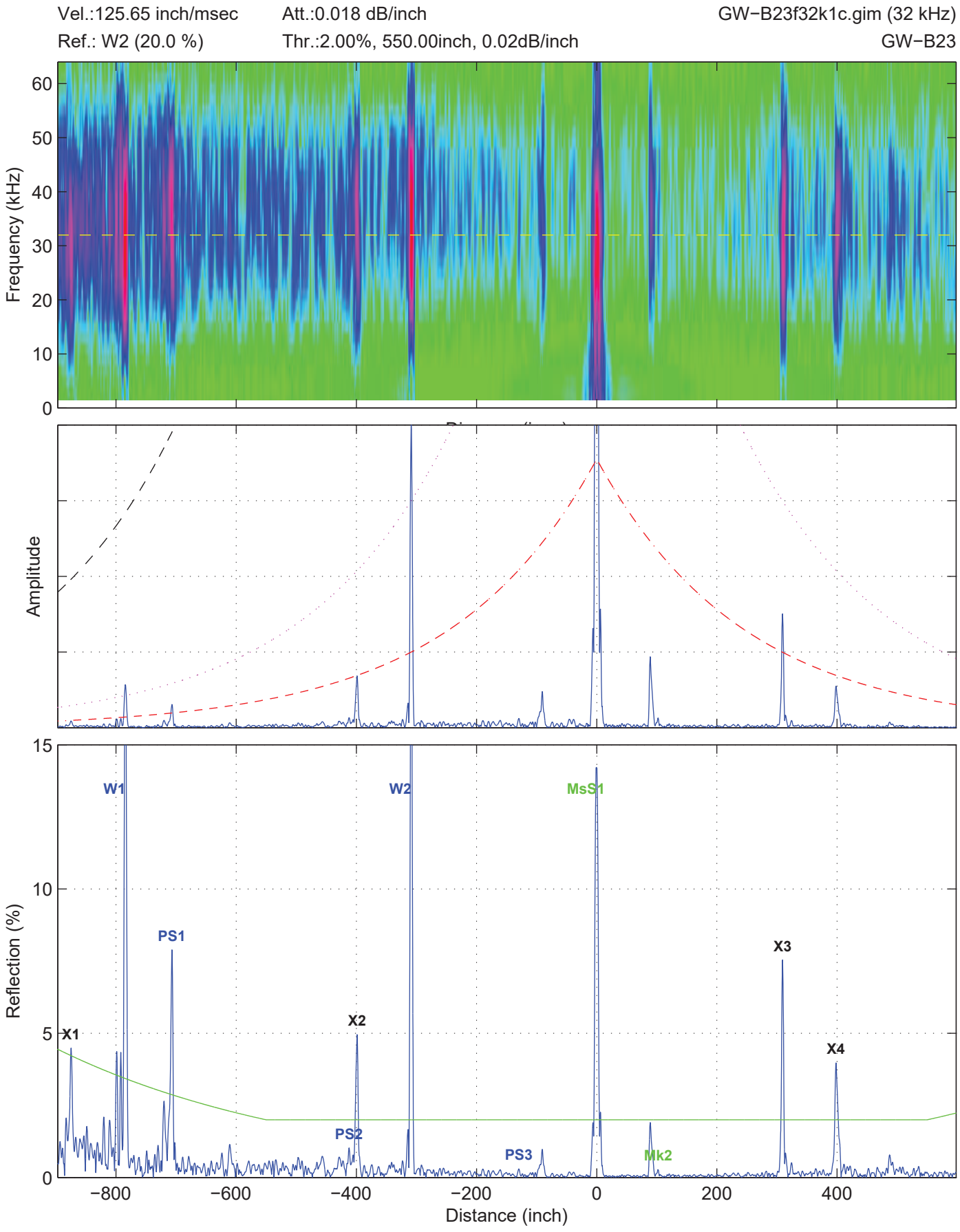
Att.:0.018 dB/inch
GW−B23f90k1c.gim (90 kHz)
Ref.: W2 (20.0 %)
Thr.:2.00%, 640.00inch, 0.03dB/inch
GW−B23
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
MsS1
X2
Mk1
X3
X4
PS1
PS2
PS3
Mk2
PS4


Vel.:125.65 inch/msec
Att.:0.018 dB/inch
GW−B23f32k1c.gim (32 kHz)
Ref.: W2 (20.0 %)
Thr.:2.00%, 550.00inch, 0.02dB/inch
GW−B23
Frequency (kHz)
Amplitude
Reflection (%)
Distance (inch)
W1
W2
MsS1
PS1
X1
X2
X3
X4
PS2
PS3
Mk2

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[GW - B23]

(b) (3) (A)

(b) (3) (A)

3/31/2022
73.3 F

UT: 0.249, 0.244, 0.247, 0.245
(Sch. 10, Nom. 0.250)

Remarks/Legend:		Owner:	
A - Dent/Gouge (0.156) at -107" (3 o'clock)	BBW - Bell - Bell Weld	**US Navy - Pearl Harbor, HI**	
B - Dent/Gouge (0.109) at -114" (4 o'clock)	W - Weld		
C - Dent/Gouge (0.1035) at -321" (3 o'clock)	PS - Pipe Support		
D - Dent/Gouge (0.1910) at -353" (4 o'clock)		Drawn By: InterSpec, LLC.	Modified By: InterSpec, LLC.
E - Dent/Gouge (0.069) at +334" (3 o'clock)		Date: 3/31/2022 Rev No : N/A	Scale: N/A
Drawing Title: GW - B23		Description: JP-5 Tunnel Piping	

LRUT REPORT-JBPH, HI-MARCH/2022

[456]

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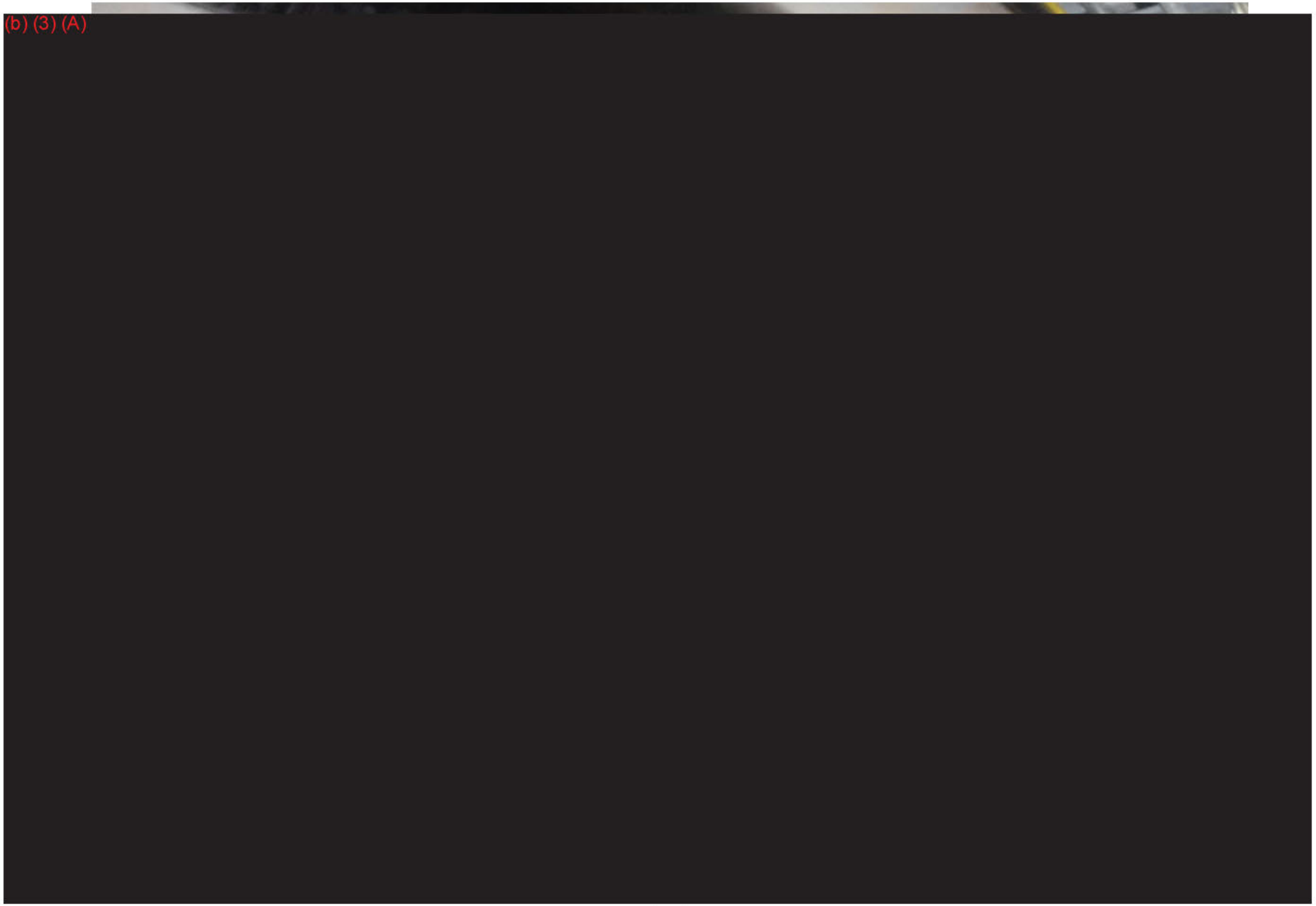
(b) (3) (A)



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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW−B24
Pipe Size: (b) (3) (A)
Inspector: (b) (6)
Analyzer:
Client: AB&A (US Navy)

Date: 31−Mar−2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: −721.1 to 766.7 inch

Test Pipe: (b) (3) (A)

Note:

Summary: Piping tested satisfactory with a few unidentified indications noted in the bulkhead (M1 @ +107", M2 @ 122", M3 @ 137"). Note M1 is likely part of the anchor/support because highest magnitude is at the 6 o'clock position and similar pattern seen in other tests at this facility. This data also shows the signals separated by approx. 15" inside the bulkhead and appears to be welds attaching to possibly rebars or other anchor plates inside the bulkhead. The anchor plates welded inside the bulkhead are located approximately 4.5" inside the bulkhead (Tank gallery side of bulkhead). Review construction drawing is recommended to determine what M1 – M3 are. The section of piping can remain in−service.

Sym.	Dist.(inch)	% Refl.	Comment
W1	−658.08	116.3	Weld;
GF1	−653.54	52.0	Geometric Feature; Bell
PS1	−544.09	5.2	Pipe Support; W2−Q19 (545.61, 0.57);
Y1	−422.30	1.5	Multiple Reflection; |MsS−X|=422.25; W3−W4−W3 (423.27, 0.38)
W2	−417.80	25.8	Weld;
Y2	−349.26	2.5	Multiple Reflection; |MsS−X|=349.39; PS2−Mk1 (348.08, 1.45)
Y3	−303.37	5.1	Multiple Reflection; |MsS−X|=303.51; W3−Mk2 (303.32, 1.47)
Y4	−288.24	12.2	Multiple Reflection; |MsS−X|=288.38; W3−Mk1 (286.94, 9.24)
Y5	−257.66	0.9	Multiple Reflection; |MsS−X|=257.61; W3−W4 (254.91, 0.39)
PS2	−241.60	8.4	Pipe Support;
W3	−181.40	23.6	Weld; Q11 (176.67, 1.32);
GF2	−176.14	17.8	Geometric Feature; Bell
X1	−139.58	2.5	Directionality; |MsS−X|=139.50; Mk3 (137.44, 0.48)
X2	−124.58	3.2	Directionality; |MsS−X|=124.50; Mk2 (122.31, 1.11)
Y6	−112.85	2.6	Multiple Reflection; |MsS−X|=112.78; Mk1−Mk1−Mk1 (111.74, 0.15)
X3	−110.58	3.8	Directionality; |MsS−X|=110.51; Mk1 (106.98, 5.03)
X4	−62.43	4.9	Directionality; |MsS−X|=62.35; W4 (60.99, 5.36)
MsS1	0.00	−−	Initial Pulse;
PS3	44.79	0.3	Pipe Support;
W4	60.99	25.8	Weld;
GF3	101.46	2.0	Geometric Feature;
Mk1	107.63	−−	Marker; Anchor/support
Y7	114.82	3.1	Multiple Reflection; |MsS−X|=114.90; Mk1−GF3−Mk1 (113.89, 0.13)
Mk2	122.26	−−	Marker; Anchor/support
X5	127.80	2.2	Directionality;
Mk3	137.39	−−	Marker; Anchor/support
Y8	176.59	6.4	Multiple Reflection; |MsS−X|=176.67; GF2 (176.06, 3.70)
X6	179.99	5.2	Directionality; |MsS−X|=180.07; W3 (179.16, 6.88)
X7	181.36	10.1	Directionality; |MsS−X|=181.22; W3 (180.46, 12.76)
X8	190.89	0.8	Directionality; |MsS−X|=190.94; W3 (188.45, 0.69)
Y9	240.99	8.5	Multiple Reflection; |MsS−X|=240.85; W4−W3 (240.80, 9.02)
Y10	287.51	13.3	Multiple Reflection; |MsS−X|=287.37; Mk1−W3 (286.94, 9.24)
W5	300.75	5.9	Weld;
W6	355.04	2.4	Weld;
PS4	397.52	2.7	Pipe Support; Q16−Q10−Q16 (399.97, 0.28);
W7	494.59	3.5	Weld;

[redacted]

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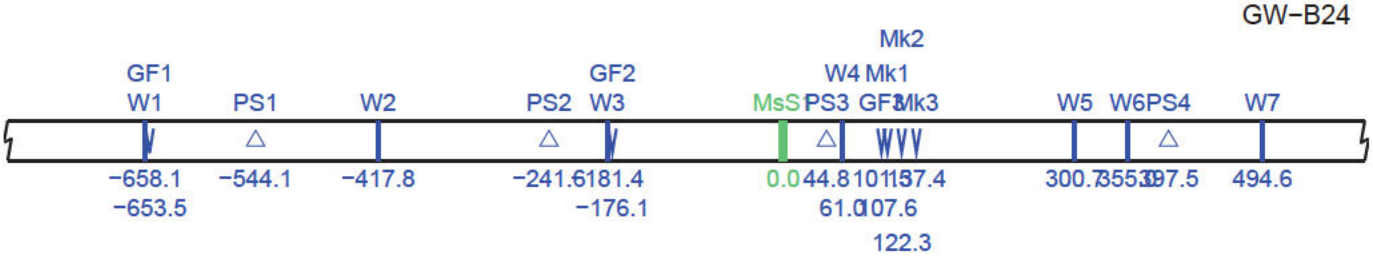
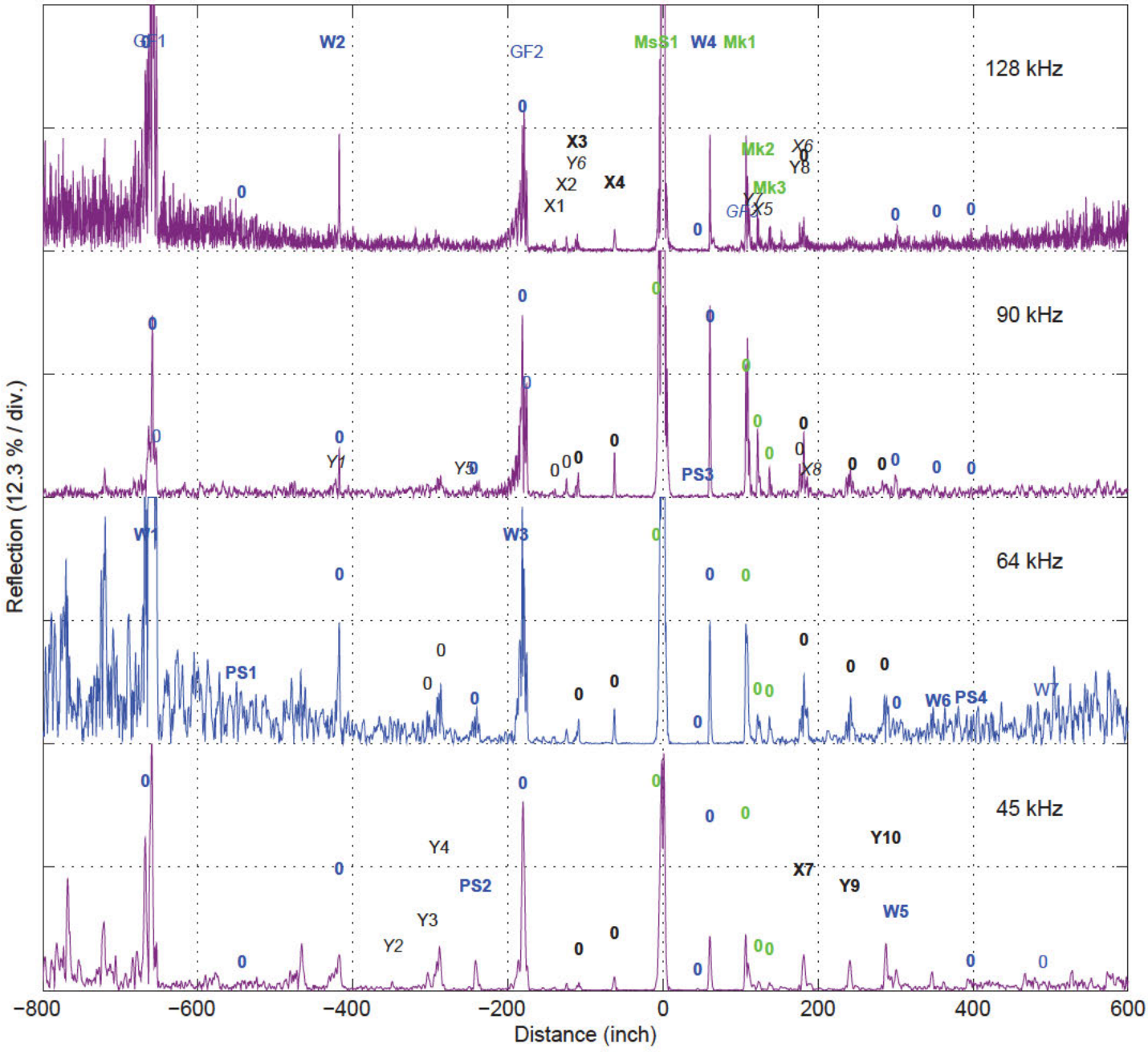
GW−B24





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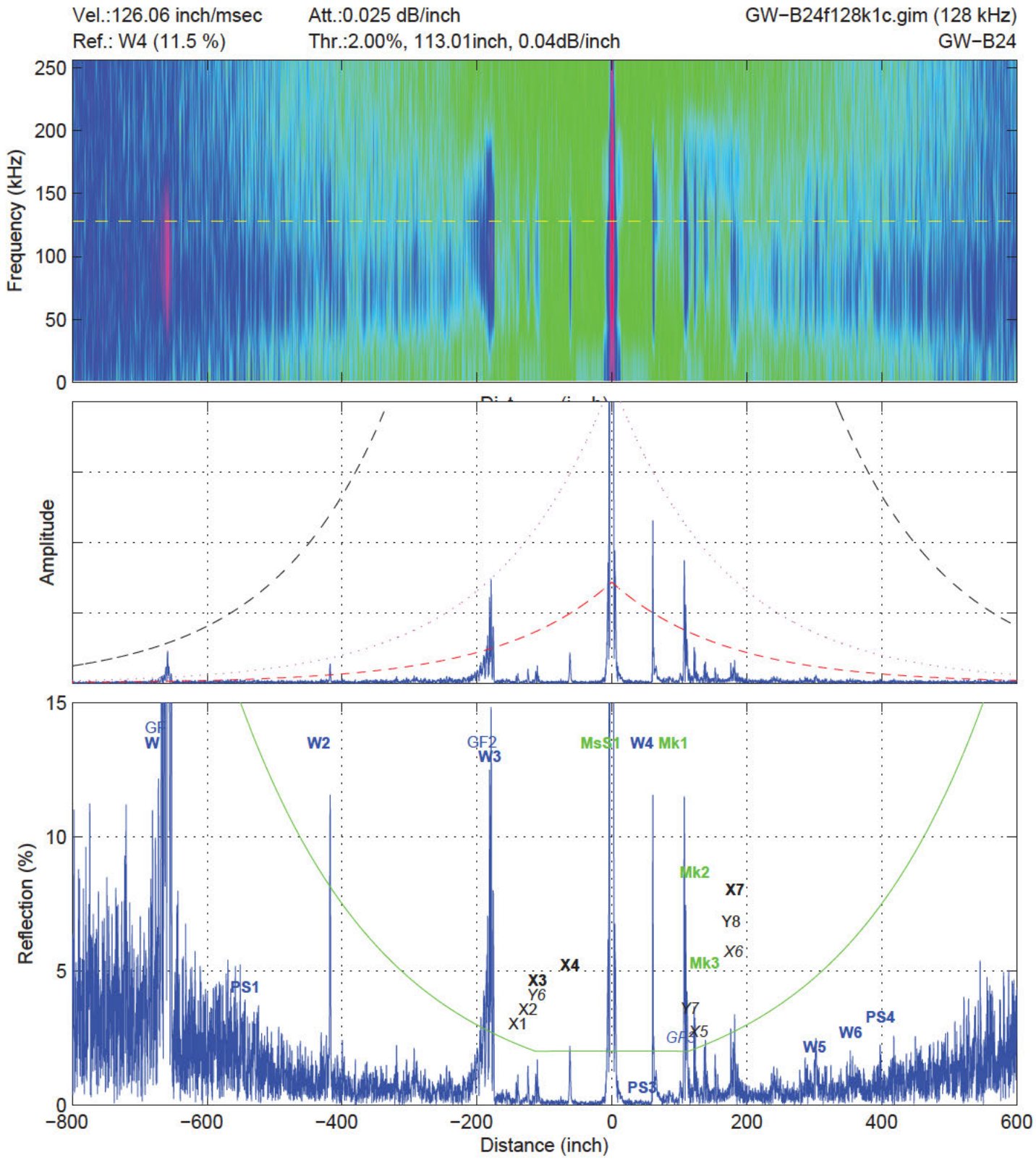

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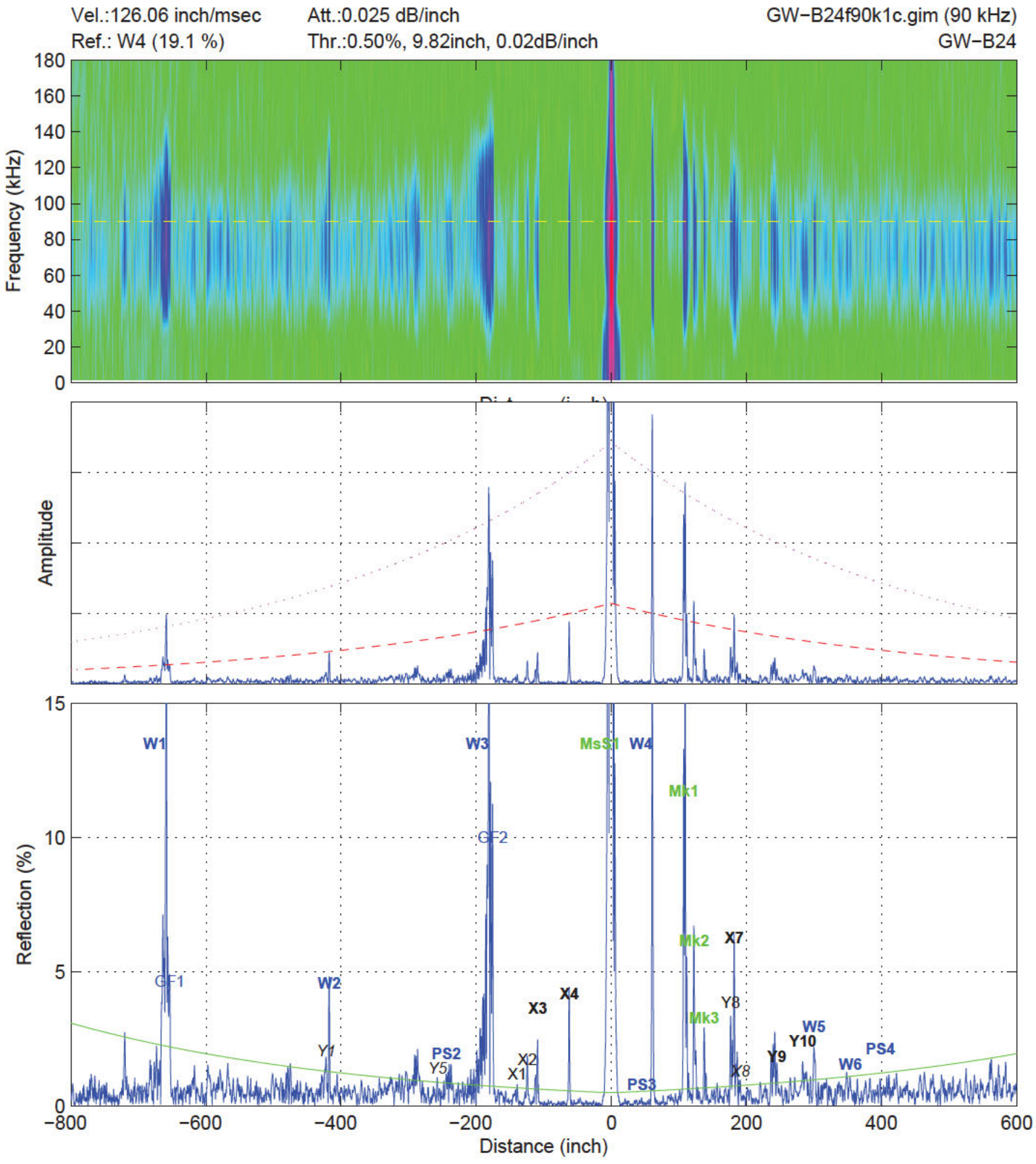

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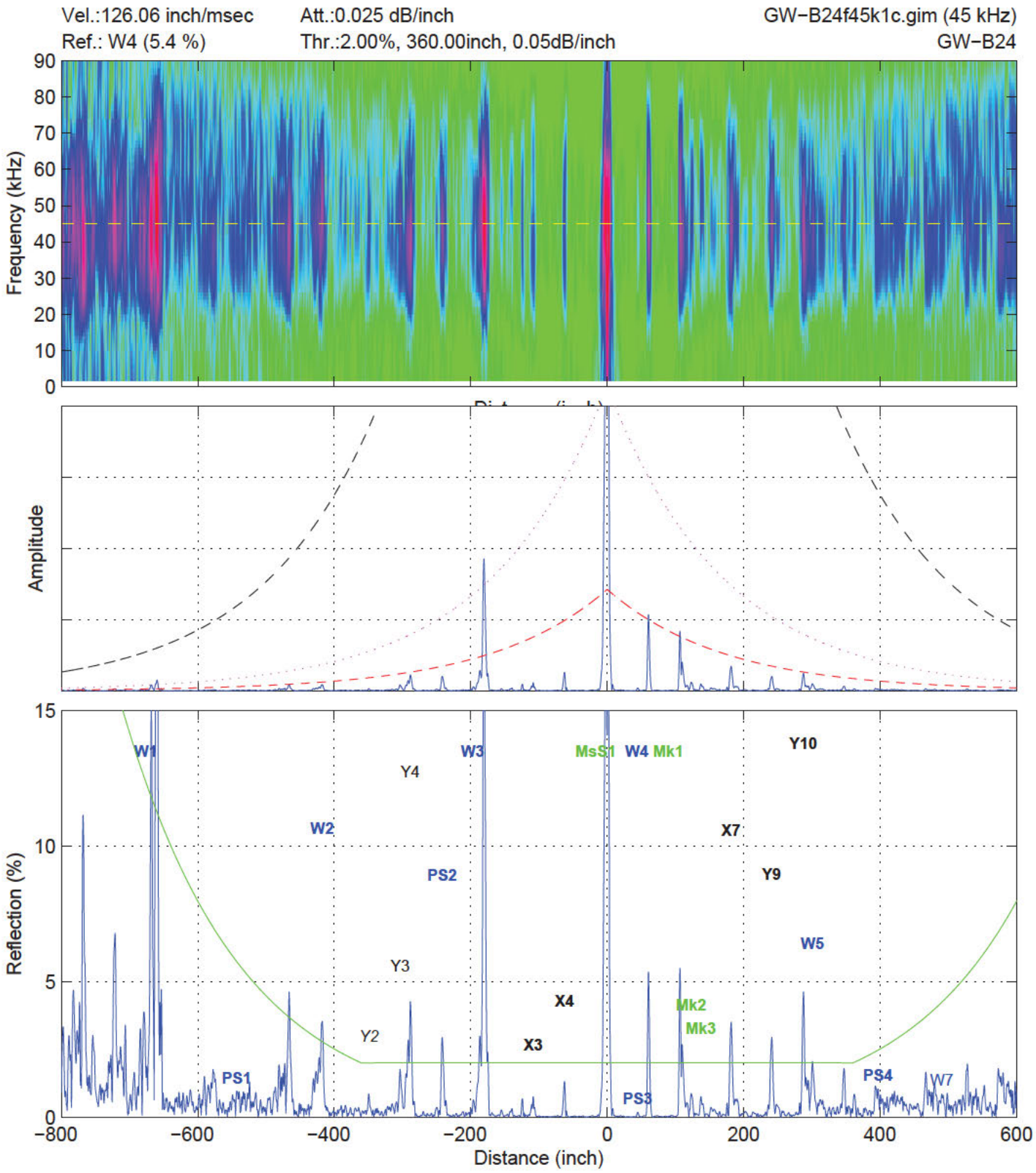

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[GW - B24]

(b) (3) (A)

3/31/2022
73.5 F

UT: 0.409, 0.407, 0.397, 0.401
(Sch. STD, Nom. 0.375)

Remarks/Legend: BBW - Bell - Bell Weld W - Weld PS - Pipe Support		Owner: **US Navy - Pearl Harbor, HI**		
		Drawn By: InterSpec, LLC.	Modified By: InterSpec, LLC.	
		Date: 3/31/2022	Rev No : N/A	Scale: N/A
Drawing Title: GW - B24	Description: F-76 Tunnel Piping			

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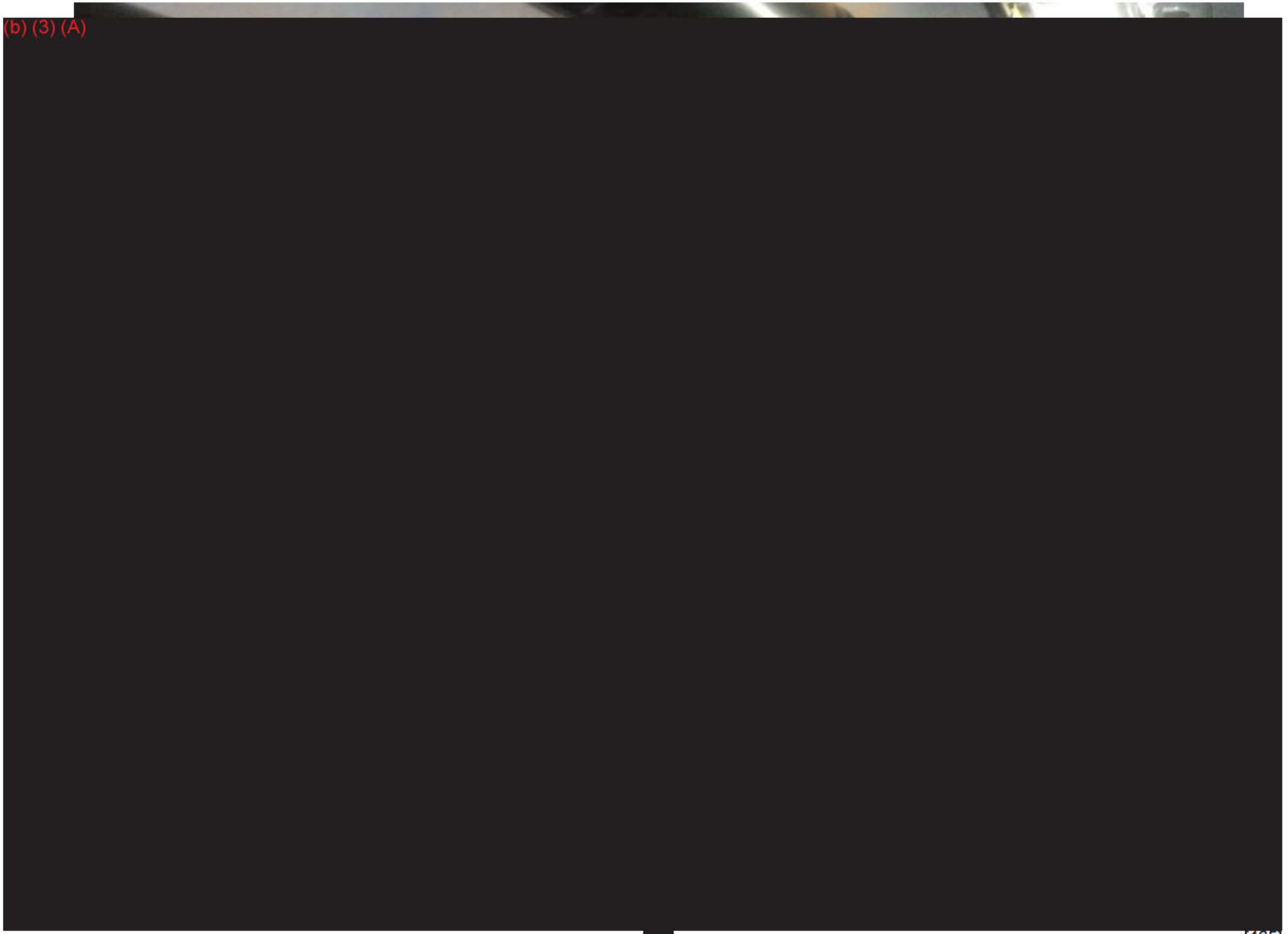
(b) (3) (A)



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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW-B25
Pipe Size: (b) (3) (A) [redacted]
Inspector (b) (6) [redacted]
Analyzer [redacted]
Client: AB&A (US Navy)

Date: 31-Mar-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -1914.6 to 1530.4 inch

Test Pipe: (b) (3) (A) [redacted]

Note:

Summary: This data has several multiple reflections and directionality due to weld geometry. No indication is found within the inspection range

Sym.	Dist.(inch)	% Refl.	Comment
W1	-1819.92	16.3	Weld; Q11-W2-Q11 (1822.71, 3.17);
X1	-1530.32	3.2	Directionality; |MsS-X|=1530.32; W9 (1530.38, 2.50)
W2	-1344.79	9.9	Weld; Q22-W5-Q22 (1342.78, 2.28);
W3	-1340.09	10.2	Weld; Q22-W5-Q22 (1342.78, 2.28);
X2	-1051.78	2.8	Directionality; |MsS-X|=1051.78; W8 (1051.33, 2.42)
W4	-863.19	14.1	Weld; Q21-W5-Q21 (862.54, 63.62);
X3	-574.00	3.8	Directionality; |MsS-X|=574.00; W7 (573.42, 3.08)
Y1	-480.17	10.2	Multiple Reflection; |MsS-X|=480.17; W5-W6 (477.64, 0.98)
PS1	-393.63	2.0	Pipe Support;
W5	-384.86	24.3	Weld;
PS2	-95.83	2.7	Pipe Support; W5 (96.54, 8.43);
MsS1	0.00	--	Initial Pulse;
W6	96.54	14.1	Weld;
X4	384.83	3.3	Directionality; |MsS-X|=384.83; W5 (384.27, 2.61)
PS3	479.63	10.8	Pipe Support;
W7	572.94	12.4	Weld;
GF1	578.03	3.8	Geometric Feature;
GF2	585.02	4.1	Geometric Feature; Bell
Y2	957.04	8.9	Multiple Reflection; |MsS-X|=957.04; W7-W5 (957.69, 1.33)
W8	1052.29	16.4	Weld; W7-W5-W6 (1054.63, 0.32);
GF3	1058.16	7.6	Geometric Feature; Bell
X5	1341.91	2.5	Directionality; |MsS-X|=1341.91; W3 (1342.23, 2.23)
Y3	1435.45	9.5	Multiple Reflection; |MsS-X|=1435.45; W6-W3 (1436.23, 1.23)
W9	1533.03	17.6	Weld; W5-W2-W5 (1533.01, 48.70);
GF4	1542.86	10.5	Geometric Feature;

[redacted]

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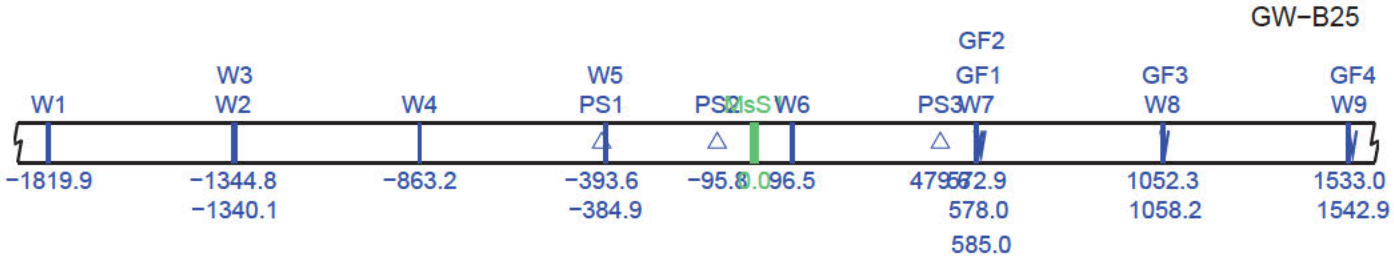
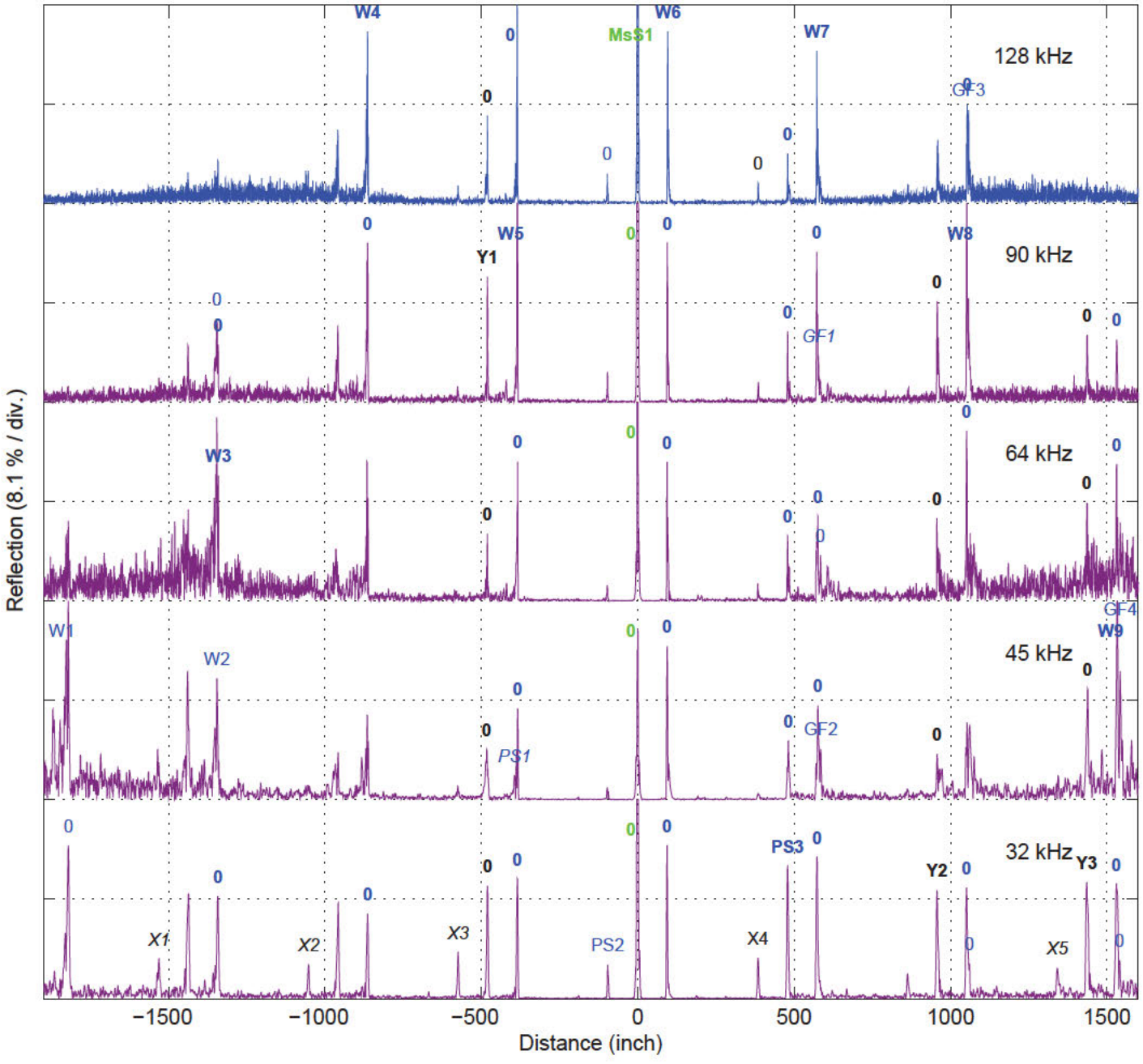
GW−B25





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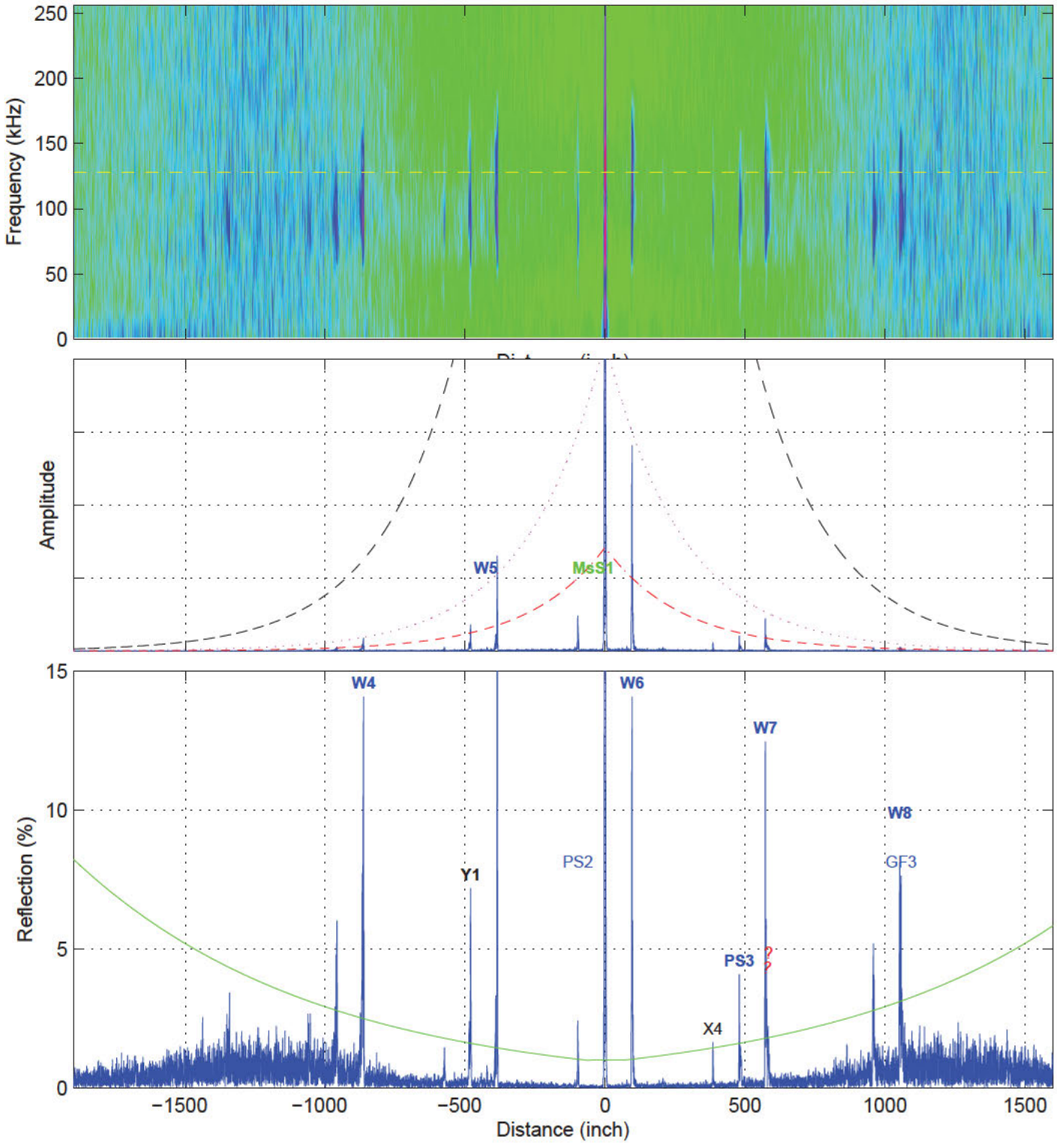
Vel.:126.06 inch/msec Att.:0.011 dB/inch GW-B25f128k1c.gim (128 kHz)
Ref.: W6 (14.1 %) Thr.:1.00%, 69.47inch, 0.01dB/inch GW-B25



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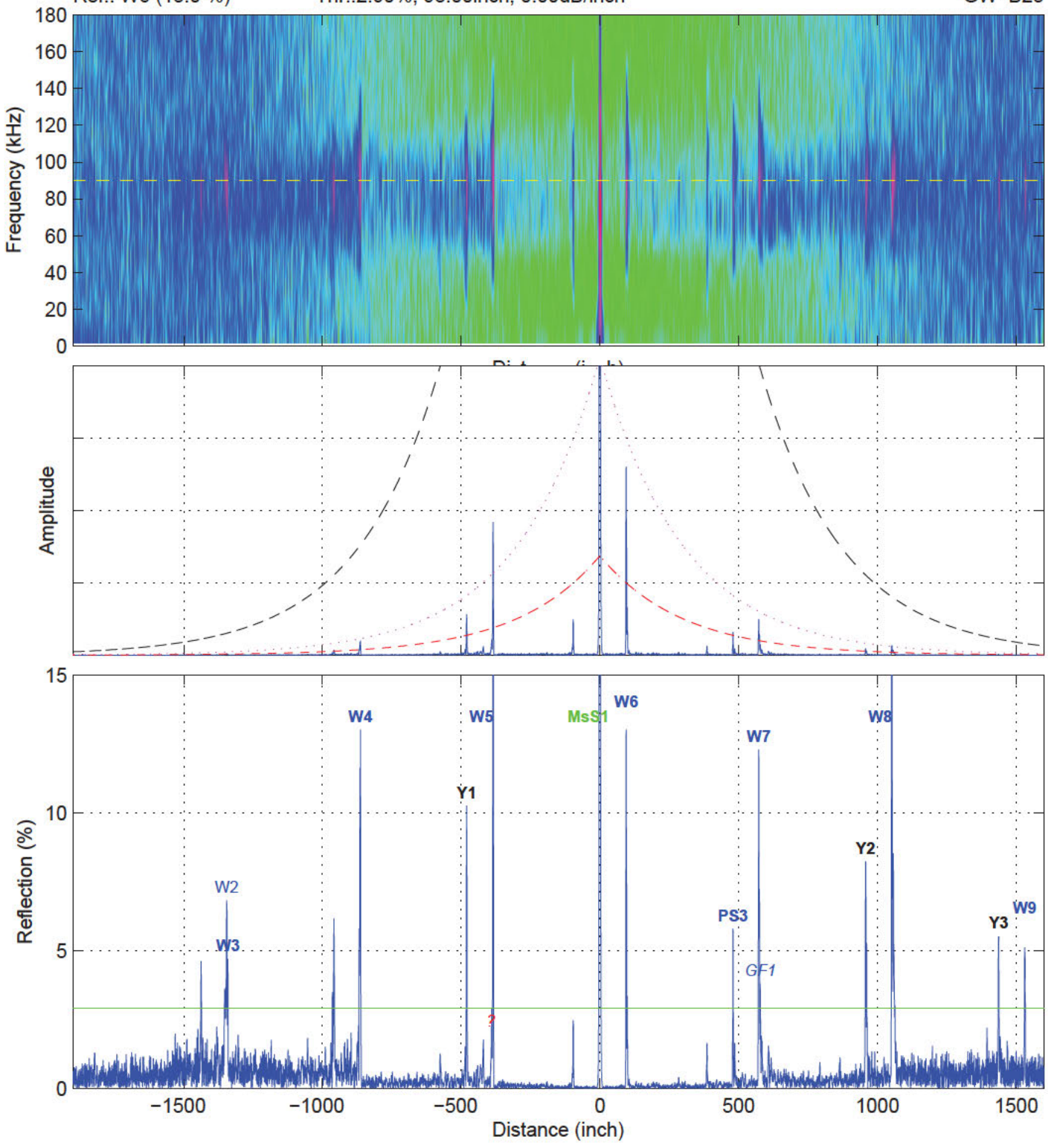
Vel.:126.06 inch/msec
Ref.: W6 (13.0 %)
Att.:0.011 dB/inch
Thr.:2.90%, 98.00inch, 0.00dB/inch
GW-B25f90k1c.gim (90 kHz)
GW-B25



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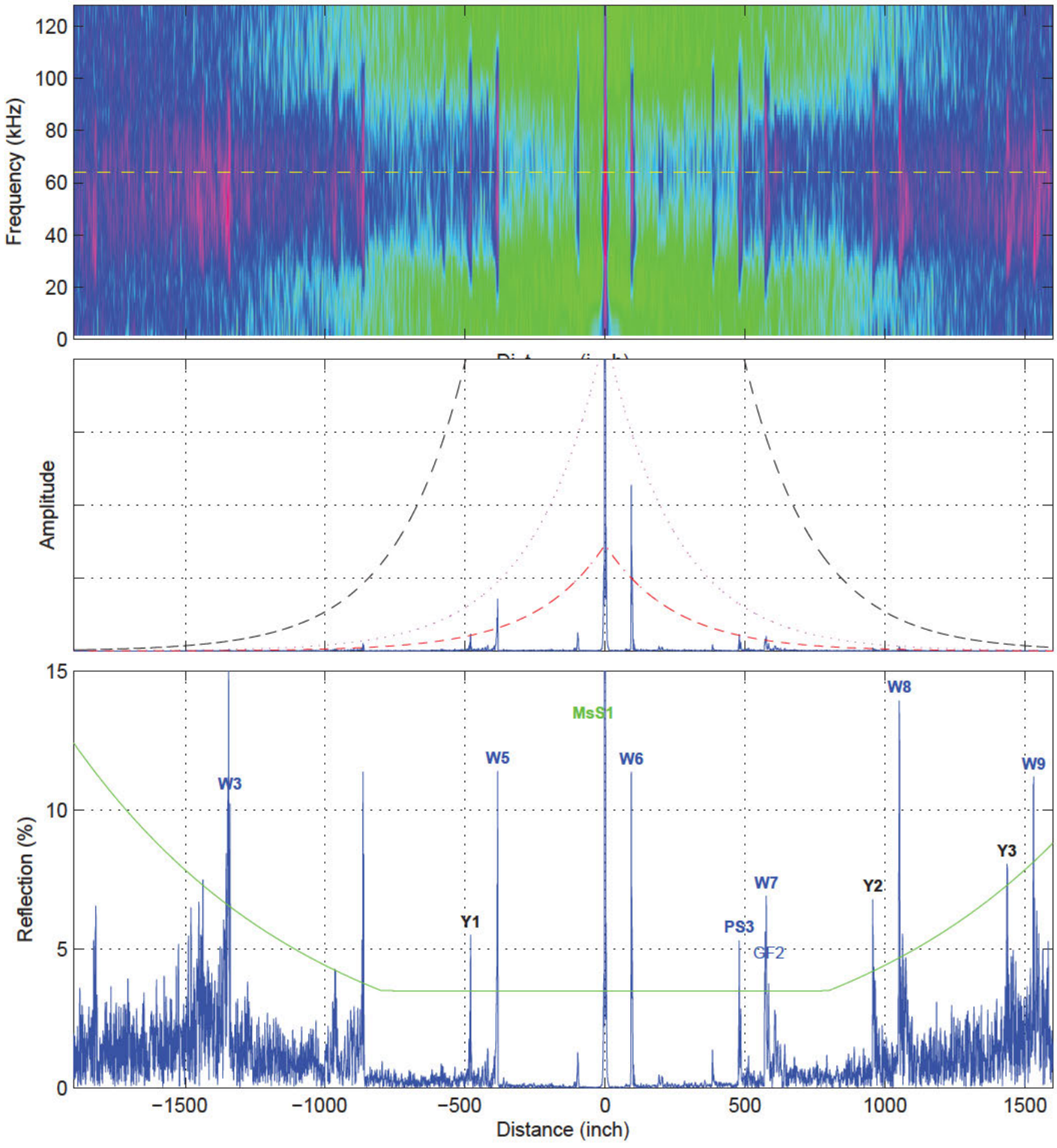
Vel.:126.06 inch/msec
Ref.: W6 (11.4 %)

Att.:0.011 dB/inch
Thr.:3.50%, 800.00inch, 0.01dB/inch

GW-B25f64k1c.gim (64 kHz)
GW-B25



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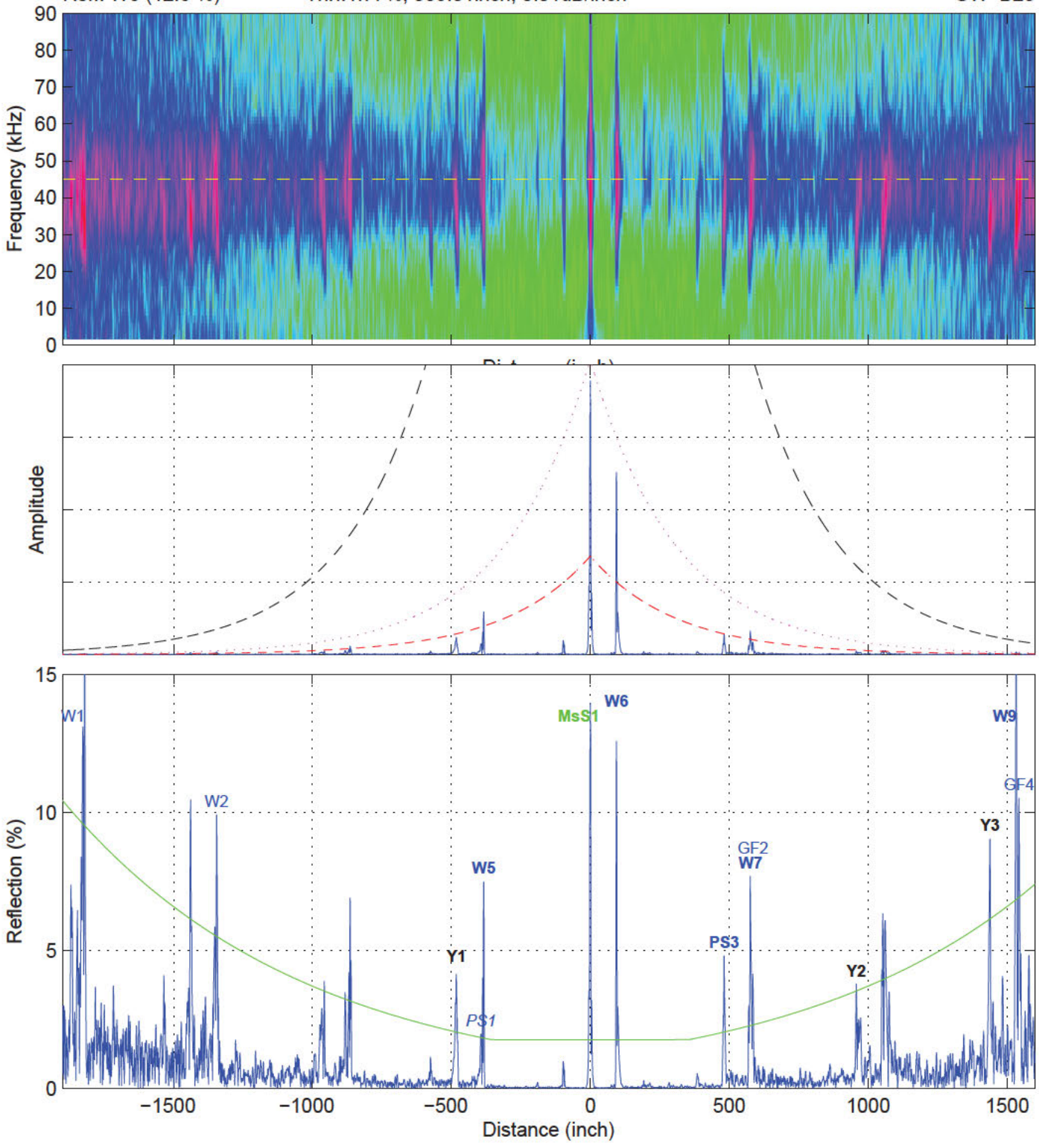
Vel.:126.06 inch/msec
Ref.: W6 (12.6 %)
Att.:0.011 dB/inch
Thr.:1.77%, 359.31inch, 0.01dB/inch
GW−B25f45k1c.gim (45 kHz)
GW−B25



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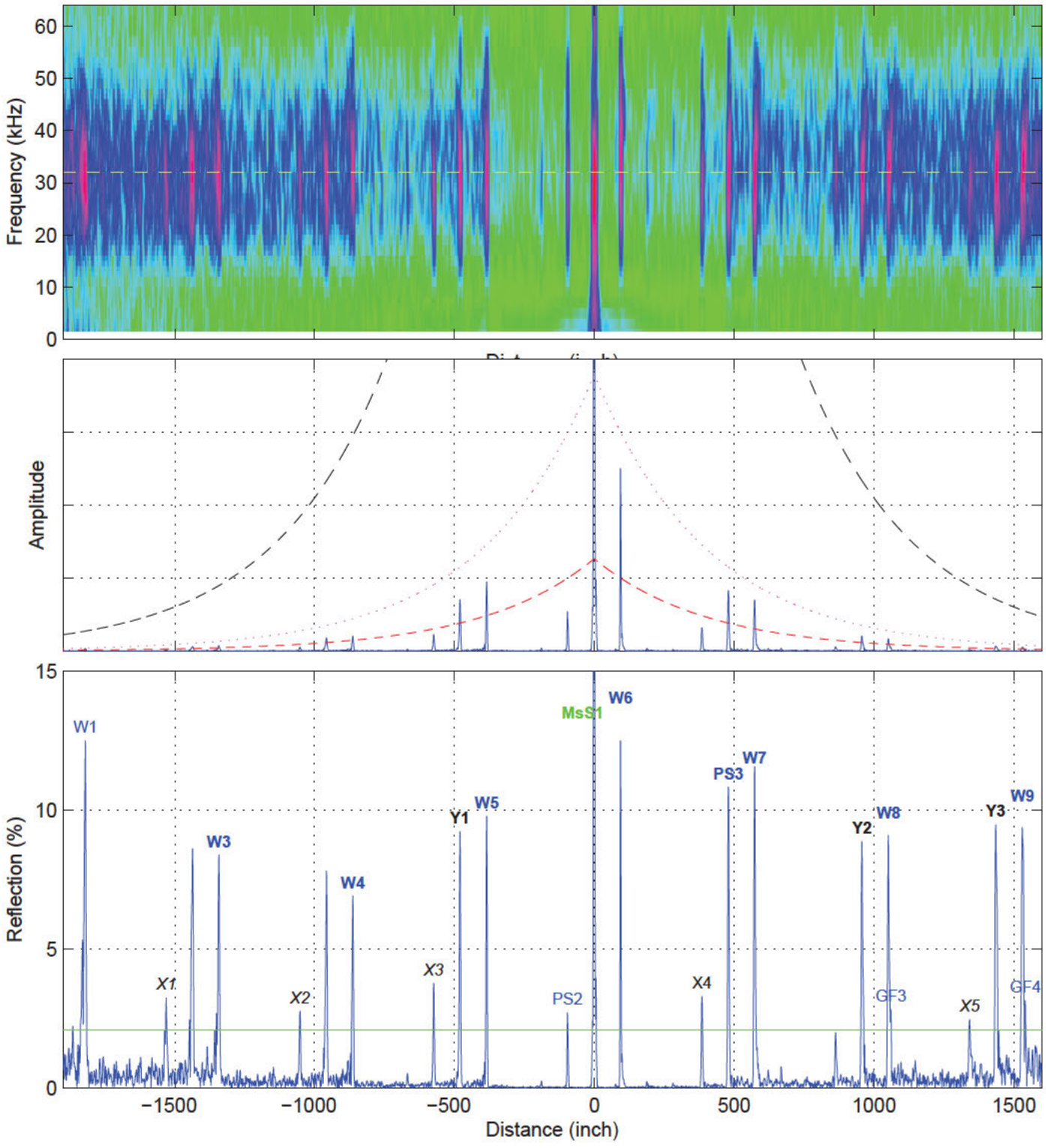
Vel.:126.06 inch/msec
Ref.: W6 (12.5 %)

Att.:0.011 dB/inch
Thr.:2.10%, 257.85inch, 0.00dB/inch

GW-B25f32k1c.gim (32 kHz)
GW-B25



Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[- B25]

(b) (3) (A)

(b) (3) (A)

4/1/2022
73.4 F

UT: 0.246, 0.246, 0.243, 0.246
(Sch. 10, Nom. 0.250)

Remarks/Legend: BBW - Bell - Bell Weld - Pipe Support	Owner: **US Navy - Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC. Date: 4/1/2022 | Rev No : N/A | Scale: N/A
Drawing Title: - B25	Description: F-24 Tunnel Piping

LRUT REPORT-JBPH, HI-APRIL/2022

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(b) (3) (A)

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: GW-B26
Pipe Size: (b) (3) (A)
Inspector: (b) (6)
Analyzer:
Client: AB&A (US Navy)

Date: 31-Mar-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -1453.8 to 1532.4 inch

Test Pipe: (b) (3) (A)

Note:

Summary: This data has several multiple reflections and directionality due to weld geometry. There is one indication (Q1 at -460") need to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test (Note: pipe warp may need to be removed if present).

Sym.	Dist.(inch)	% Refl.	Comment
Y1	-1438.48	7.8	Multiple Reflection; |MsS-X|=1438.48; X5 (1437.90, 3.52)
W1	-1360.46	16.6	Weld;
X1	-1039.03	2.7	Directionality; |MsS-X|=1039.03; W6 (1037.83, 3.08)
Y2	-959.62	4.6	Multiple Reflection; |MsS-X|=959.62; Y5-PS2 (959.58, 1.13)
W2	-882.08	49.6	Weld;
Y3	-793.94	15.7	Multiple Reflection;
Y4	-766.76	12.3	Multiple Reflection;
Y5	-481.87	18.9	Multiple Reflection; |MsS-X|=481.87; PS2 (479.57, 3.41)
Q1	-461.14	7.3	Indication;
GF1	-402.34	20.3	Geometric Feature; Bell
W3	-399.30	21.2	Weld;
X2	-80.95	3.7	Directionality; |MsS-X|=80.95; W4 (80.07, 5.21)
MsS1	0.00	--	Initial Pulse;
W4	80.07	35.9	Weld;
GF2	83.86	3.6	Geometric Feature;
PS1	193.11	0.2	Pipe Support;
X3	401.74	5.8	Directionality; |MsS-X|=401.74; W3 (400.35, 3.60)
PS2	481.28	25.4	Pipe Support;
W5	558.41	6.1	Weld;
GF3	561.83	7.8	Geometric Feature; W4-W3-W4 (559.44, 2.74); (Note Dent at Weld)
GF4	566.69	2.7	Geometric Feature; Bell (Note Dent at Weld)
X4	879.89	1.8	Directionality; |MsS-X|=879.89; W2 (879.33, 2.26)
Y6	962.03	8.9	Multiple Reflection; |MsS-X|=962.03; W4-W2 (962.14, 13.98)
PS3	999.45	5.4	Pipe Support;
W6	1037.82	7.4	Weld; W4-W2-W4 (1040.08, 0.16);
X5	1437.90	8.5	Directionality; |MsS-X|=1437.90; W4-W1 (1437.93, 1.36)
Y7	1453.20	8.9	Multiple Reflection; |MsS-X|=1453.20; W4-W1 (1439.32, 1.83)
W7	1516.80	7.7	Weld;

[redacted]

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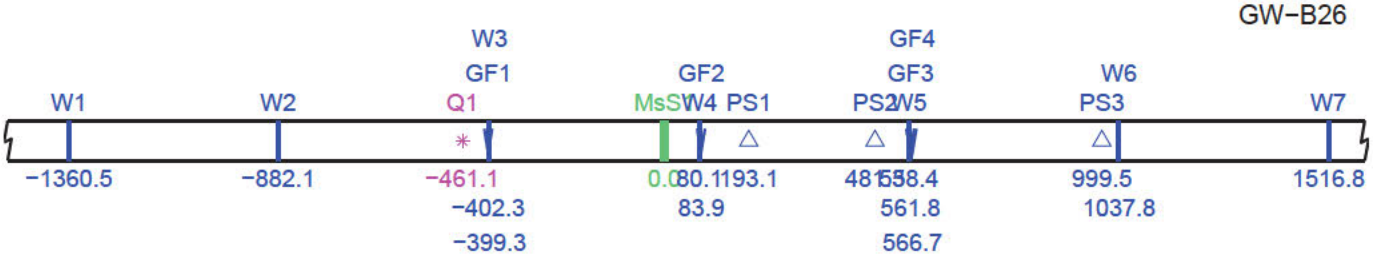
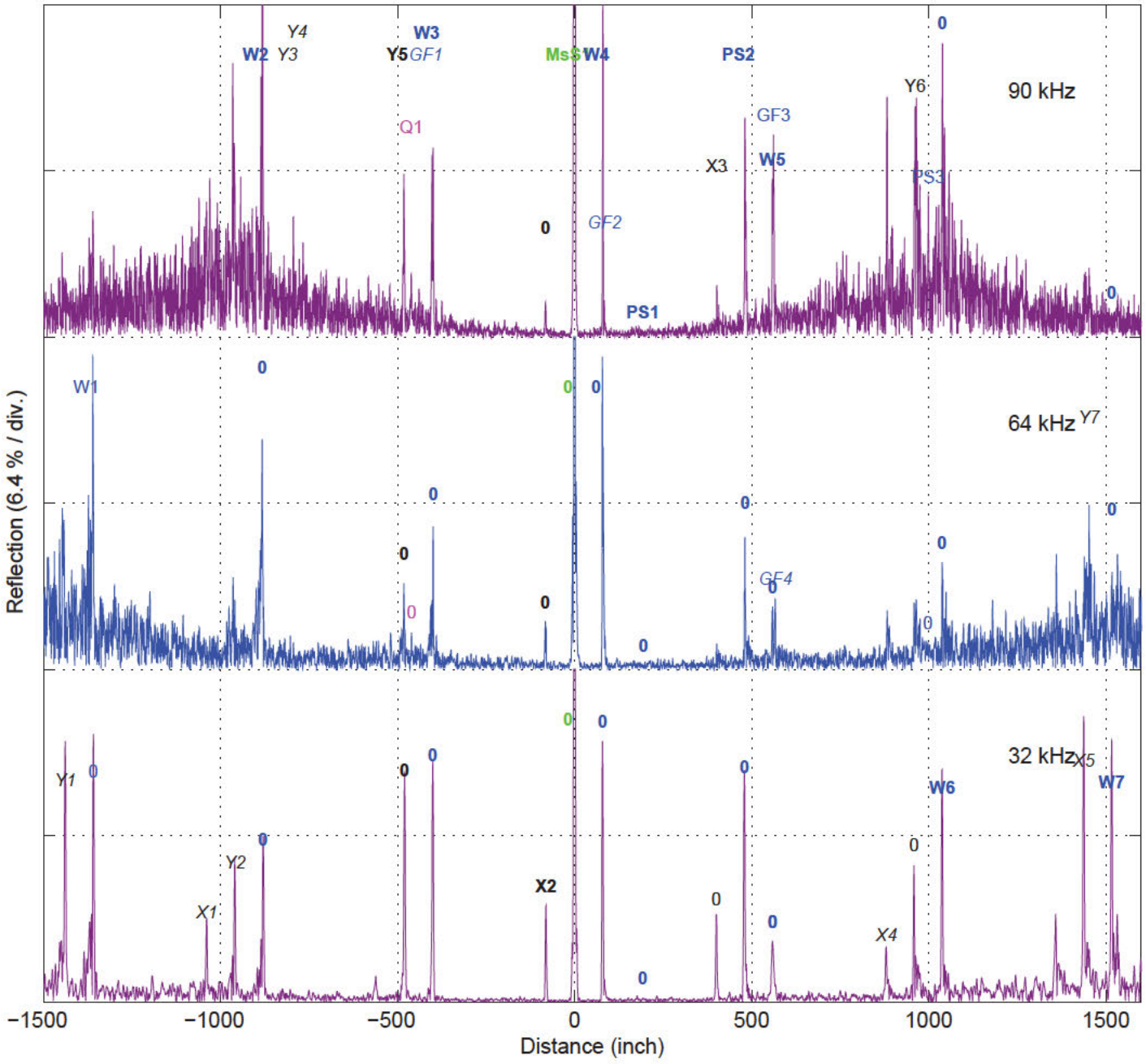
GW−B26





[redacted]

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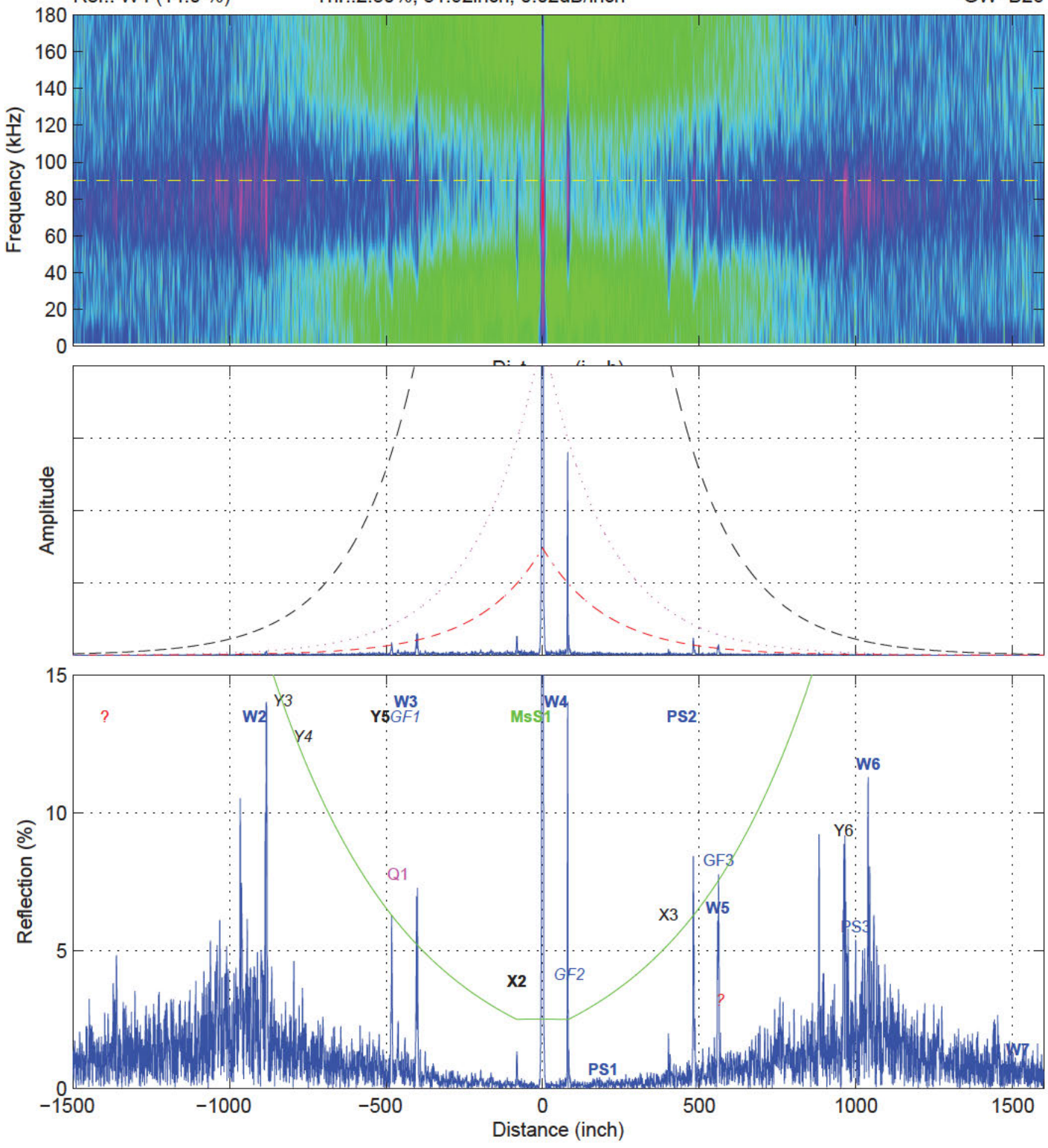
Vel.:126.45 inch/msec
Ref.: W4 (14.0 %)
Att.:0.010 dB/inch
Thr.:2.50%, 81.92inch, 0.02dB/inch
GW−B26f90k1c.gim (90 kHz)
GW−B26



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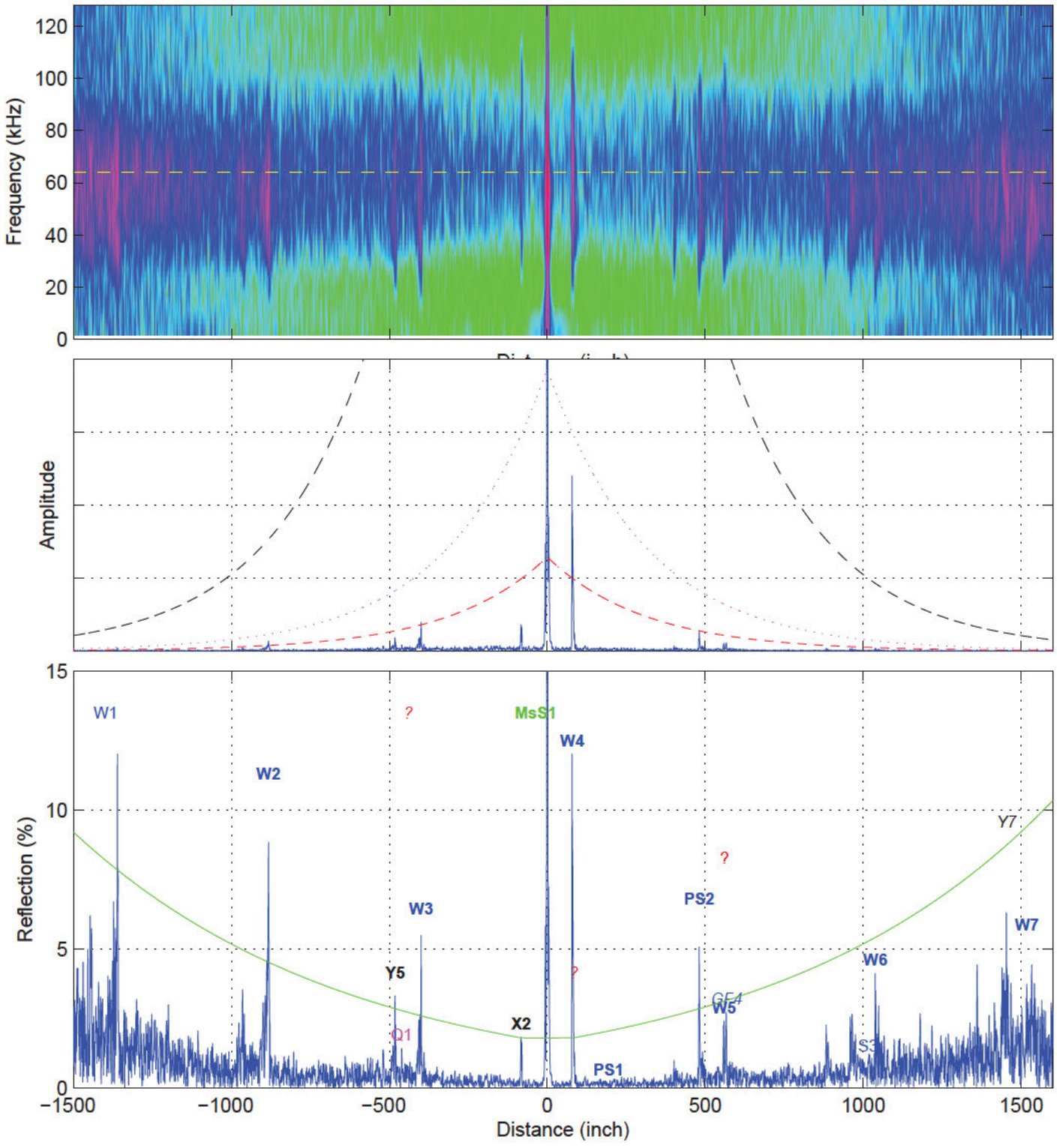
Vel.:126.45 inch/msec
Ref.: W4 (12.0 %)

Att.:0.010 dB/inch
Thr.:1.80%, 82.59inch, 0.01dB/inch

GW−B26f64k1c.gim (64 kHz)
GW−B26



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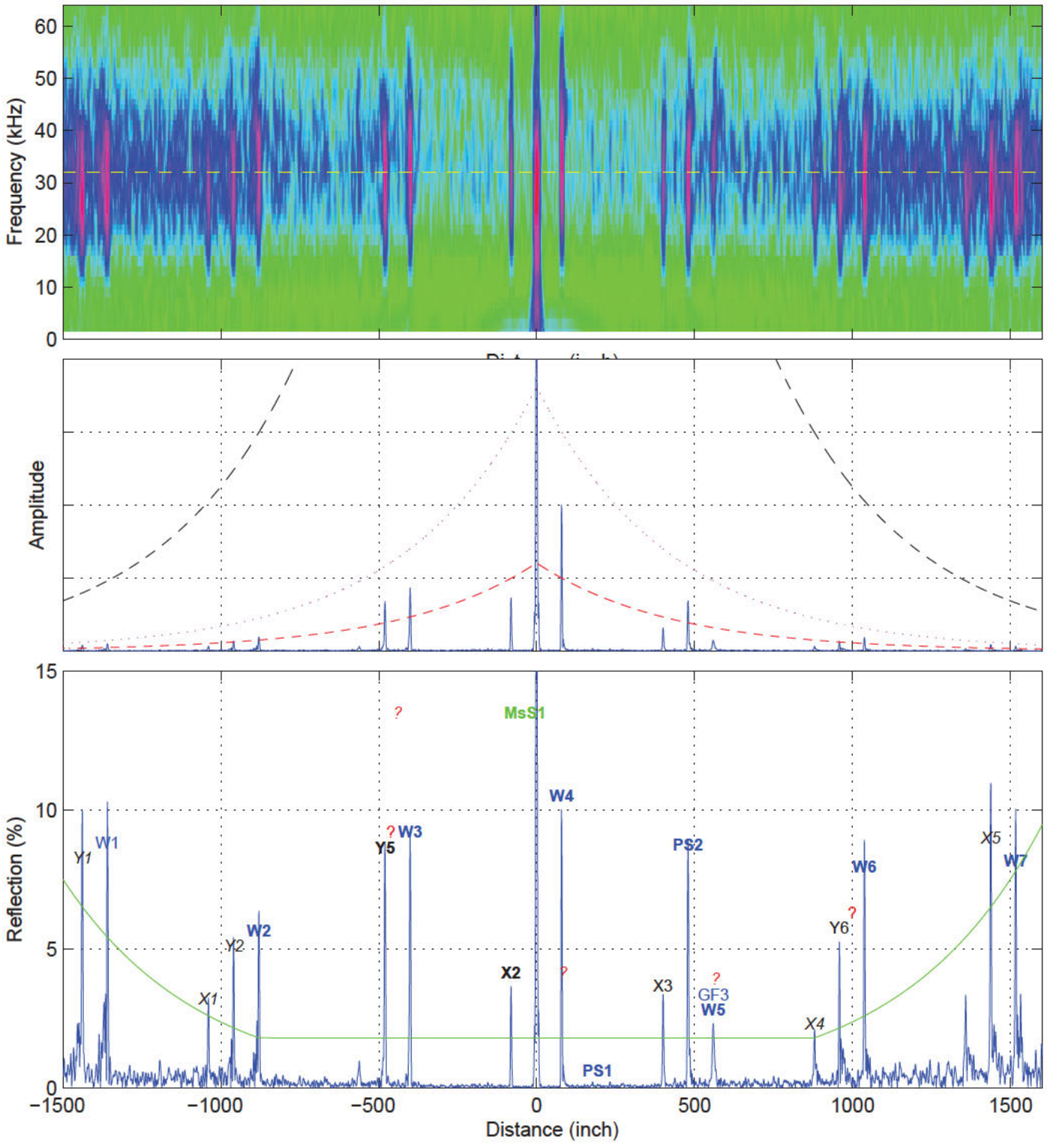
Vel.:126.45 inch/msec
Ref.: W4 (10.0 %)
Att.:0.010 dB/inch
Thr.:1.80%, 879.89inch, 0.02dB/inch
GW−B26f32k1c.gim (32 kHz)
GW−B26



Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

[- B26]

(b) (3) (A)

4/1/2022
73.4 F

(b) (3) (A)

Remarks/Legend:

BBW - Bell - Bell Weld
 - Pipe Support

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date: 4/1/2022	Rev No : N/A	Scale: N/A	

Draw Title: - B26

Description: JP-5 Tunnel Piping

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(b) (3) (A)

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GW-B27

Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: (b) (3) (A) [redacted]
Inspector: (b) (6)
Analyzer: [redacted]
Client: AB&A (US Navy)

Date: 01-Apr-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -1226.6 to 1227.4 inch

Test Pipe: (b) (3) (A) [redacted]

Note: test

Summary: This data has several multiple reflections and directionality due to weld geometry. There are two indications (Q1 at -976" and Q2 at -963") need to be checked using other NDT methods. Perform field verification of signal to include local visual inspection at indication location and thickness test (Note: pipe warp may need to be removed if present).

Sym.	Dist.(inch)	% Refl.	Comment
W1	-1253.51	13.3	Weld;
X1	-1161.71	6.2	Directionality; |MsS-X|=1161.71; W9 (1159.12, 6.41)
Y1	-1013.01	9.9	Multiple Reflection;
Y2	-1006.25	2.6	Multiple Reflection; |MsS-X|=1006.25; W3-W7 (1009.31, 0.18)
Q1	-976.91	1.8	Indication; 51.4-% wall loss; %refection is not accurate due to the two type (butt & the bell-bell) weld in this shot.
X2	-967.24	10.8	Directionality; |MsS-X|=967.24; X17 (966.67, 10.76)
Q2	-962.63	2.4	Indication; 62.6-% wall loss;%refection is not accurate due to the two type (butt & the bell-bell) weld in this shot.
W2	-773.27	11.7	Weld;
GF1	-768.34	7.0	Geometric Feature;
GF2	-763.15	3.0	Geometric Feature; Bell
X3	-724.91	3.0	Directionality; |MsS-X|=724.91; X15 (728.44, 2.16)
X4	-675.78	4.2	Directionality; |MsS-X|=675.78; W8 (679.13, 3.62)
W3	-527.71	6.6	Weld;
GF3	-522.47	1.9	Geometric Feature;
X5	-480.04	6.6	Directionality;
GF4	-293.28	6.2	Geometric Feature; Bell
W4	-286.39	18.1	Weld;
Y3	-240.68	3.8	Multiple Reflection; |MsS-X|=240.68; W5-GF6 (242.56, 1.52)
PS1	-195.29	7.3	Pipe Support;
W5	-46.84	14.0	Weld;
MsS1	0.00	---	Initial Pulse;
X6	47.78	7.5	Directionality; |MsS-X|=47.78; W5 (46.71, 7.70)
PS2	91.66	0.1	Pipe Support;
GF5	189.97	2.9	Geometric Feature; Bell
W6	193.55	8.8	Weld;
GF6	196.97	14.1	Geometric Feature; Bell
X7	205.82	2.4	Directionality; |MsS-X|=205.82; GF6-W6-GF6 (200.38, 0.17)
X8	240.11	3.3	Directionality; |MsS-X|=240.11; Y3 (240.68, 2.91)
Y4	244.00	2.6	Multiple Reflection; |MsS-X|=244.00; GF6-W5 (243.80, 2.03)
X9	287.21	5.4	Directionality; |MsS-X|=287.21; W4 (286.39, 5.93)
X10	289.17	12.6	Directionality; |MsS-X|=289.17; W4 (286.33, 13.33)
PS3	392.92	0.8	Pipe Support;
X11	433.19	2.2	Directionality; |MsS-X|=433.19; PS3-W5 (439.57, 0.14)
X12	479.22	5.9	Directionality; |MsS-X|=479.22; X5 (480.04, 5.05)
W7	485.54	5.9	Weld;
X13	528.66	5.1	Directionality; |MsS-X|=528.66; W3 (527.71, 5.04)
GF7	672.87	2.0	Geometric Feature;
W8	679.13	4.7	Weld;
PS4	696.05	0.9	Pipe Support;
X14	720.22	2.2	Directionality; |MsS-X|=720.22; X3 (721.18, 2.04)
X15	724.58	3.1	Directionality; |MsS-X|=724.58; X3 (729.27, 2.06)
X16	774.34	11.3	Directionality; |MsS-X|=774.34; W2 (773.27, 9.01)
X17	966.67	14.0	Directionality; |MsS-X|=966.67; W6-W2 (966.34, 2.92)
PS5	1014.08	8.9	Pipe Support; W7-W3 (1013.00, 0.36);
W9	1159.12	8.3	Weld;
X18	1207.55	7.6	Directionality; |MsS-X|=1207.55; ?? (1207.99, 6.21)
X19	1254.33	9.6	Directionality; |MsS-X|=1254.33; W1 (1253.51, 10.25)

[redacted]

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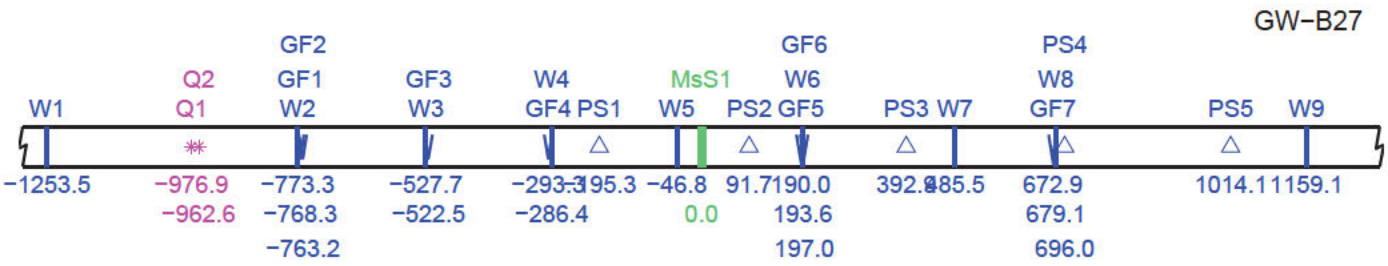
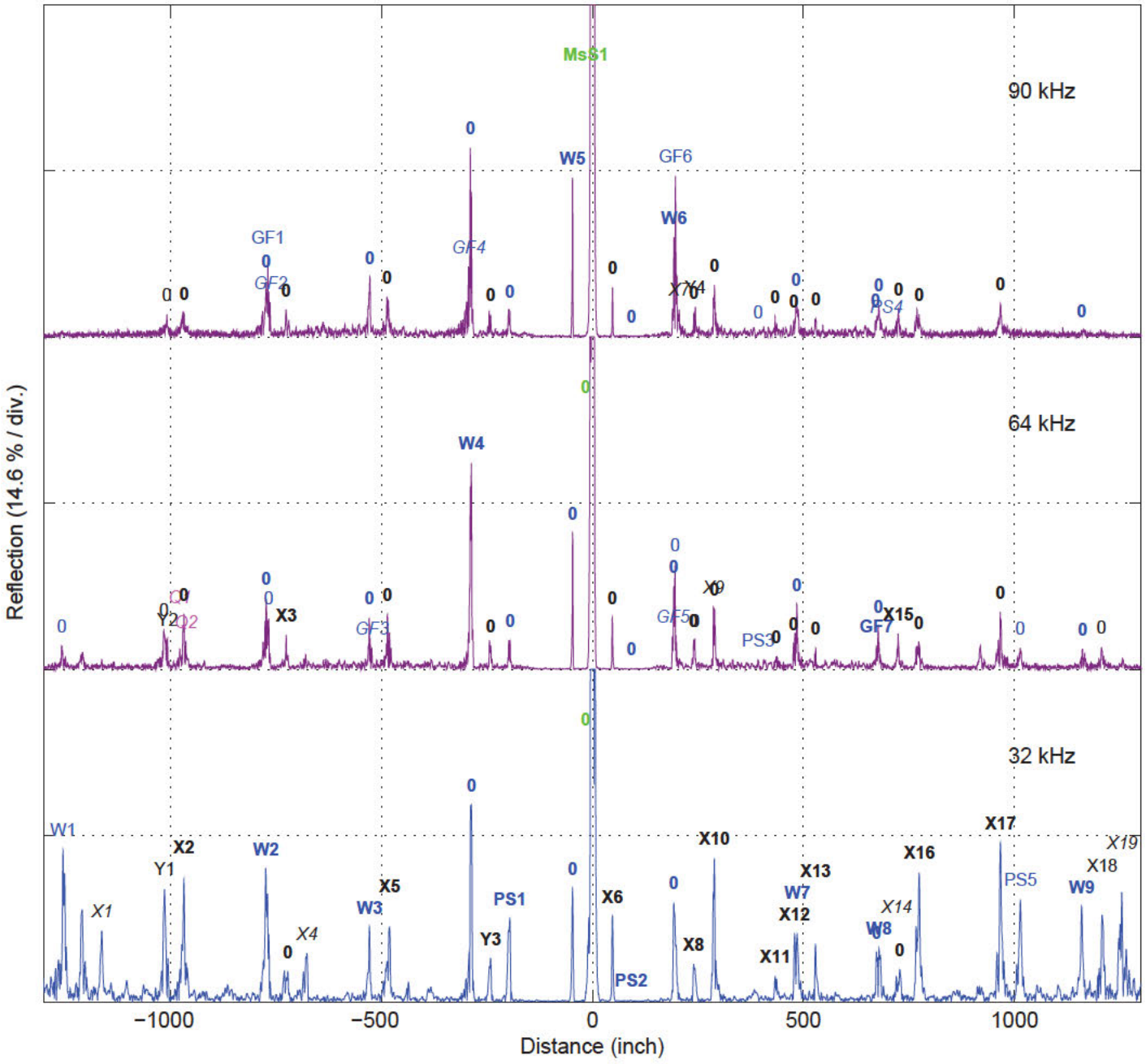
GW−B27





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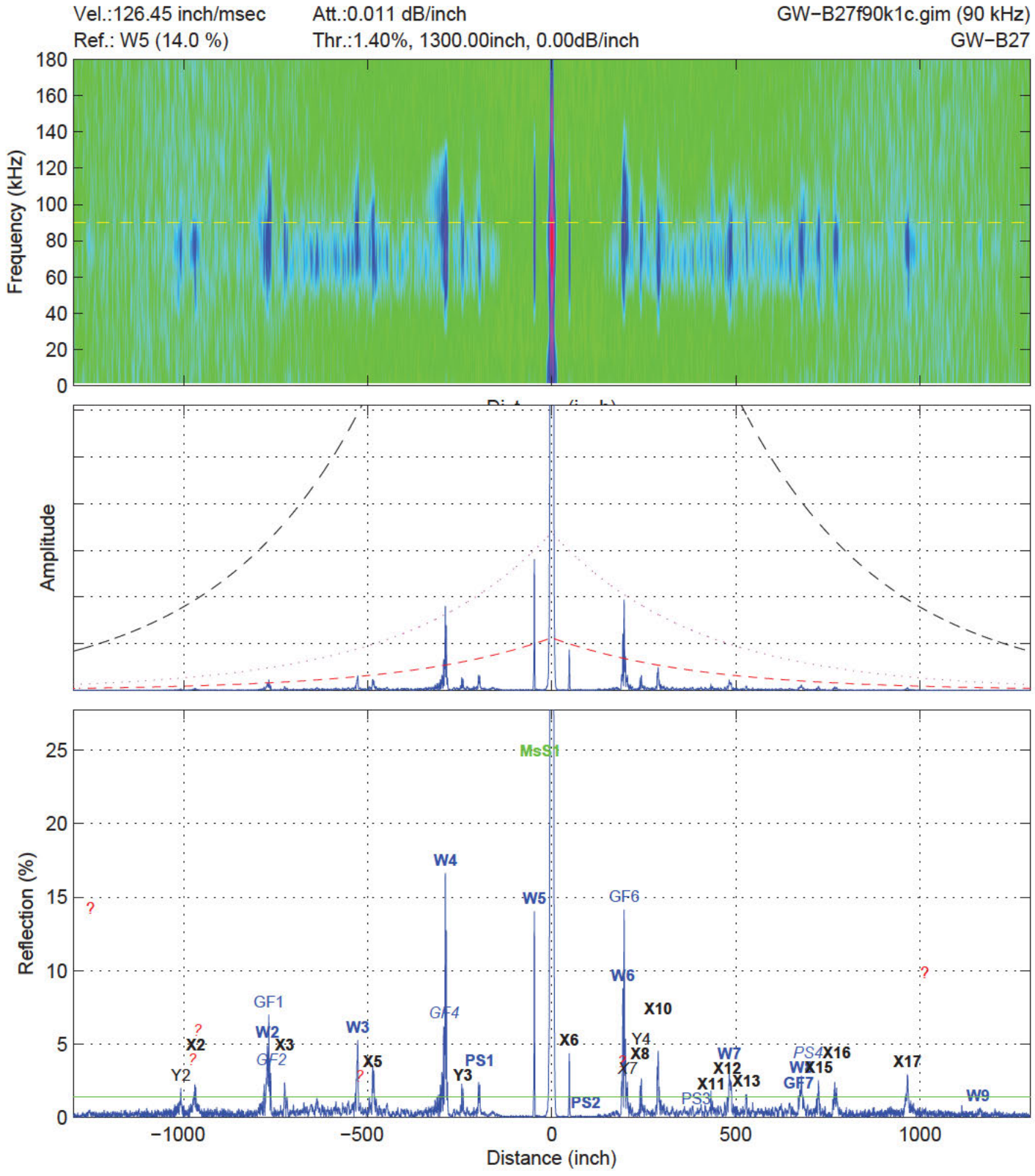

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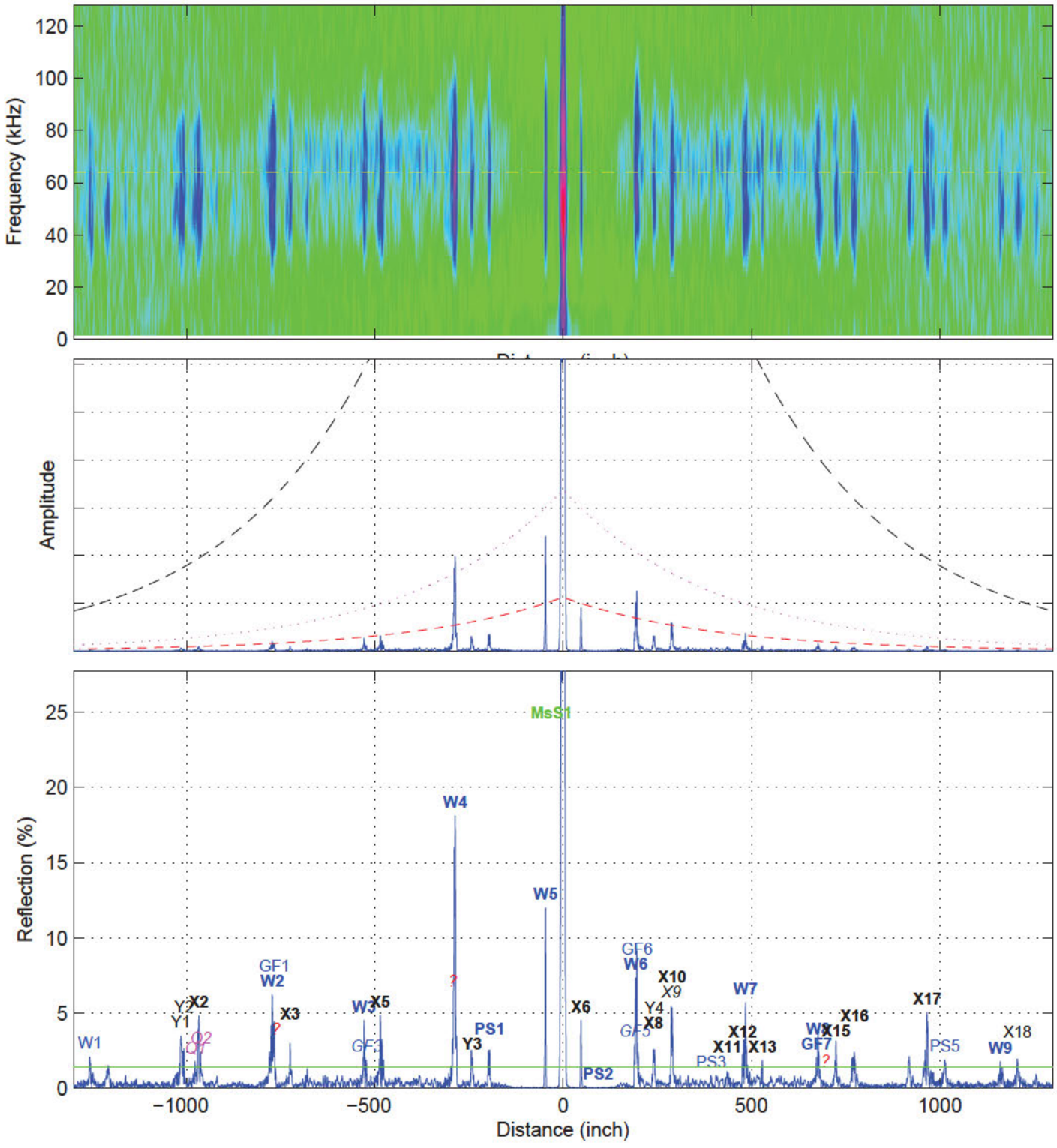
Vel.:126.45 inch/msec
Ref.: W5 (12.0 %)
Att.:0.011 dB/inch
Thr.:1.40%, 1300.00inch, 0.03dB/inch
GW−B27f64k1c.gim (64 kHz)
GW−B27



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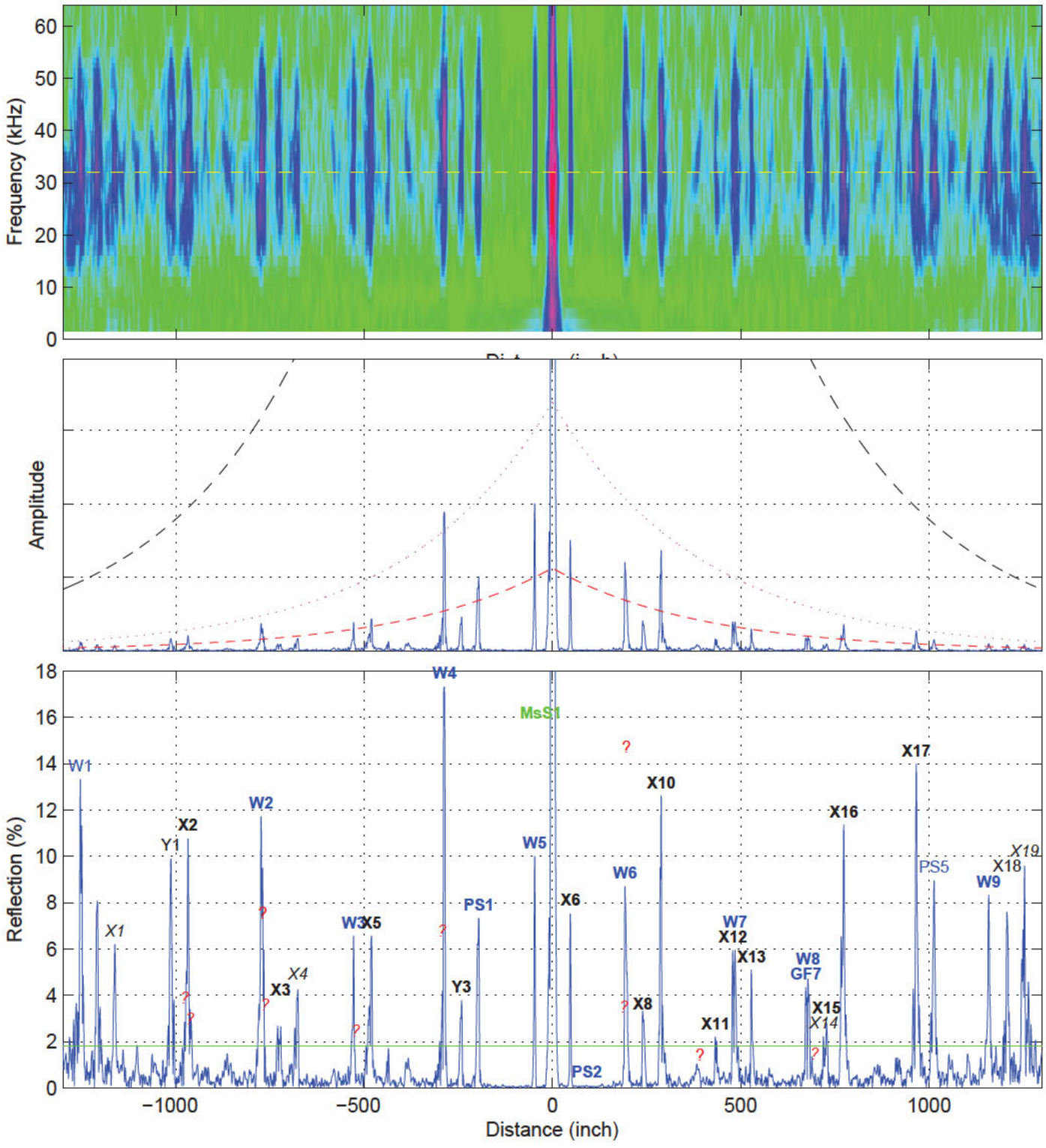
Vel.:126.45 inch/msec
Ref.: W5 (10.0 %)

Att.:0.011 dB/inch
Thr.:1.80%, 1300.00inch, 0.00dB/inch

GW−B27f32k1c.gim (32 kHz)
GW−B27



Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

Remarks/Legend:

BBW - Bell - Bell Weld
W - Weld

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	4/1/2022	Rev No : N/A	Scale: N/A

Draw[redacted] Title:
[redacted] - B27

Description:
F-76 Tunnel Piping

[redacted]

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(b) (3) (A)

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Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

(b) (3) (A)

Plan View

Remarks/Legend: W - Weld	Owner: **US Navy - Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC.
	Date: 4/1/2022 | Rev No : N/A | Scale: N/A
Draw[redacted] Title: [redacted] - B28	Description: FOR Line[redacted] 3 Door/Underground

[redacted]

LRUT REPORT-JBPH, HI-APRIL/2022

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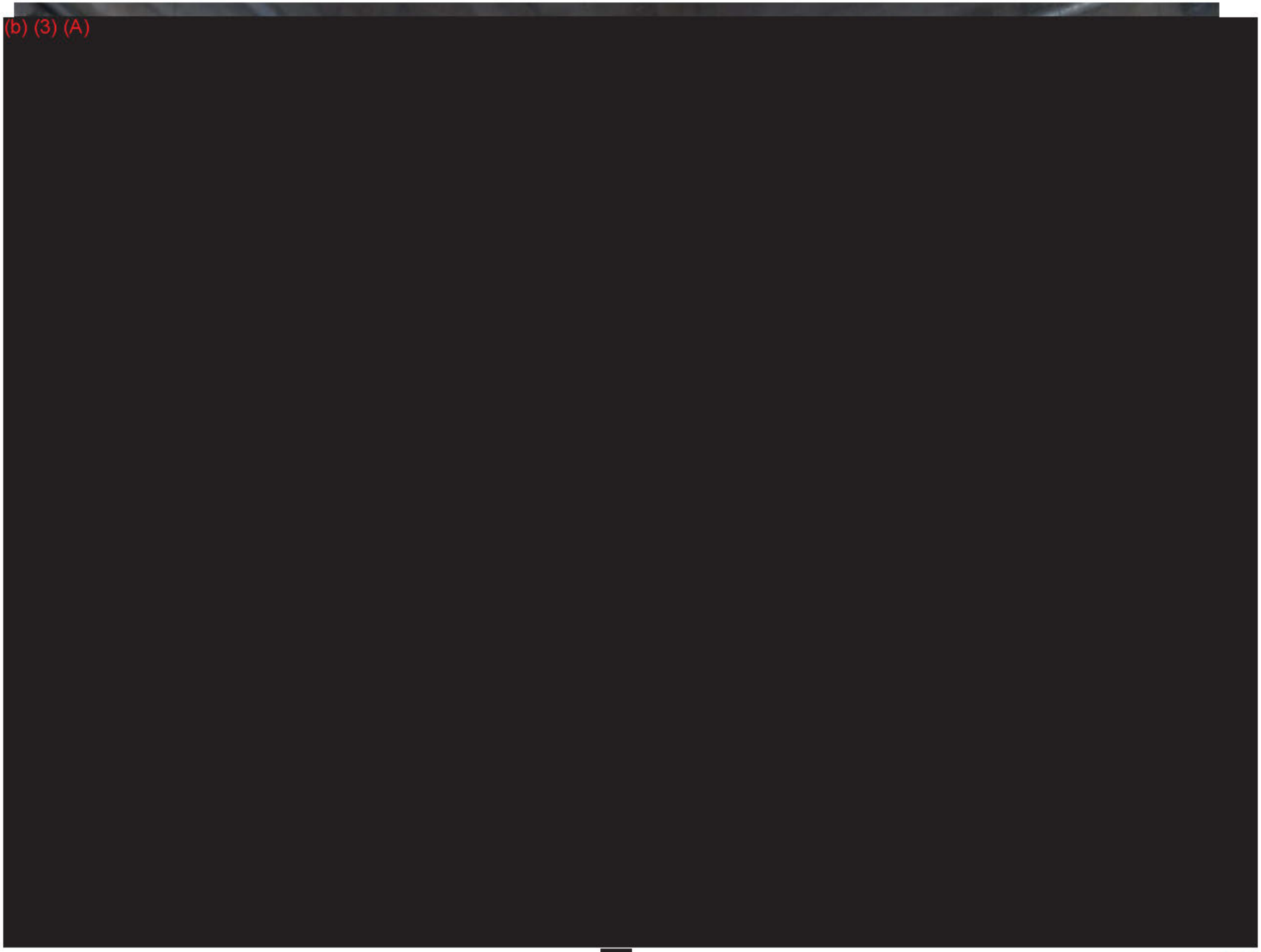
(b) (3) (A)



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GW-B29

Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: (b) (3) (A)
Inspector: (b) (6)
Analyzer:
Client: AB&A (US Navy)

Date: 01-Apr-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -35.9 to 131.0 inch

Test Pipe: (b) (3) (A)

Note:

Summary: No indication is found within the inspection range. The inspection range was limited for this location. It is recommend to supplement this inspection with other NDE (Borescope and CP Survey)

Sym.	Dist.(inch)	% Refl.	Comment
F1	-22.96	21.0	Flange;
W1	-19.46	13.6	Weld;
W2	-8.09	15.0	Weld;
MsS1	0.00	--	Initial Pulse;
X1	8.91	4.3	Directionality; |MsS-X|=8.91; W2 (8.09, 3.17)
X2	23.77	4.6	Directionality; |MsS-X|=23.77; F1 (22.84, 5.15)
EW1	34.39	13.0	Elbow Weld;
EW2	42.64	4.8	Elbow Weld;
EW3	53.64	5.5	Elbow Weld;
Y1	57.39	8.3	Multiple Reflection; |MsS-X|=57.39; EW1-F1 (57.23, 2.90)
Y2	91.34	3.9	Multiple Reflection; |MsS-X|=91.34; EW1-F1-EW1 (91.85, 0.28)
Y3	98.84	3.1	Multiple Reflection; |MsS-X|=98.84; EW1-F1-EW1 (91.85, 0.28)
W3	125.39	9.4	Weld;
EW4	130.96	10.2	Elbow Weld;

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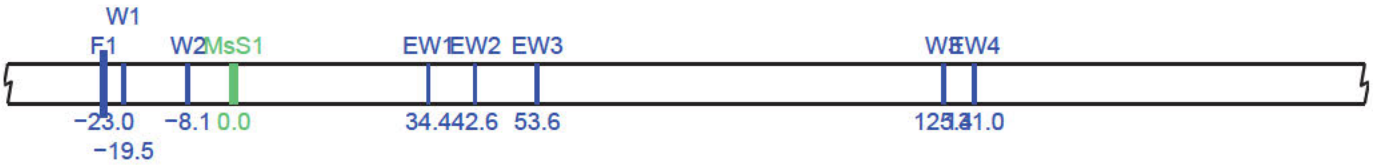
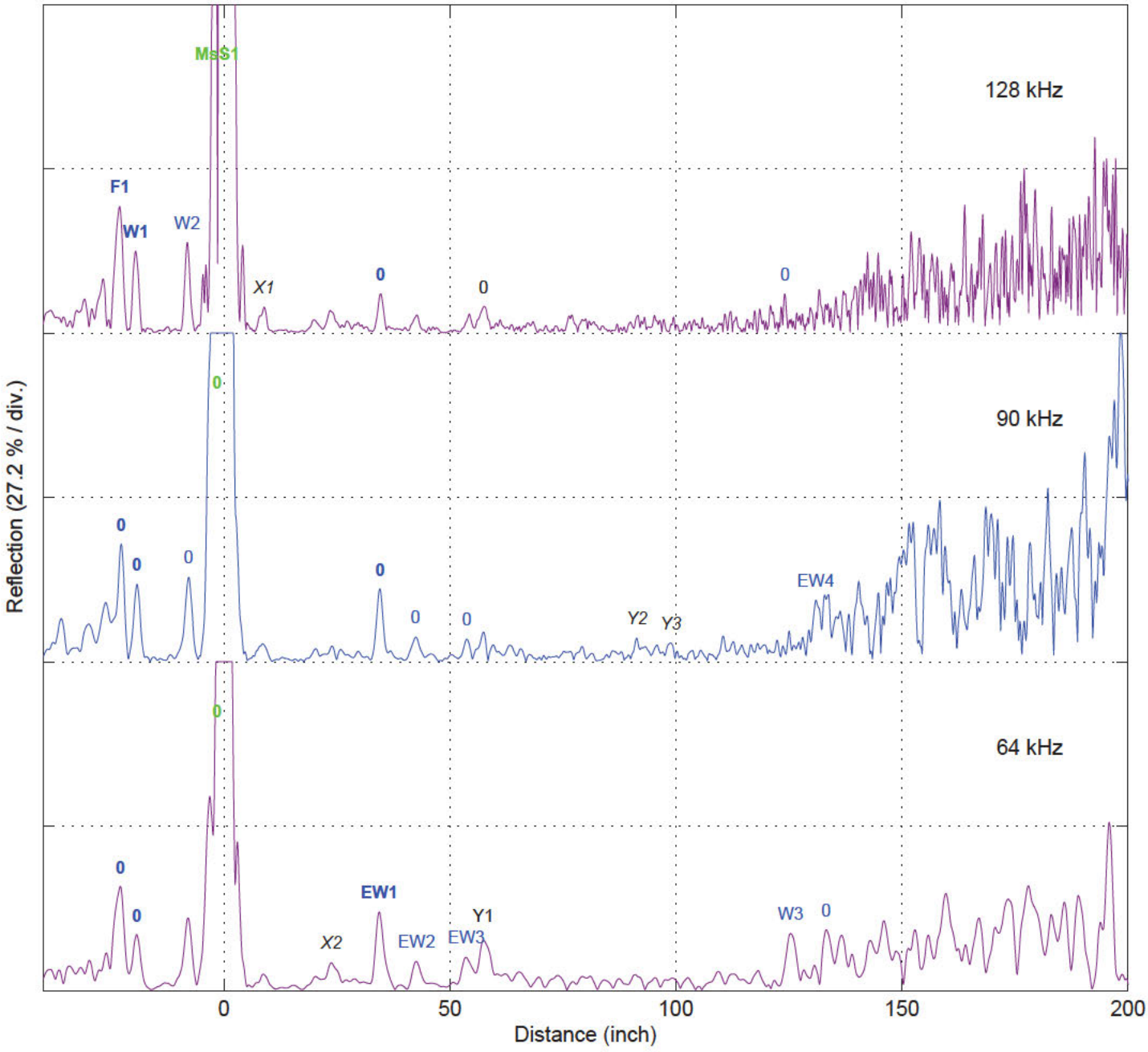
GW-B29





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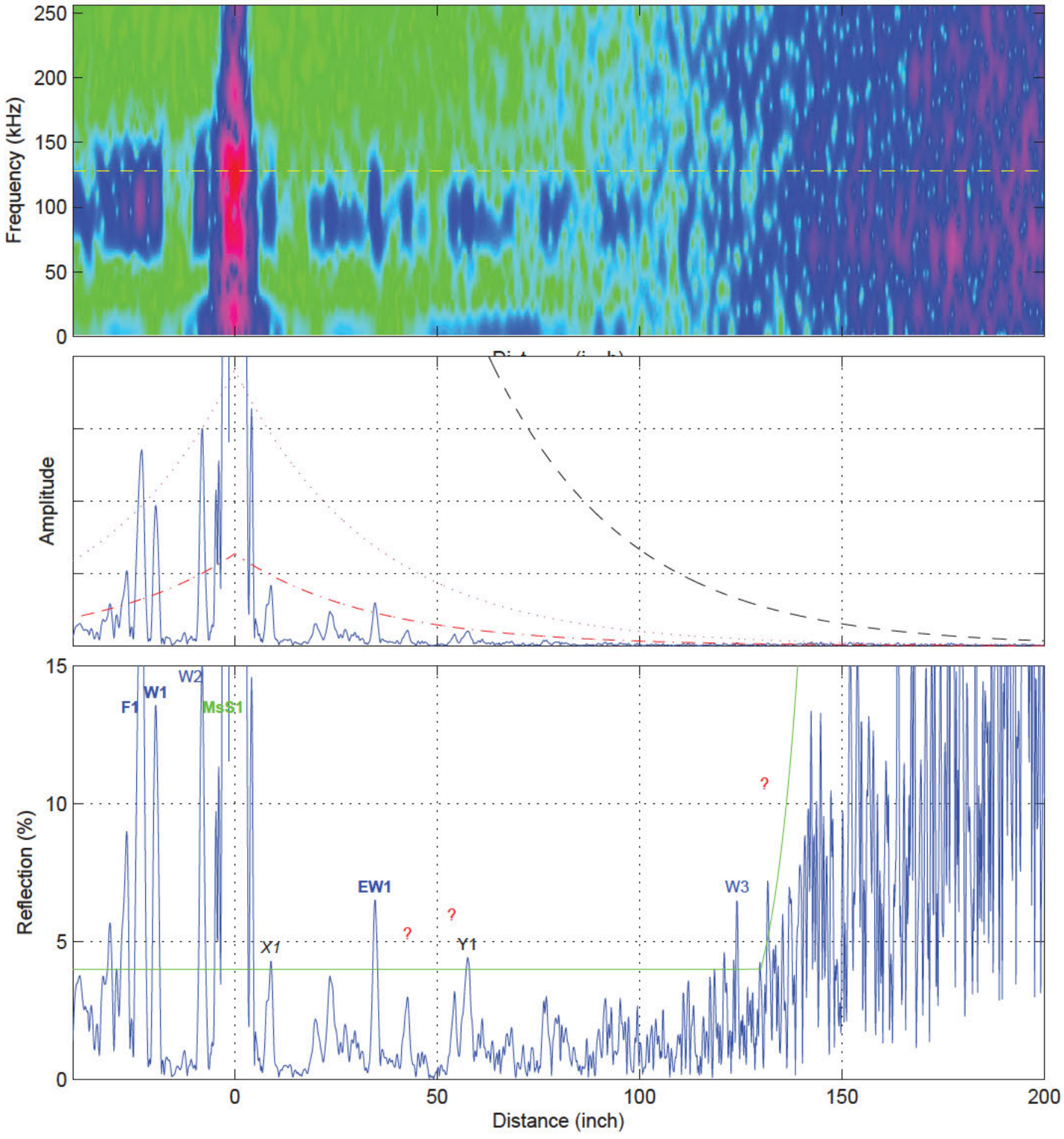
Vel.:125.00 inch/msec
Ref.: W2 (15.0 %)
Att.:0.123 dB/inch
Thr.:4.00%, 130.00inch, 1.26dB/inch
GW–B29f128k1c.gim (128 kHz)
GW–B29



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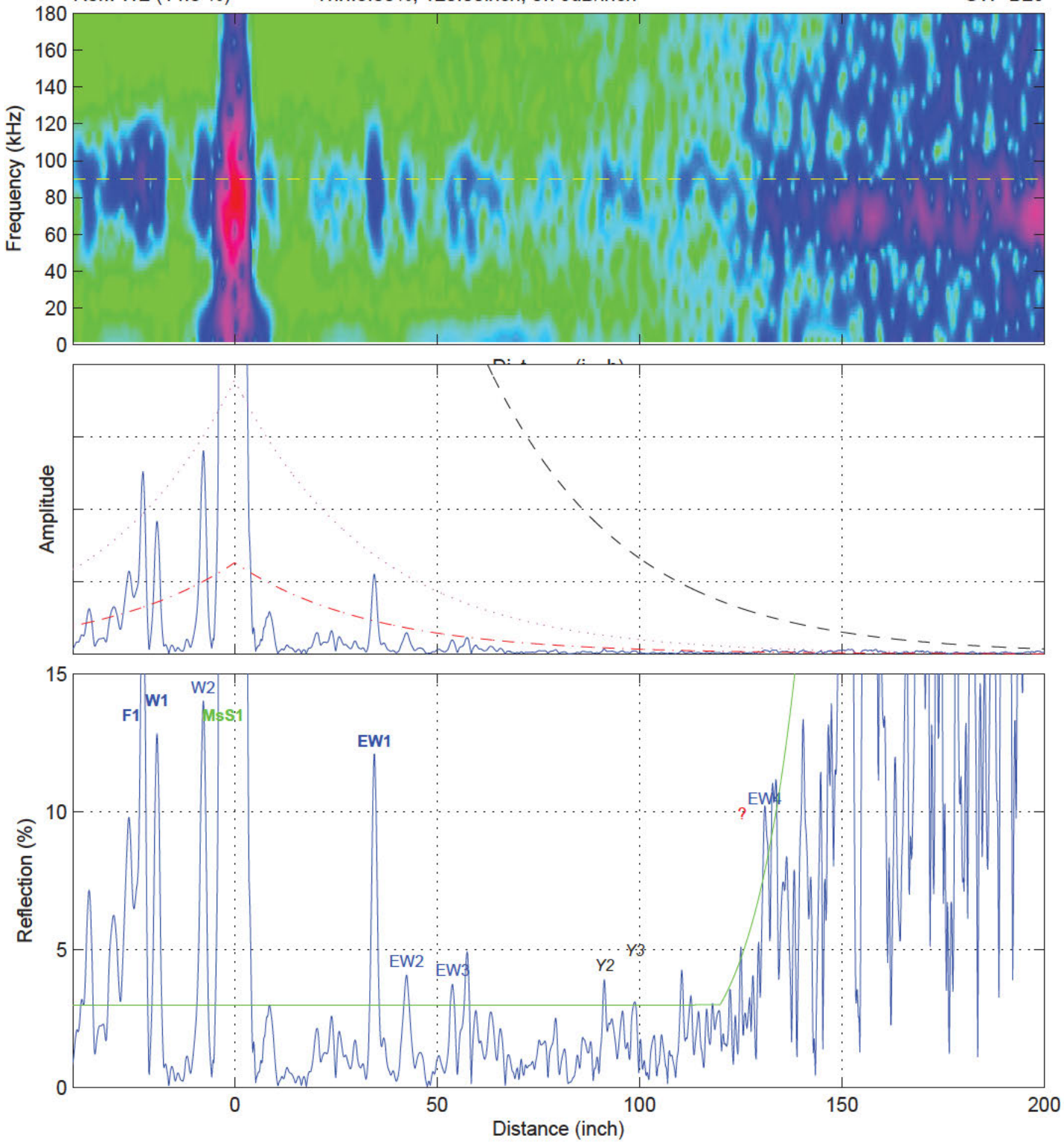
Vel.:125.00 inch/msec
Ref.: W2 (14.0 %)
Att.:0.123 dB/inch
Thr.:3.00%, 120.00inch, 0.76dB/inch
GW−B29f90k1c.gim (90 kHz)
GW−B29



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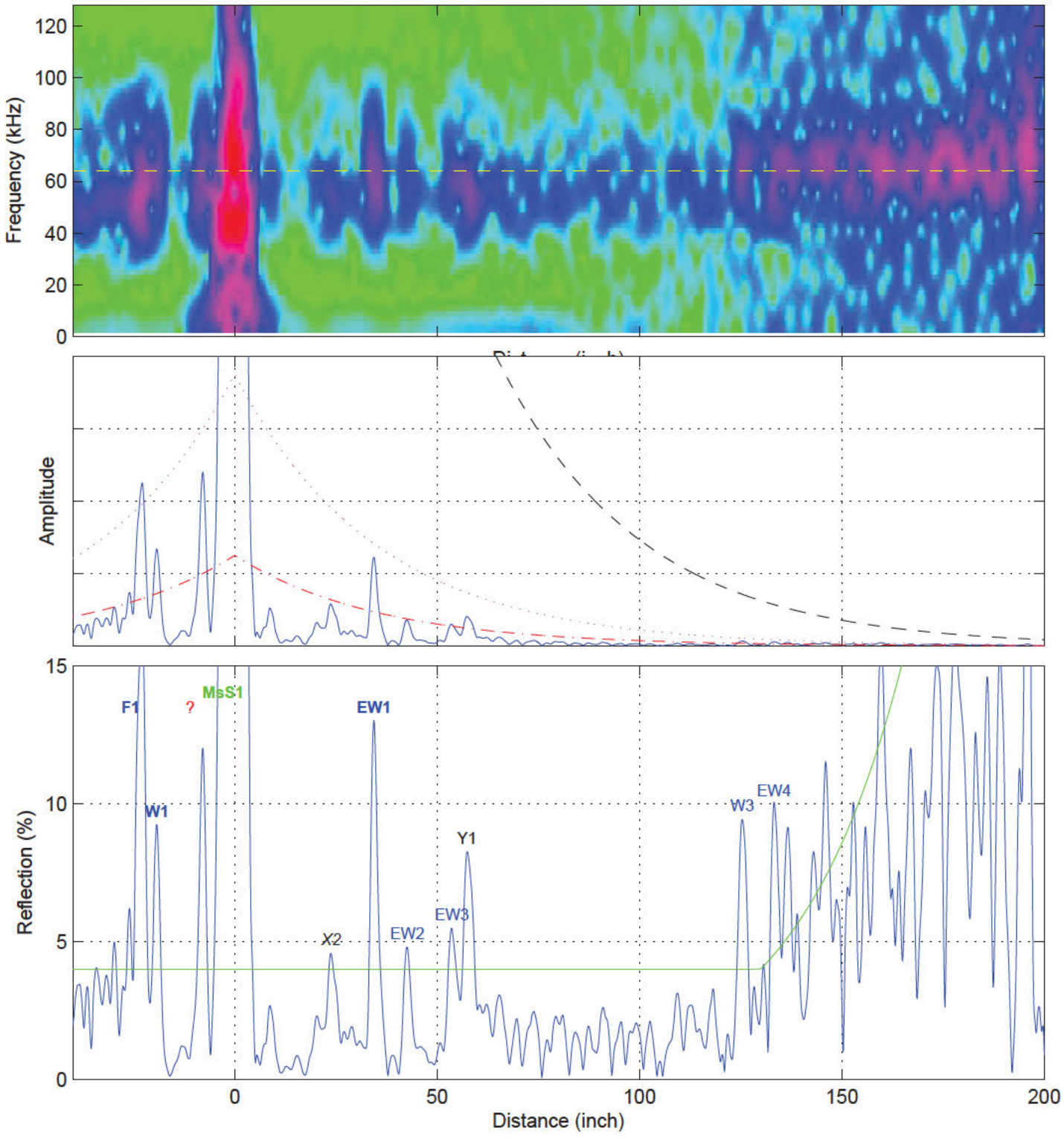
Vel.:125.00 inch/msec
Ref.: W2 (12.0 %)
Att.:0.123 dB/inch
Thr.:4.00%, 130.00inch, 0.33dB/inch
GW–B29f64k1c.gim (64 kHz)
GW–B29



[redacted]

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

(b) (3) (A) [redacted]

(b) (3) (A) [redacted]

4/1/2022
81.8 F

Remarks/Legend: W - Weld	Owner: **US Navy - Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC. Date: 4/1/2022 | Rev No : N/A | Scale: N/A
Draw[redacted] Title: [redacted] - B29	Description: FOR Line Outside/Underground

LRUT REPORT-JBPH, HI-APRIL/2022

[redacted]

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(b) (3) (A)

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Guided Wave Inspection Report

Site: RH PPG
Pipe ID/Location: (b) (3) (A) [redacted]
Inspector: (b) (6) [redacted]
Analyzer: [redacted]
Client: AB&A (US Navy)

Date: 02-Apr-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -73.9 to 399.8 inch

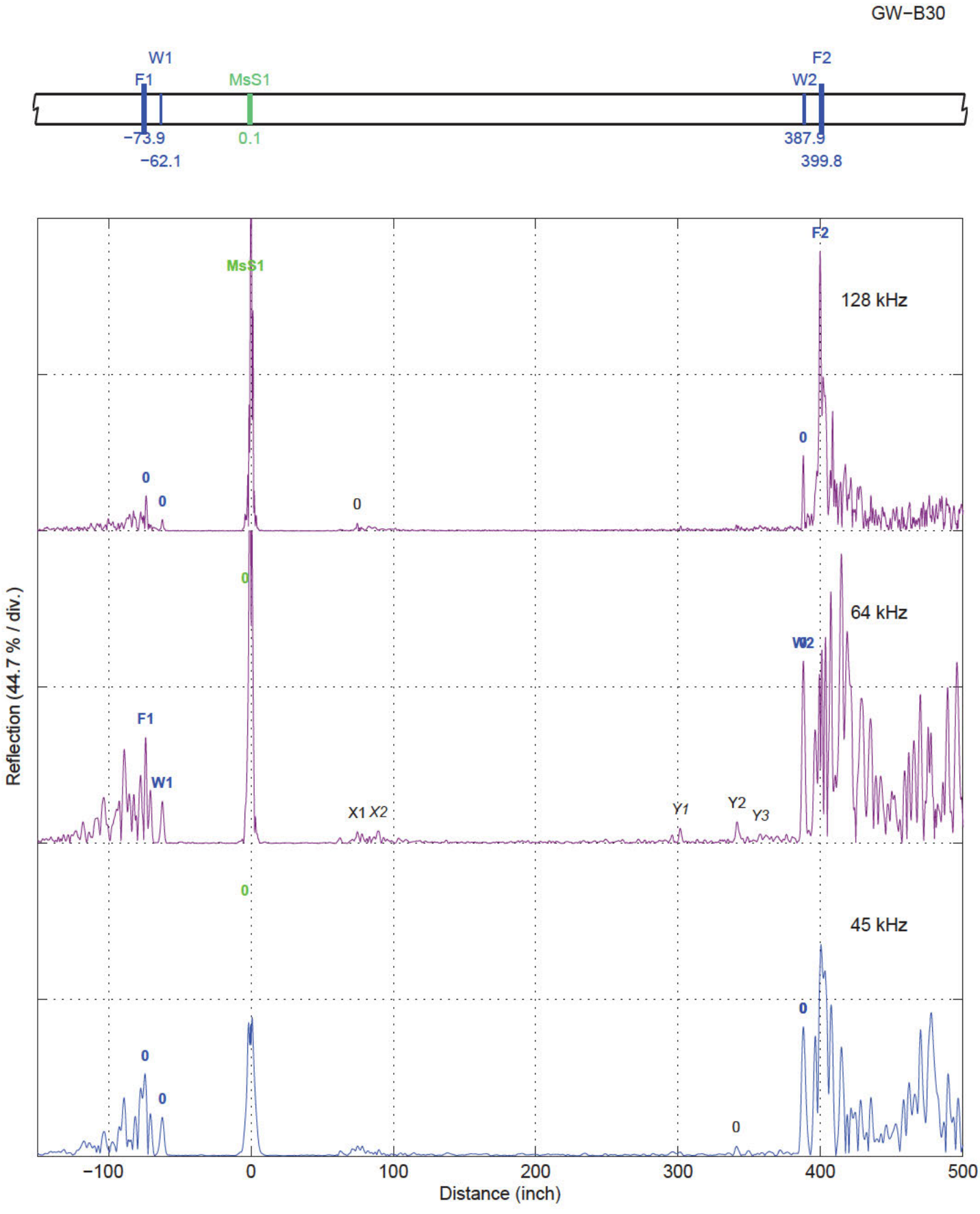
Test Pipe: (b) (3) (A) [redacted]

Note:

Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-73.89	30.3	Flange;
W1	-62.14	12.0	Weld;
MsS1	0.11	--	Initial Pulse;
X1	74.82	3.3	Directionality; |MsS-X|=74.76; F1 (73.95, 4.86)
X2	89.44	3.6	Directionality; |MsS-X|=89.38; F1 (88.95, 3.07)
Y1	301.57	4.3	Multiple Reflection;
Y2	341.44	6.2	Multiple Reflection;
Y3	357.57	2.7	Multiple Reflection; |MsS-X|=357.51; Y1-W1 (358.08, 0.24)
W2	387.94	52.1	Weld;
F2	399.82	80.0	Flange;

[redacted]



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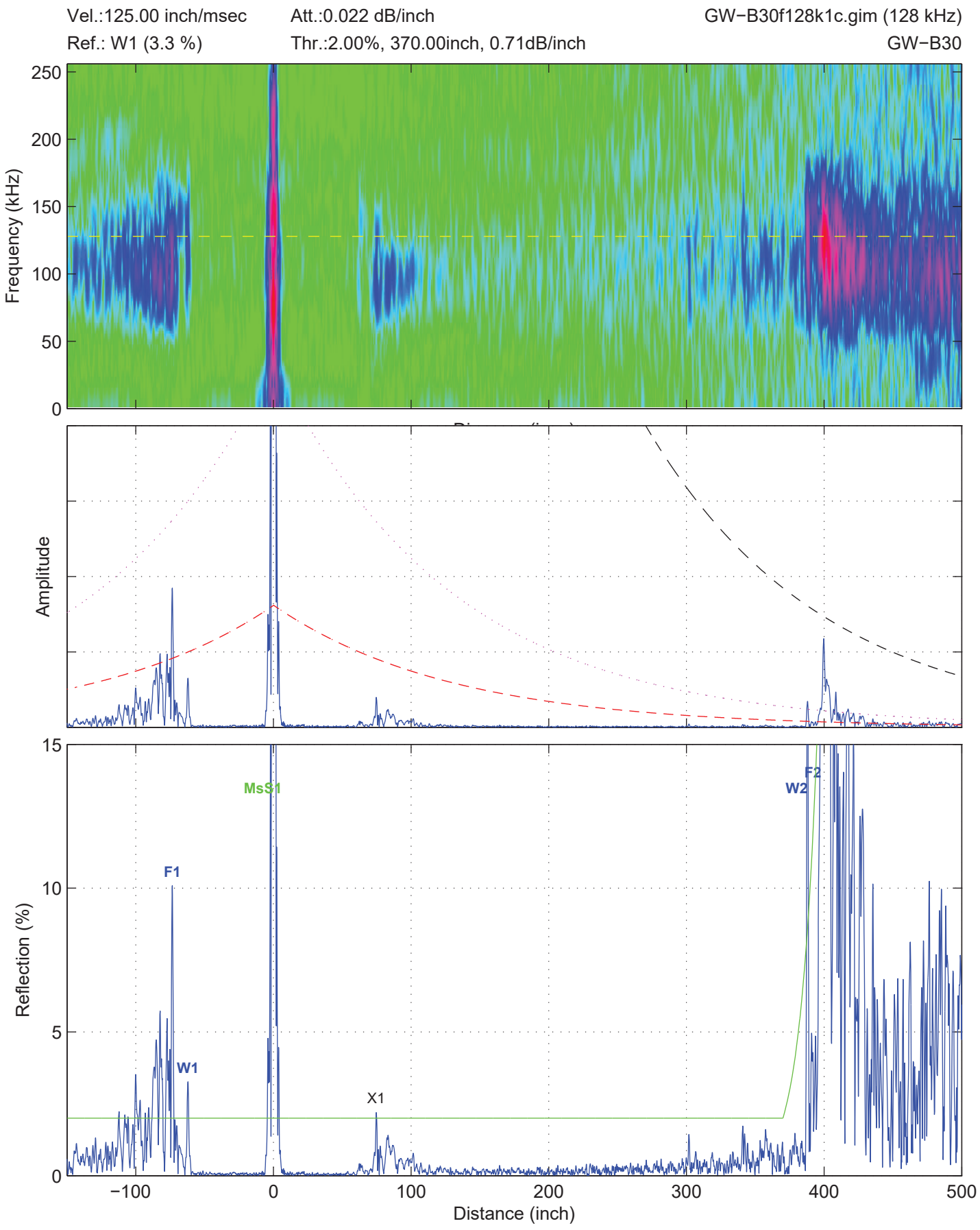
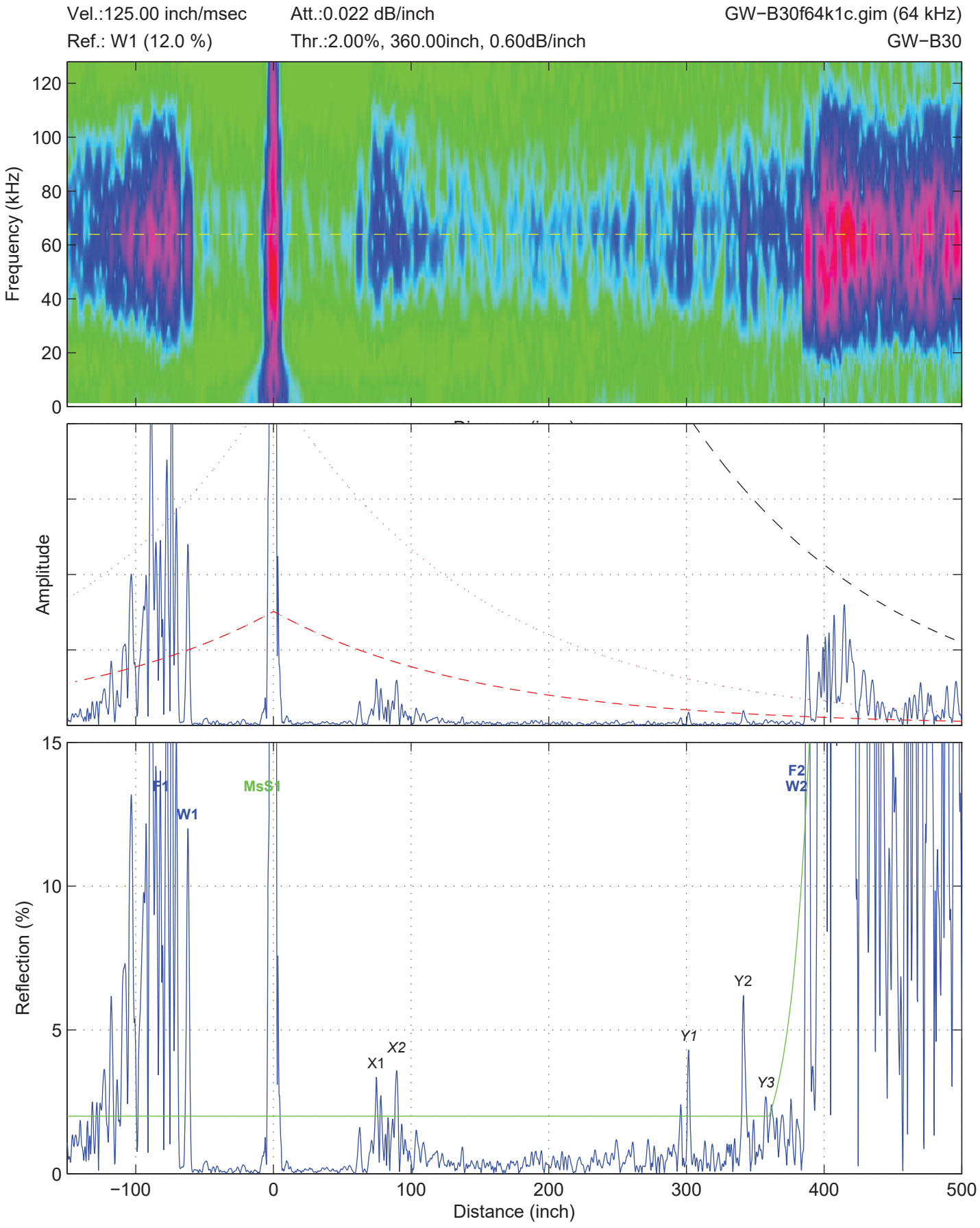
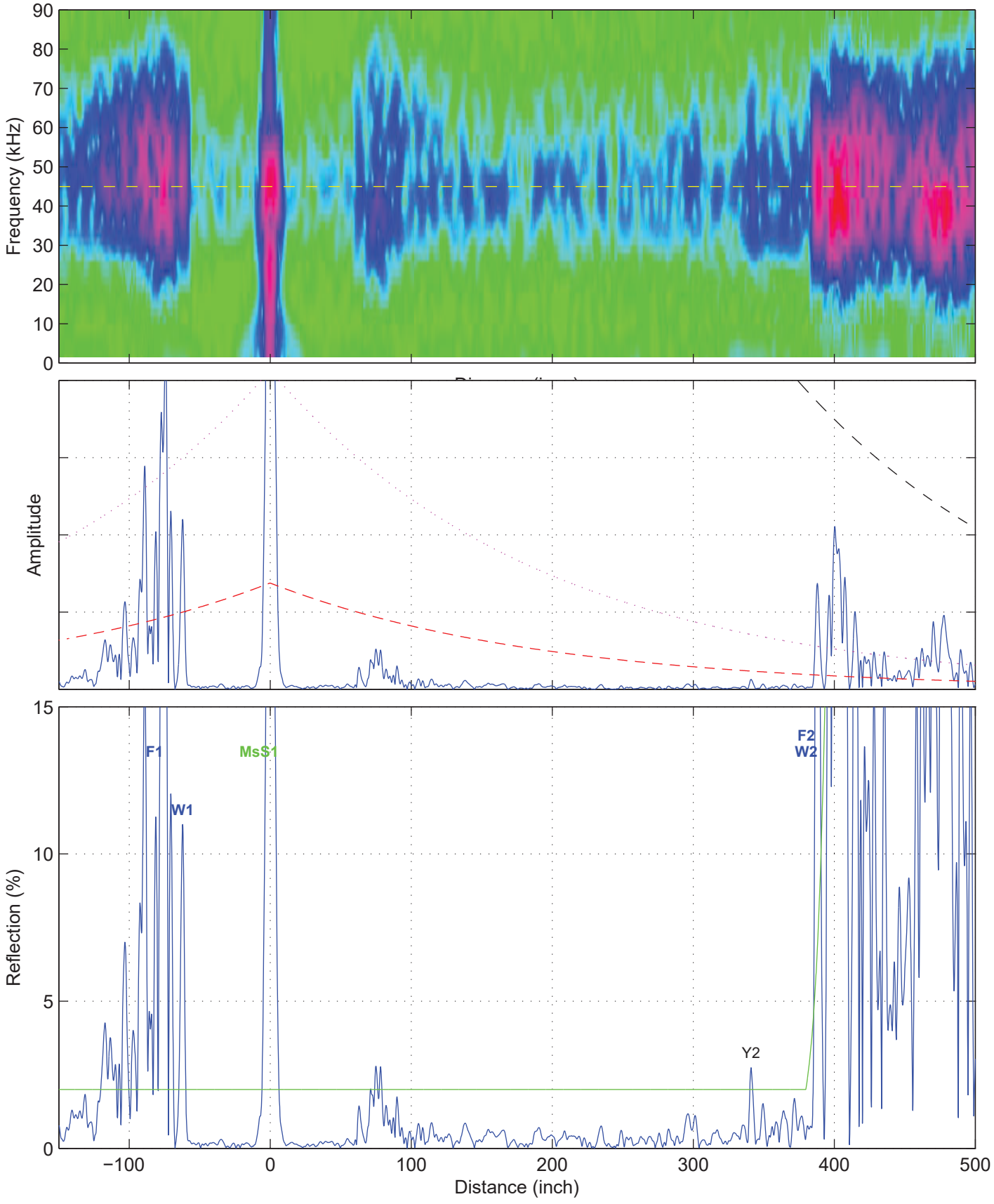

Vel.:125.00 inch/msec
Att.:0.022 dB/inch
GW−B30f128k1c.gim (128 kHz)
Ref.: W1 (3.3 %)
Thr.:2.00%, 370.00inch, 0.71dB/inch
GW−B30
Frequency (kHz)
250
200
150
100
50
0
Amplitude
Reflection (%)
15
10
5
0
MsS1
F1
W1
X1
F2
W2
−100
0
100
200
300
400
500
Distance (inch)


Vel.:125.00 inch/msec
Att.:0.022 dB/inch
GW−B30f64k1c.gim (64 kHz)
Ref.: W1 (12.0 %)
Thr.:2.00%, 360.00inch, 0.60dB/inch
GW−B30
Frequency (kHz)
120
100
80
60
40
20
0
Amplitude
Reflection (%)
15
10
5
0
F1
W1
MsS1
F2
W2
X1
X2
Y1
Y2
Y3
−100
0
100
200
300
400
500
Distance (inch)


Vel.:125.00 inch/msec
Att.:0.022 dB/inch
GW−B30f45k1c.gim (45 kHz)
Ref.: W1 (11.0 %)
Thr.:2.00%, 380.00inch, 1.30dB/inch
GW−B30
Frequency (kHz)
Amplitude
Reflection (%)
F1
W1
MsS1
F2
W2
Y2
Distance (inch)

(b) (3) (A)

Remarks/Legend: W - Weld	Owner: **US Navy - Pearl Harbor, HI**		
	Drawn By: InterSpec, LLC.	Modified By: InterSpec, LLC.	
	Date: 4/2/2022	Rev No : N/A	Scale: N/A
Draw[redacted] Title: [redacted] - B30	Description: F-24 Line From Pump House to Surge tanks		

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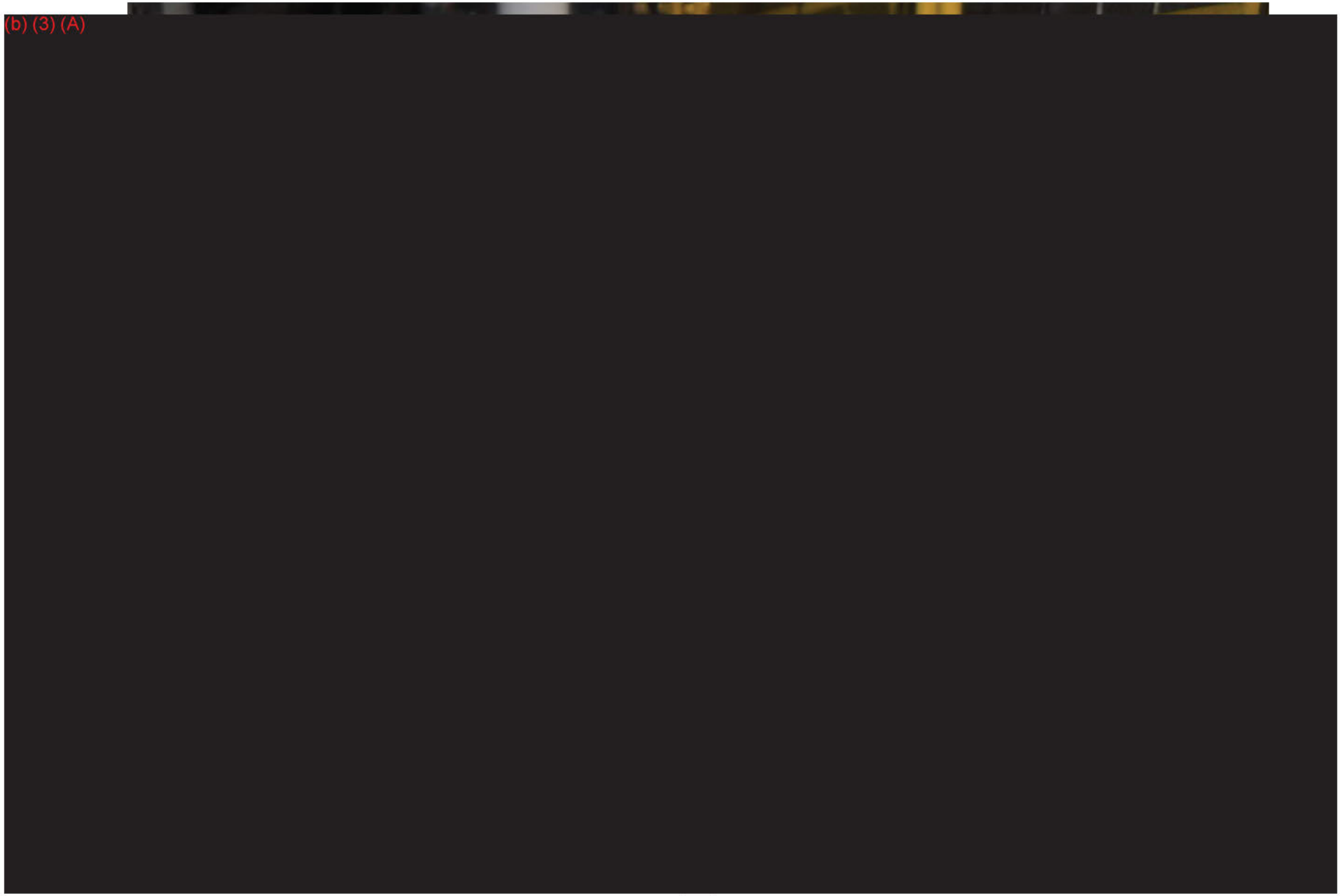
(b) (3) (A)



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GW-B31

Wave Inspection Report

Site: (b) (3) (A)
Pipe ID/Location:
Pipe Size:
Inspector:
Analyzer:

Date: 01-Apr-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -192.3 to 370.0 inch

Test Pipe: (b) (3) (A)
Note:

Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-116.05	37.1	Flange;
W1	-104.59	15.0	Weld;
MsS1	0.00	--	Initial Pulse;
X1	119.91	2.8	Directionality; |MsS-X|=119.91; F1 (118.96, 4.23)
Y1	320.16	3.1	Multiple Reflection;
W2	343.59	21.5	Weld;
W3	355.16	25.6	Weld;
W4	359.29	27.4	Weld;

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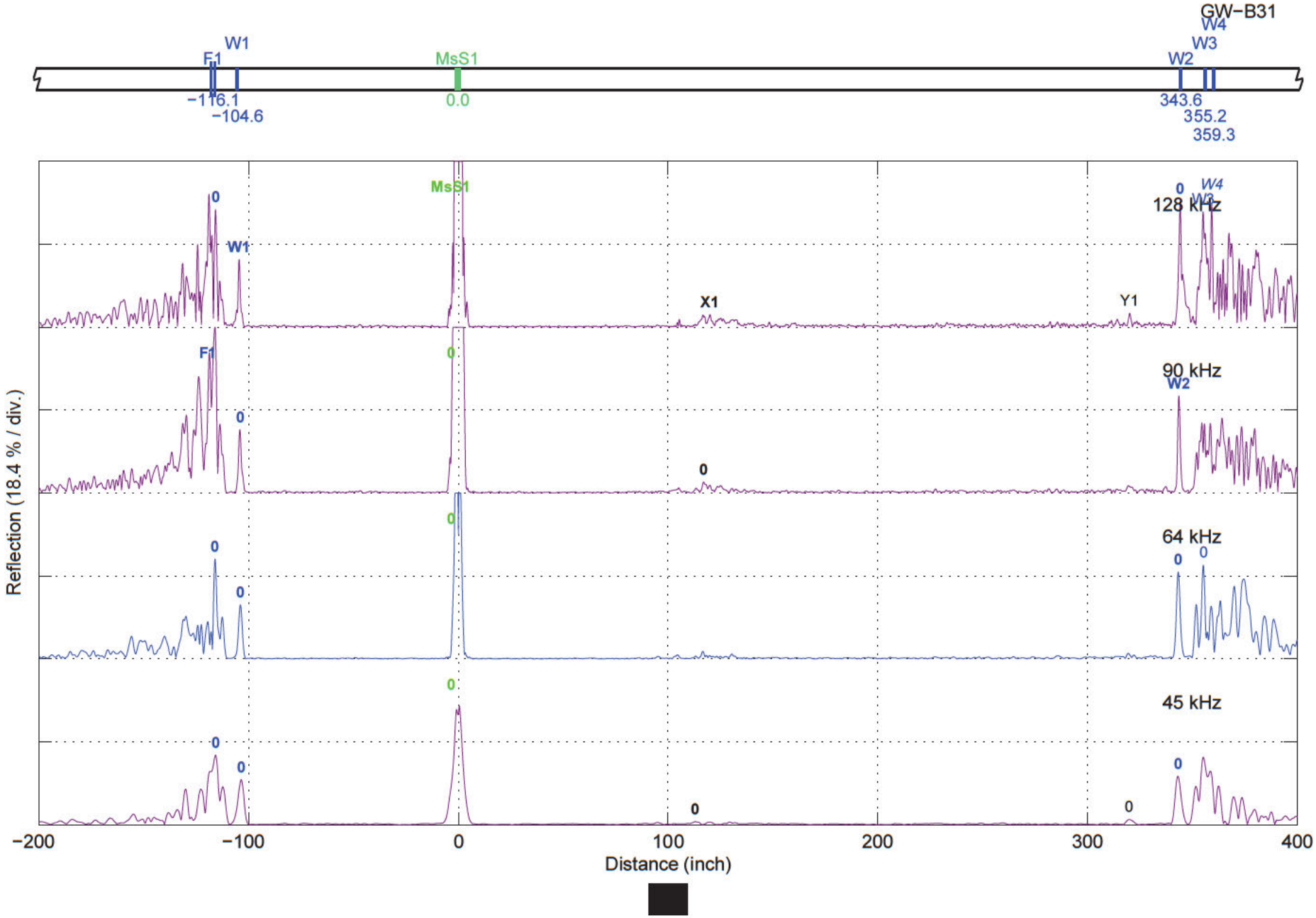

[513]

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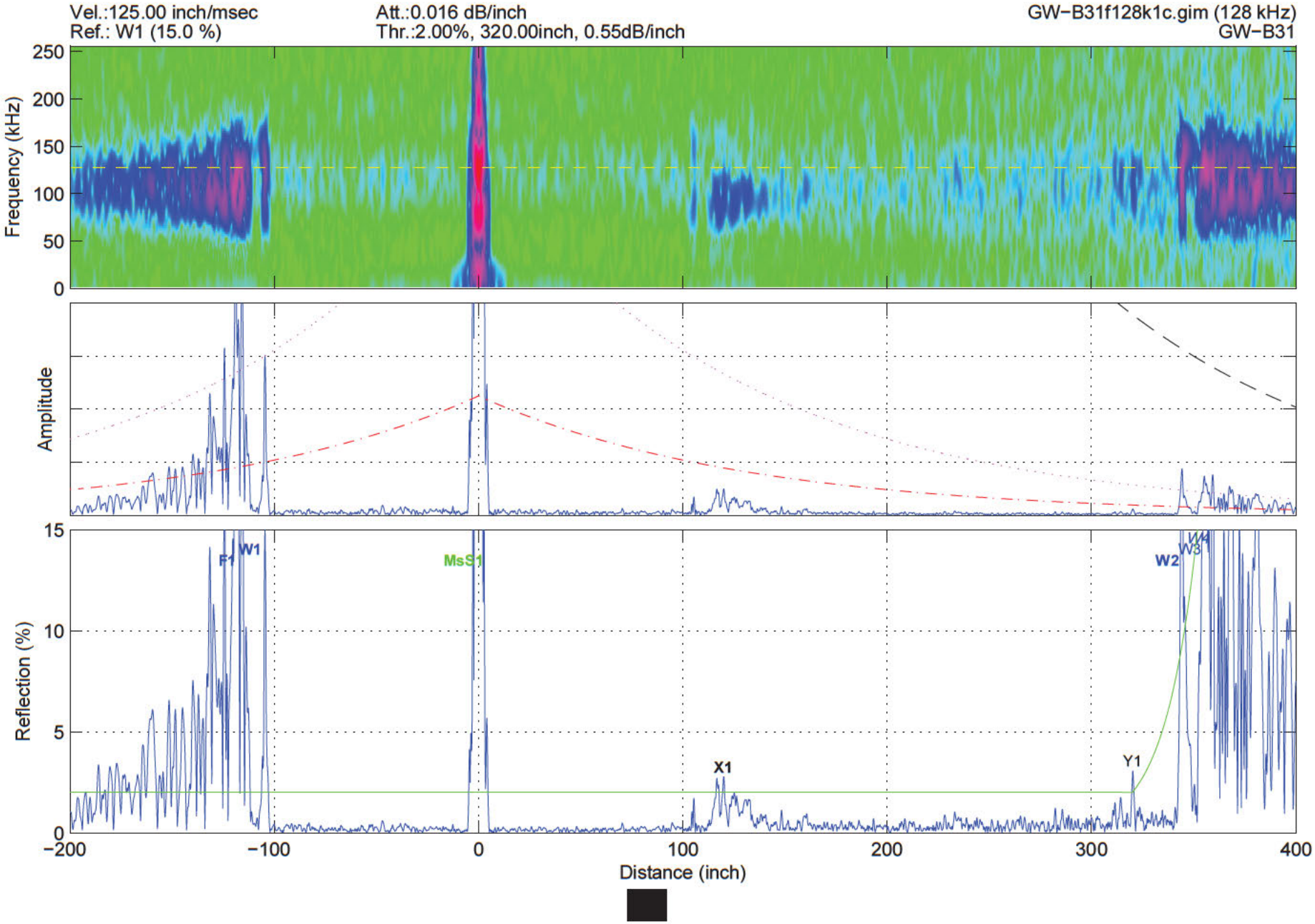

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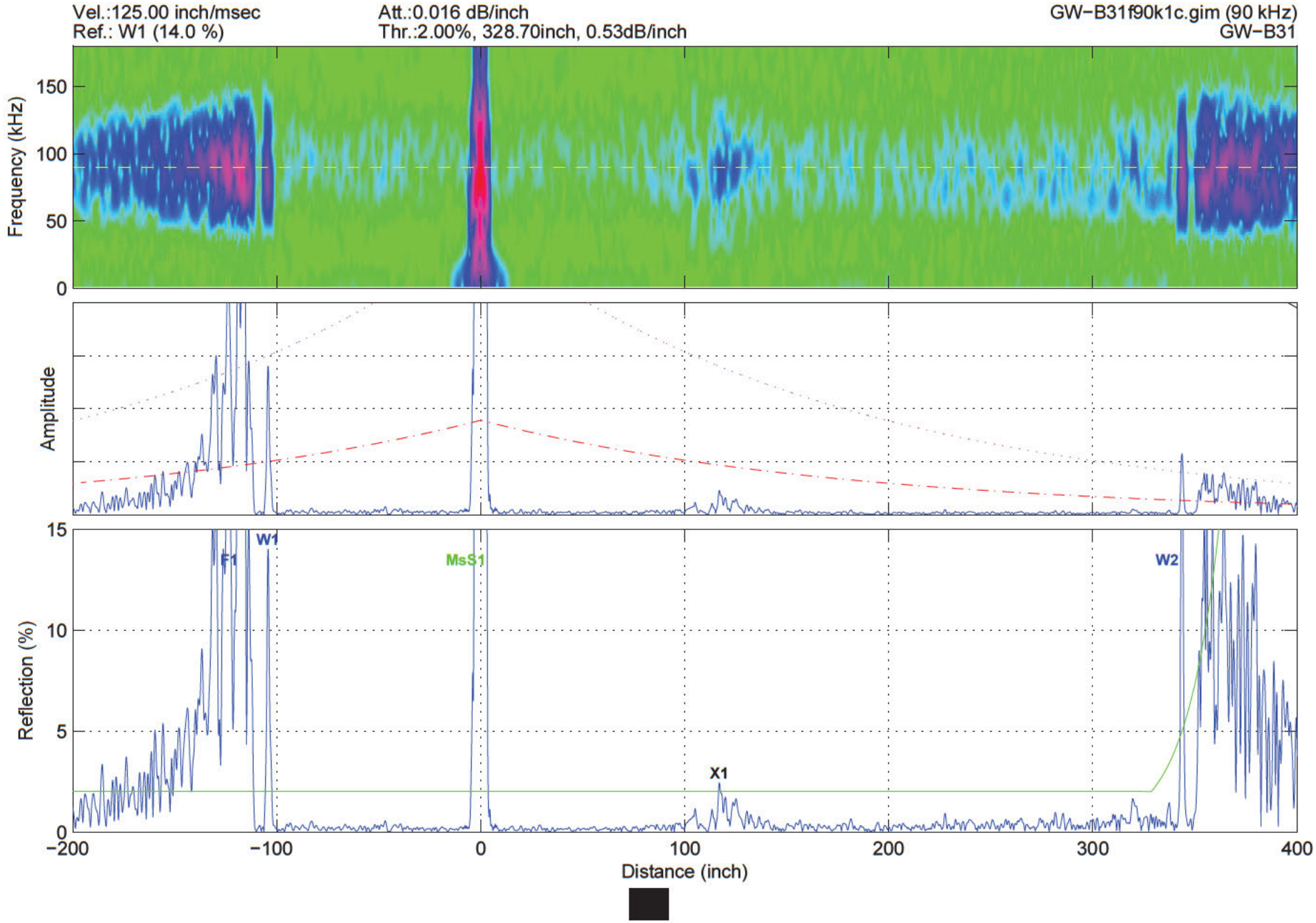

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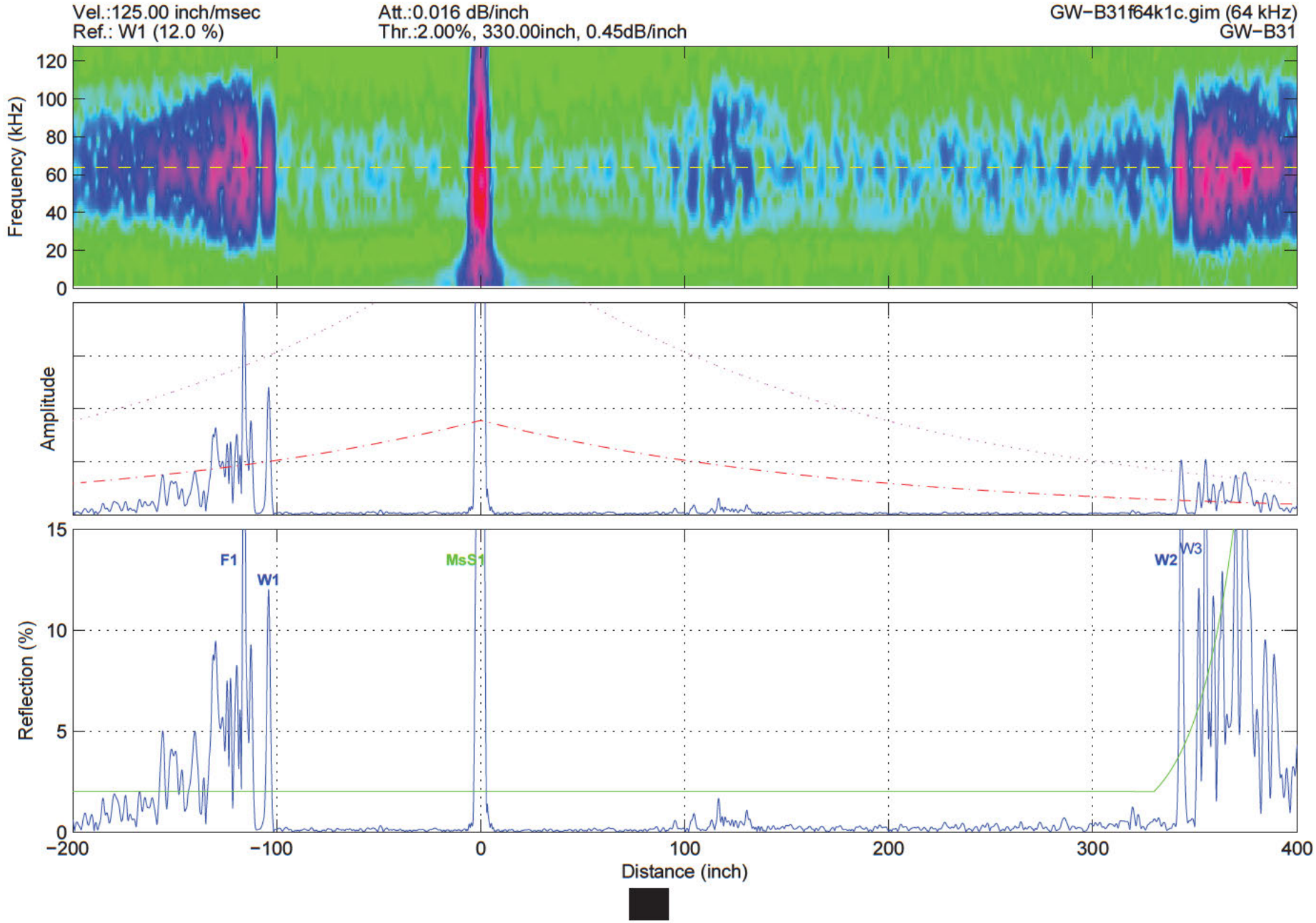

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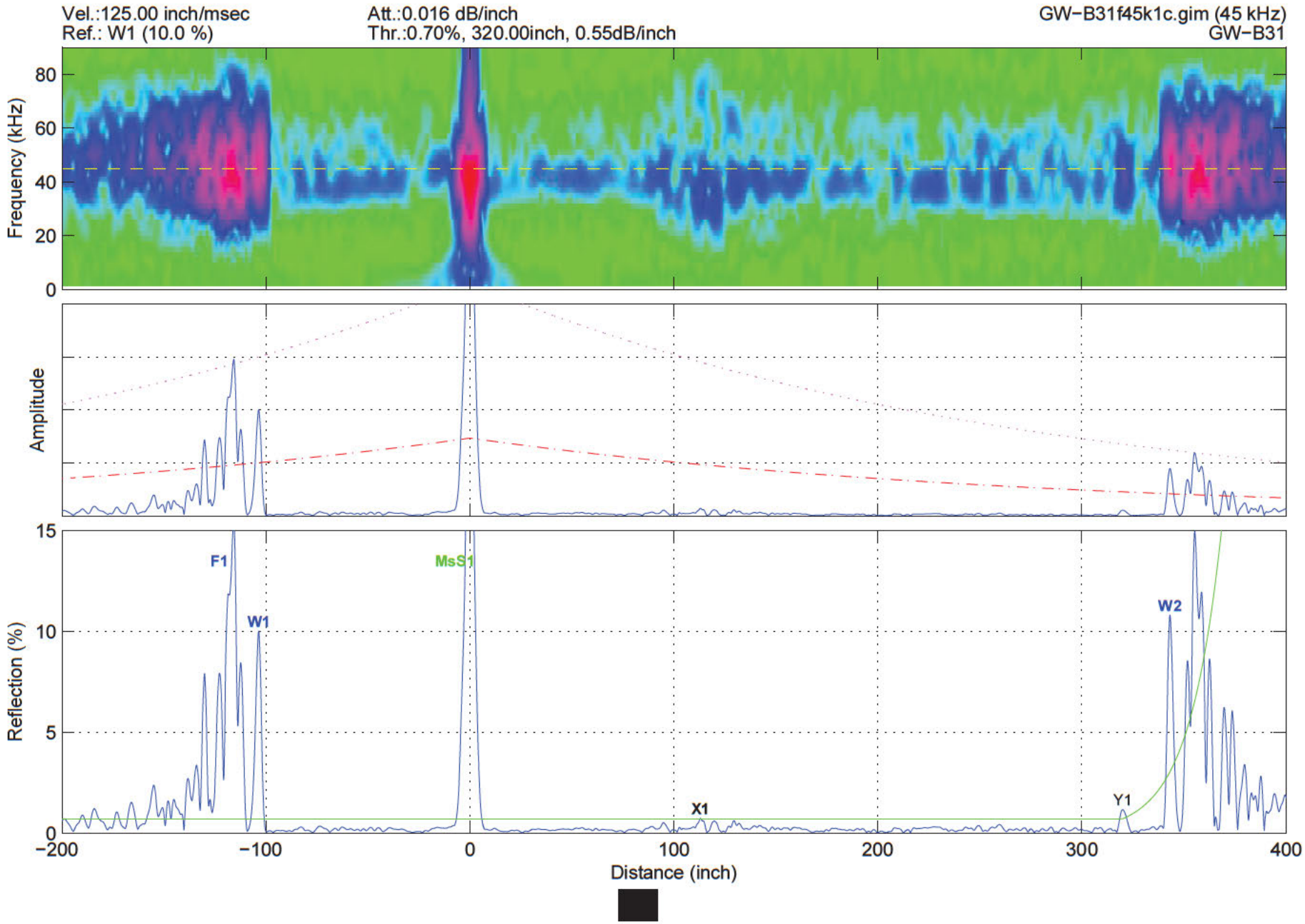

[redacted]

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

(b) (3) (A)

Remarks/Legend: W - Weld	Owner: **US Navy - Pearl Harbor, HI**			
	Drawn By: InterSpec, LLC.		Modified By: InterSpec, LLC.	
	Date: 4/2/2022	Rev No : N/A	Scale: N/A	
Drawing Title: [redacted] - B31	Description: JP-5 Line From Pump House to Surge tanks			

[redacted]

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(b) (3) (A)

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GW-B32

Guided Wave Inspection Report

Site:
Pipe ID: (b) (3) (b) (6) [redacted]

Date: 02-Apr-2022
GWT System: MsSR3030R 53100
Analysis S/W: V4.1
Procedure: GWA 4.01
Wave Mode: Torsional Mode
Inspection Range: -236.5 to -0.3 inch

Test Pipe: (b) (3) (A) [redacted]
Note:

Summary: No indication is found within the inspection range.

Sym.	Dist.(inch)	% Refl.	Comment
F1	-234.88	29.2	Flange;
W1	-198.13	18.5	Weld;
W2	-85.27	4.6	Weld;
W3	-79.68	9.6	Weld;
X1	-79.68	9.6	Directionality; |MsS-X|=79.77; EW1-EW2-EW1 (75.25, 0.43)
EW1	-66.36	23.7	Elbow Weld;
EW2	-57.21	7.6	Elbow Weld;
W4	-18.08	15.0	Weld;
MsS1	-0.27	--	Initial Pulse;
X2	19.32	2.4	Directionality; |MsS-X|=19.14; W4 (18.14, 2.29)
X3	67.01	2.0	Directionality; |MsS-X|=66.83; EW1 (66.10, 2.65)
X4	81.16	2.4	Directionality; |MsS-X|=80.99; W3 (79.98, 2.31)
X5	198.78	3.9	Directionality; |MsS-X|=198.60; W1 (197.60, 3.86)
X6	235.65	6.4	Directionality; |MsS-X|=235.47; F1 (235.06, 7.88)

[redacted]

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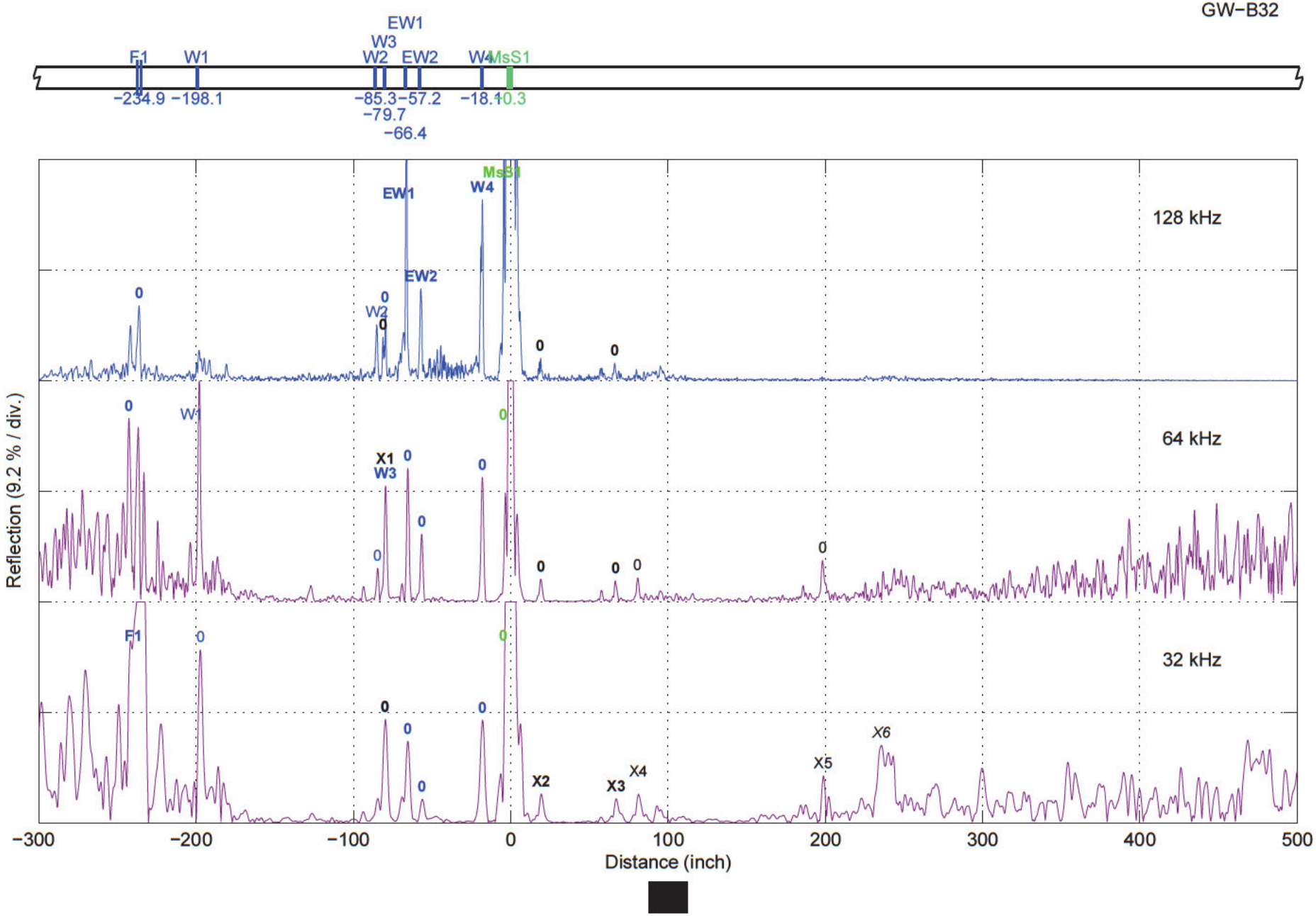
GW-B32



[522]

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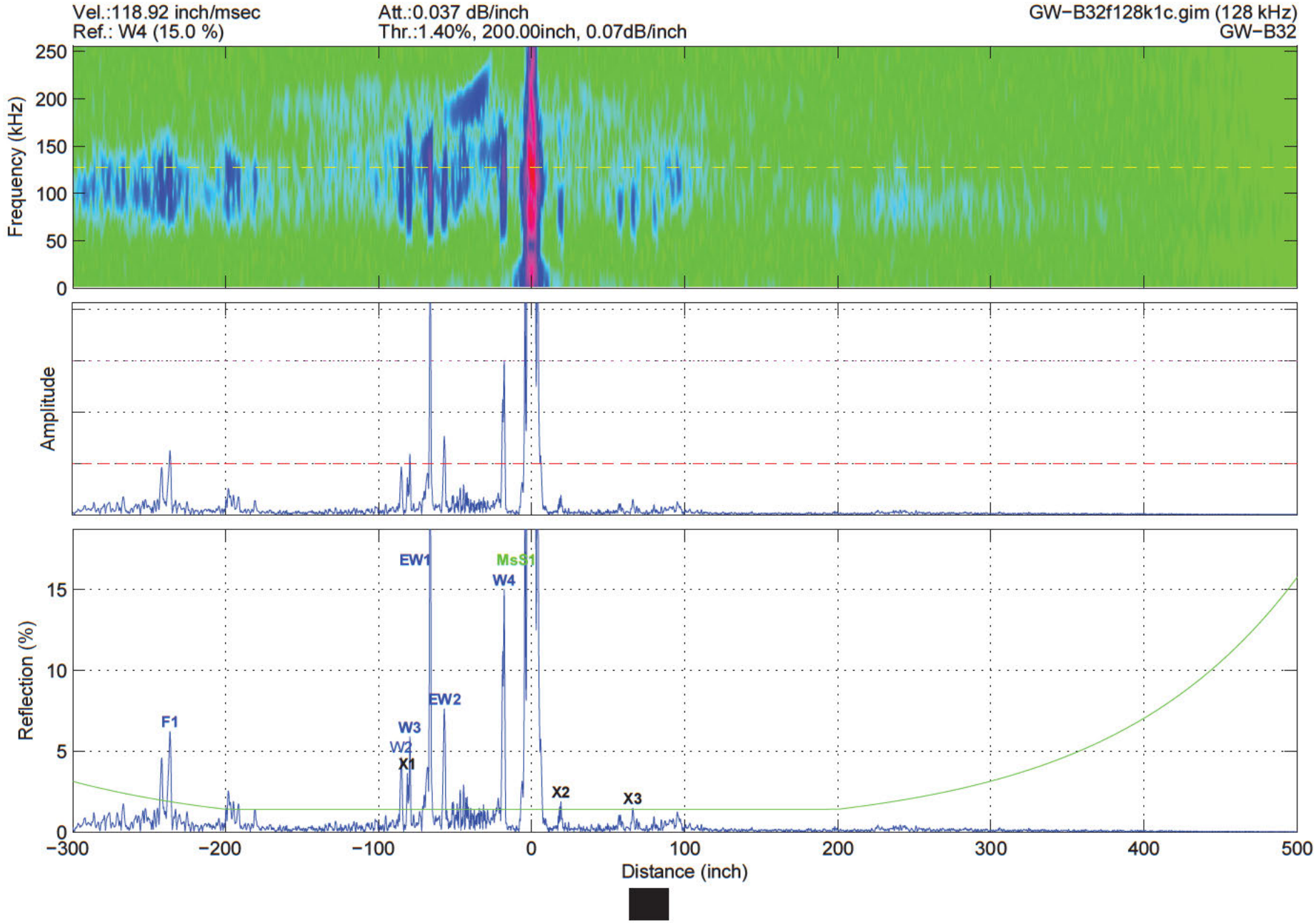

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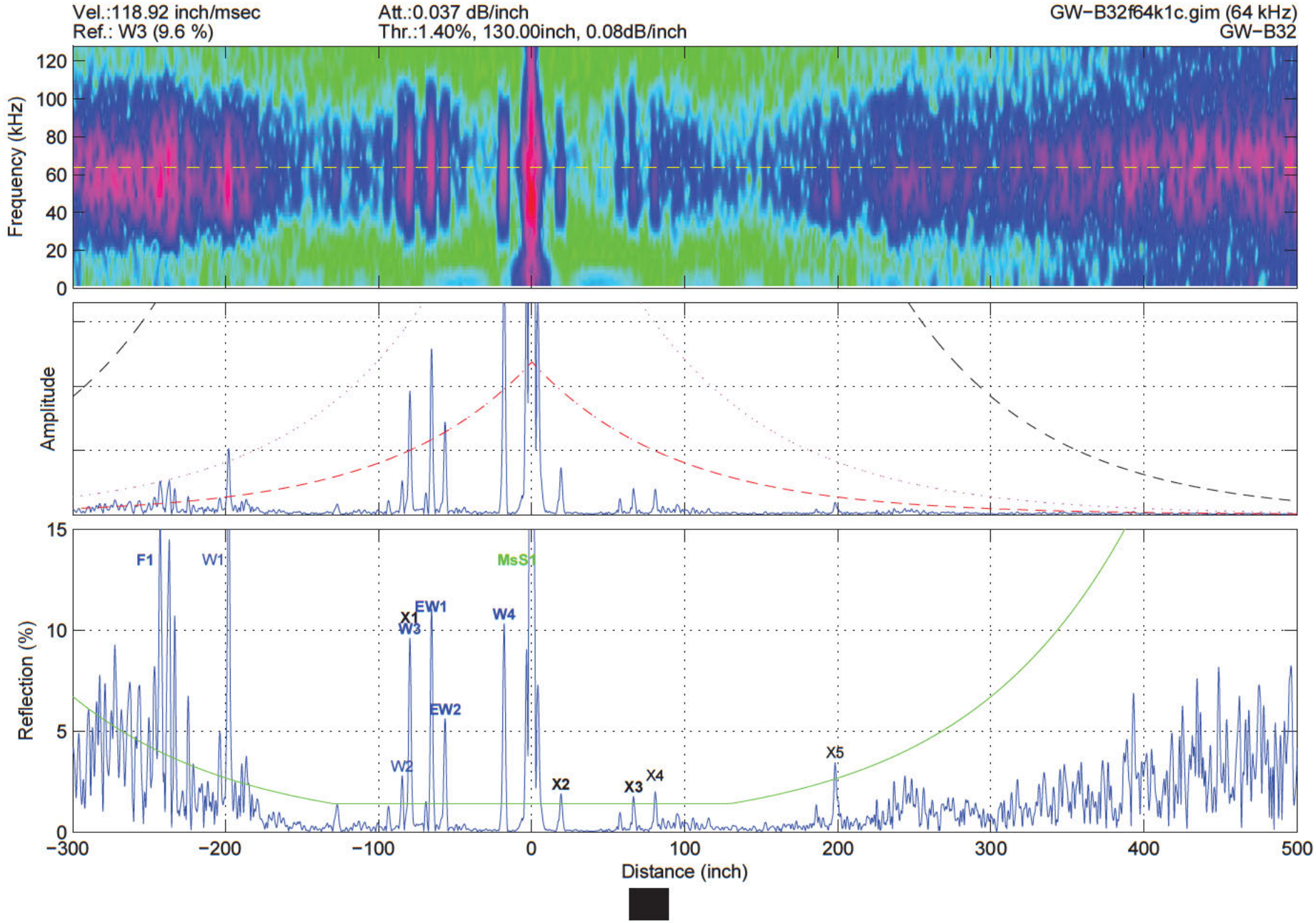

[524]

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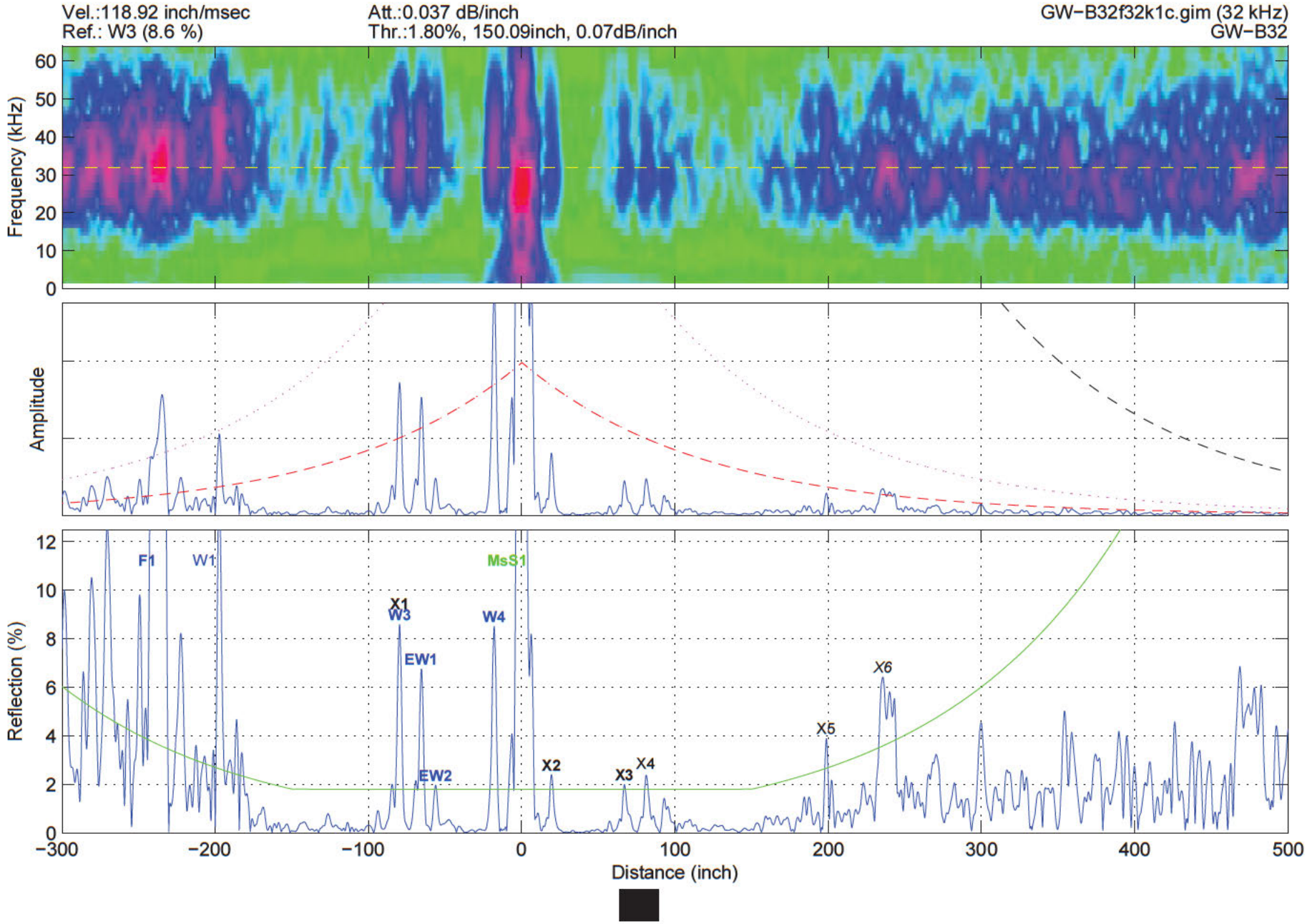

Joint Base Pearl Harbor Hickam, Pearl Harbor, HI (Project # 22-0114)

(b) (3) (A)

Remarks/Legend:

W - Weld

Owner:

US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	4/2/2022	Rev No :	N/A
Scale:	N/A		

Draw[redacted] Title:

[redacted] - B32

Description:

JP-5 Line Going Up to Tunnel Ceiling

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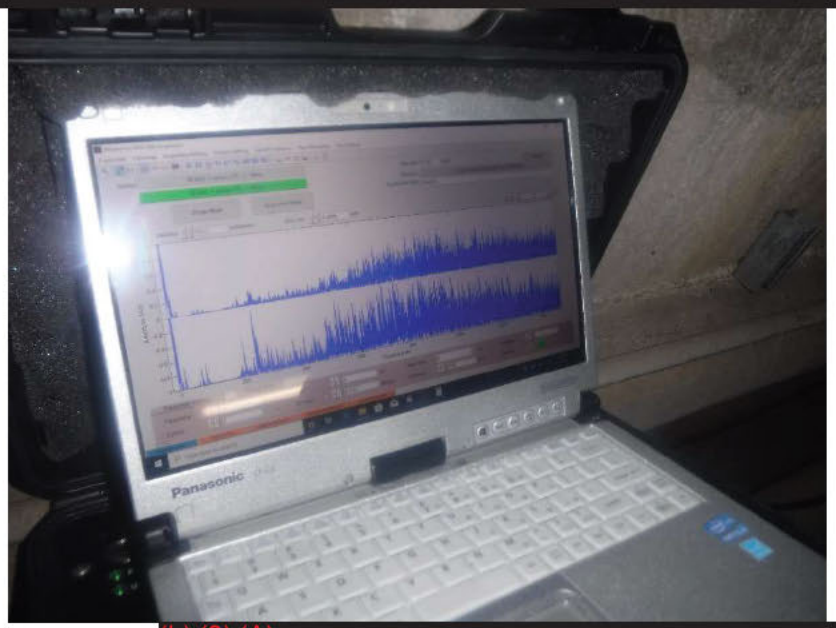
(b) (3) (A)



(b) (3) (A)

(b) (3) (A)

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Table L - Straight Beam Pipe Ultrasonic Thickness Testing Data at LRUT CMLs

CML ID #	Pipe Ultrasonic Thickness Data at LRUT Locations (Inches)			
GW B1	0.390	0.392	0.393	0.394
GW B2	-	-	-	-
GW B2A	0.228	0.232	0.234	0.230
GW B3	-	-	-	-
GW B4	0.379	0.377	0.374	0.380
GW B5	0.235	0.232	0.235	0.245
GW B6	0.253	0.252	0.252	0.250
GW B7	0.239	0.236	0.242	0.240
GW B8	0.394	0.369	0.385	0.396
GW B9	0.373	0.380	0.376	0.376
GW B10	0.362	0.370	0.357	0.361
GW B11	0.376	0.378	0.376	0.371
GW B12	0.435	0.439	0.440	0.424
GW B13	0.249	0.249	0.246	0.249
GW B14	0.237	0.242	0.241	0.243
GW B15	0.405	0.395	0.396	0.401
GW B16	0.398	0.401	0.395	0.399
GW B17	0.244	0.238	0.242	0.244
GW B18	0.236	0.237	0.241	0.237
GW B19	0.247	0.247	0.250	0.244
GW B20	0.236	0.241	0.239	0.237
GW B21	0.401	0.398	0.398	0.400
GW B22	0.250	0.250	0.247	0.249
GW B23	0.249	0.244	0.247	0.245
GW B24	0.409	0.407	0.397	0.401
GW B25	0.246	0.246	0.243	0.246
GW B26	0.240	0.236	0.245	0.248
GW B27	0.401	0.405	0.397	0.394

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Table L - Straight Beam Pipe Ultrasonic Thickness Testing Data at LRUT CMLs (Cont.)

CML ID #	Pipe Ultrasonic Thickness Data at LRUT Locations (Inches)			
GW B28	0.280	0.292	0.227	0.242
GW B29	0.278	0.271	0.275	0.274
GW B30	0.384	0.375	0.377	0.373
GW B31	0.348	0.336	0.379	0.380
GW B32	0.370	0.371	0.372	0.374

Annex B
Facility Piping Appendices

1. Appendix A (API 570 Calculations)
2. Appendix B (Thickness Data/CMLs)
3. Appendix C (Drawings)
4. Appendix D (API 570 Checklist and Site Assessment Findings/Discussion Form)
5. Appendix E (Photographs)

Appendix A

API-570 Calculations

1. Minimum Thickness Calculation
2. Remaining Life
3. Maximum Allowable Operating Pressure

Definitions

API 570 - PIPE EVALUATION

References:

API 570

7.1 - Corrosion Rate Determination
7.2 - MAOP Determination
7.3 - Minimum Required Thickness
(Reference API 574, Section 9)

ASME B31.3

304.1.2 - Internal Pressure Calculations
304.1.3 - External Pressure Calculations

Definitions:

A = factor determined from Figure G in Subpart 3 of Section II, Part D and used to enter the applicable material chart in Subpart 3 of Section II, Part D.

B = factor determined from applicable material chart in Subpart 3 of Section II, Part D for maximum design temperature.

C_a = remaining corrosion allowance of the pipe section under consideration, in inches.

C_r = corrosion rate of the pipe section under consideration, in inches per year.

d = inside diameter of the pipe section under consideration, in inches.

D = outside diameter of the pipe section under consideration, in inches.

E = Quality factor from Table A-1A

L = total length of a pipe section between lines of support, in inches.

[redacted] = the design maximum allowable internal working pressure, including static head pressure, in psi.

P_a = maximum allowable external working pressure, in psi.

R_L = estimated remaining life of the pipe section under consideration, in years.

R_o = outside radius of the pipe section consideration, in inches.

S = stress value for material from Table A-1, in psi.

t = thickness of the pipe section under consideration, variable related to applicable calculation used therein, in inches.

t_{act} = minimum thickness measurement of the pipe section under consideration, as recorded at the time of inspection, in inches.

t_{eng} = an established engineering minimum thickness that considers structural support and localized corrosion, in inches.

t_{min} = minimum required thickness of pipe section, as calculated from the MOWP at the coinciding working temperature or t_{eng} thickness, whichever is greater, in inches.

t_{nom} = design nominal thickness of pipe section, in inches.

t_{prev} = original thickness of the pipe section under consideration, as recorded at first inspection or nominal thickness if no original thickness measurements were for t_{prev}, in years.

Y = time span between thickness readings or age of the pipe section if t_{nom} is used for $tprev$, in years.

Y_n = estimated time span to next inspection of the vessel part under consideration, in years.

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
20	20	0.375	275

[redacted]	D	S	E
275	20.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.171 [redacted]

$t_{eng} =$ 0.120 [redacted]

$t_{use} =$ 0.171 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.171	0.318	0.375	79

$C_a = t_{act} - t_{use} =$ 0.147 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000722 [redacted] *year*

$R_L = C_a / C_r =$ 204 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.318	5	0.000722

$t_{req} = t_{act} - 2Y_n C_r =$ 0.311 [redacted]

S	E	t_{req}	D
20,000	0.8	0.311	20.000

[redacted] $= 2t_{req} SE/D =$ 498 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
12	STD	0.375	275

[redacted]	D	S	E
275	12.750	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.109 *inches*

$t_{eng} =$ 0.110 *inches*

$t_{use} =$ 0.110 *inches*

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.110	0.320	0.375	79

$C_a = t_{act} - t_{use} =$ 0.210 *inches*

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000696 *inches/year*

$R_L = C_a / C_r =$ 302 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.320	5	0.000696

$t_{req} = t_{act} - 2Y_n C_r =$ 0.313 *inches*

S	E	t_{req}	D
20,000	0.8	0.313	12.750

[redacted] $= 2t_{req} SE/D =$ 786 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
16	10	0.250	275

[redacted]	D	S	E
275	16.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.137 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.137 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.137	0.240	0.250	79

$C_a = t_{act} - t_{use} =$ 0.103 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000127 [redacted] *year*

$R_L = C_a / C_r =$ 811 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.240	5	0.000127

$t_{req} = t_{act} - 2Y_n C_r =$ 0.239 [redacted]

S	E	t_{req}	D
20,000	0.8	0.239	16.000

[redacted] $= 2t_{req} SE/D =$ 478 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
18	10	0.250	275

[redacted]	D	S	E
275	18.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.154 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.154 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.154	0.231	0.250	79

$C_a = t_{act} - t_{use} =$ 0.077 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000241 [redacted] *year*

$R_L = C_a / C_r =$ 320 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.231	5	0.000241

$t_{req} = t_{act} - 2Y_n C_r =$ 0.229 [redacted]

S	E	t_{req}	D
20,000	0.8	0.229	18.000

[redacted] $= 2t_{req} SE/D =$ 407 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
32	STD	0.375	275

[redacted]	D	S	E
275	32.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.274 [redacted]

$t_{eng} =$ 0.150 [redacted]

$t_{use} =$ 0.274 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.274	0.342	0.375	79

$C_a = t_{act} - t_{use} =$ 0.068 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000418 [redacted] *year*

$R_L = C_a / C_r =$ 163 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.342	5	0.000418

$t_{req} = t_{act} - 2Y_n C_r =$ 0.338 [redacted]

S	E	t_{req}	D
20,000	0.8	0.338	32.000

[redacted] $= 2t_{req} SE/D =$ 338 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
16	10	0.250	275

[redacted]	D	S	E
275	16.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.137 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.137 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.137	0.193	0.250	79

$C_a = t_{act} - t_{use} =$ 0.056 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000722 [redacted] *year*

$R_L = C_a / C_r =$ 78 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.193	5	0.000722

$t_{req} = t_{act} - 2Y_n C_r =$ 0.186 [redacted]

S	E	t_{req}	D
20,000	0.8	0.186	16.000

[redacted] $= 2t_{req}SE/D =$ 372 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
18	10	0.250	275

[redacted]	D	S	E
275	18.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.154 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.154 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.154	0.192	0.250	79

$C_a = t_{act} - t_{use} =$ 0.038 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000734 [redacted] *year*

$R_L = C_a / C_r =$ 52 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.192	5	0.000734

$t_{req} = t_{act} - 2Y_n C_r =$ 0.185 [redacted]

S	E	t_{req}	D
20,000	0.8	0.185	18.000

[redacted] $= 2t_{req} SE/D =$ 329 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
32	STD	0.375	275

[redacted]	D	S	E
275	32.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.274 [redacted]

$t_{eng} =$ 0.150 [redacted]

$t_{use} =$ 0.274 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.274	0.344	0.375	79

$C_a = t_{act} - t_{use} =$ 0.070 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000392 [redacted] *year*

$R_L = C_a / C_r =$ 179 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.344	5	0.000392

$t_{req} = t_{act} - 2Y_n C_r =$ 0.340 [redacted]

S	E	t_{req}	D
20,000	0.8	0.340	32.000

[redacted] $= 2t_{req} SE/D =$ 340 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
18	10	0.250	275

[redacted]	D	S	E
275	18.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.154 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.154 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.154	0.224	0.250	79

$C_a = t_{act} - t_{use} =$ 0.070 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000329 [redacted] *year*

$R_L = C_a / C_r =$ 213 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.224	5	0.000329

$t_{req} = t_{act} - 2Y_n C_r =$ 0.221 [redacted]

S	E	t_{req}	D
20,000	0.8	0.221	18.000

[redacted] $= 2t_{req} SE/D =$ 393 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
24	20	0.375	275

[redacted]	D	S	E
275	24.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.206 [redacted]

$t_{eng} =$ 0.130 [redacted]

$t_{use} =$ 0.206 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.206	0.341	0.375	79

$C_a = t_{act} - t_{use} =$ 0.135 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.00043 [redacted] *year*

$R_L = C_a / C_r =$ 314 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.341	5	0.00043

$t_{req} = t_{act} - 2Y_n C_r =$ 0.337 [redacted]

S	E	t_{req}	D
20,000	0.8	0.337	24.000

[redacted] $= 2t_{req} SE/D =$ 449 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
16	STD	0.375	275

[redacted]	D	S	E
275	16.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.137 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.137 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.137	0.360	0.375	79

$C_a = t_{act} - t_{use} =$ 0.223 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.00019 [redacted] *year*

$R_L = C_a / C_r =$ 1174 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.360	5	0.00019

$t_{req} = t_{act} - 2Y_n C_r =$ 0.358 [redacted]

S	E	t_{req}	D
20,000	0.8	0.358	16.000

[redacted] $= 2t_{req} SE/D =$ 716 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
16	10	0.250	275

[redacted]	D	S	E
275	16.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.137 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.137 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.137	0.241	0.250	79

$C_a = t_{act} - t_{use} =$ 0.104 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000114 [redacted] *year*

$R_L = C_a / C_r =$ 912 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.241	5	0.000114

$t_{req} = t_{act} - 2Y_n C_r =$ 0.240 [redacted]

S	E	t_{req}	D
20,000	0.8	0.240	16.000

[redacted] $= 2t_{req} SE/D =$ 480 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
16	10	0.250	275

[redacted]	D	S	E
275	16.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.137 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.137 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.137	0.241	0.250	79

$C_a = t_{act} - t_{use} =$ 0.104 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000114 [redacted] *year*

$R_L = C_a / C_r =$ 912 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.241	5	0.000114

$t_{req} = t_{act} - 2Y_n C_r =$ 0.240 [redacted]

S	E	t_{req}	D
20,000	0.8	0.240	16.000

[redacted] $= 2t_{req} SE/D =$ 480 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
32	STD	0.375	275

[redacted]	D	S	E
275	32.000	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.274 [redacted]

$t_{eng} =$ 0.150 [redacted]

$t_{use} =$ 0.274 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.274	0.336	0.375	79

$C_a = t_{act} - t_{use} =$ 0.062 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000494 [redacted] *year*

$R_L = C_a / C_r =$ 126 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.336	5	0.000494

$t_{req} = t_{act} - 2Y_n C_r =$ 0.331 [redacted]

S	E	t_{req}	D
20,000	0.8	0.331	32.000

[redacted] $= 2t_{req} SE/D =$ 331 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
4	40	0.237	275

[redacted]	D	S	E
275	4.5	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.039 [redacted]

$t_{eng} =$ 0.090 [redacted]

$t_{use} =$ 0.090 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.090	0.211	0.237	79

$C_a = t_{act} - t_{use} =$ 0.121 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000329 [redacted] *year*

$R_L = C_a / C_r =$ 368 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.211	5	0.000329

$t_{req} = t_{act} - 2Y_n C_r =$ 0.208 [redacted]

S	E	t_{req}	D
20,000	0.8	0.208	4.5

[redacted] $= 2t_{req} SE/D =$ 1479 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MA0P Calculations

(b) (3) (A) [redacted]

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
6	40	0.280	275

[redacted]	D	S	E
275	6.625	20,000	0.8

$t_{min} = PD/2(SE+0.4P) =$ 0.057 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.110 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.110	0.219	0.280	79

$C_a = t_{act} - t_{use} =$ 0.109 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.000772 [redacted] *year*

$R_L = C_a / C_r =$ 141 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: 5 *years*

UT Inspection: 5 *years*

t_{act}	Y_n	C_r
0.219	5	0.000772

$t_{req} = t_{act} - 2Y_n C_r =$ 0.211 [redacted]

S	E	t_{req}	D
20,000	0.8	0.211	6.625

[redacted] $= 2t_{req} SE/D =$ 1019 *psi*

[redacted]

[redacted]

Piping Evaluation

Pipe Wall Minimum Thickness, Remaining Life, and MAOP Calculations

(b) (3) (A)

A) Minimum Thickness Calculation

NPS	Schedule	t_{nom}	MAOP
6	40	0.280	275

[redacted]	D	S	E
275	6.625	20,000	0.8

$_{min} = PD/2(SE+0.4P) =$ 0.057 [redacted]

$t_{eng} =$ 0.110 [redacted]

$t_{use} =$ 0.110 [redacted]

* t_{use} is greater of t_{min} and t_{eng}

B) Remaining Life

t_{use}	t_{act}	t_{prev}	ΔY
0.110	0.090	0.280	79

$C_a = t_{act} - t_{use} =$ -0.020 [redacted]

$C_r = t_{prev} - t_{act} / \Delta Y =$ 0.002405 [redacted] *year*

$R_L = C_a / C_r =$ -8 *years*

C) MAOP at Next UT Inspection

Pipe Class: 1

Next Inspection (Y_n):

Visual Inspection: -4 *years*

UT Inspection: -4 *years*

t_{act}	Y_n	C_r
0.090	-4	0.002405

$t_{req} = t_{act} - 2Y_n C_r =$ 0.109 [redacted]

S	E	t_{req}	D
20,000	0.8	0.109	6.625

[redacted] $= 2t_{req} SE/D =$ 526 *psi*

[redacted]

Appendix B

Thickness Data/CMLs

[redacted]

Table M1 - API STD 570 Thickness Data & TML

TML ID	(b) (3) (A)	Pipe Size (in.)	Pipe Sch.	Thickness Measurements (in inches) (Metal Thickness)				
				Nom.	0º	90º	270º	180º
G1		(b) (3) (A)		0.375	0.353	0.348	0.348	0.352
G2				0.375	0.343	0.353	0.350	0.357
G3				0.375	0.260	0.259	0.255	0.258
G4				0.250	NA	0.231	0.266	0.236
G5				0.375	NA	0.377	0.371	0.377
G6				0.375	0.351	0.351	0.349	0.352
G7				0.375	0.350	0.349	0.352	0.352
G8				0.375	0.354	0.357	0.357	0.354
G9				0.375	0.351	0.349	0.348	0.352
G10				0.375	0.372	0.360	0.376	0.368
G11				0.250	0.238	0.243	0.239	0.241
G12				0.375	NA	0.383	0.355	0.379
G13				0.375	0.352	0.357	0.358	0.354
G14				0.375	0.351	0.320	0.344	0.346
G15				0.375	0.318	0.348	0.344	0.355
G16				0.375	0.330	0.354	0.357	0.359
G17				0.375	0.383	0.369	0.379	0.367
G18				0.250	0.252	0.252	0.240	0.244
G19				0.375	NA	0.381	0.364	0.381
G20				0.375	0.350	0.348	0.347	0.354
G21				0.375	0.347	0.353	0.352	0.349
G22				0.375	0.346	0.350	0.353	0.354
G23				0.375	0.354	0.348	0.345	0.349
G24				0.375	NA	0.368	0.363	0.367
G25				0.250	NA	0.265	0.235	0.245
G26				0.375	NA	0.343	0.347	0.342
G27				0.375	0.349	0.349	0.357	0.349
G28				0.375	0.346	0.344	0.344	0.335
G29				0.375	0.348	0.356	0.341	0.350
G30				0.375	0.352	0.350	0.352	0.344
G31				0.250	NA	0.257	0.244	0.251
G32				0.250	0.252	0.245	0.239	0.252
G33				0.375	0.387	0.357	0.395	0.395
G34				0.375	0.381	0.353	0.354	0.356
G35				0.375	0.345	0.347	0.350	0.350
G36				0.375	0.344	0.353	0.352	0.355
G37				0.375	0.362	0.361	0.359	0.355
G38				0.250	NA	NA	0.244	NA
G39				0.250	NA	0.240	0.246	0.247
G40				0.375	NA	0.387	0.371	0.400
G41				0.375	0.342	0.347	0.350	0.358
G42				0.375	0.356	0.361	0.357	0.363
G43				0.375	0.350	0.349	0.344	0.340
G44				0.375	0.351	0.350	0.345	0.350
G45				-	NA	NA	NA	NA
G46				0.250	NA	0.256	0.246	0.233
G47				0.375	NA	0.371	0.371	0.369

[redacted]

(b) (3) (A)

G48	[redacted]	0.375	0.351	0.353	0.349	0.343
G49		0.375	0.356	0.358	0.348	0.362
G50		0.375	0.353	0.349	0.352	0.352
G51		0.375	0.353	0.349	0.352	0.349
G52		0.250	NA	0.258	0.240	0.246
G53		0.250	0.253	0.256	0.237	0.241
G54		0.375	0.391	0.405	0.390	0.386
G55		0.375	0.356	0.354	0.344	0.357
G56		0.375	0.348	0.337	0.345	0.346

[redacted]

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	Location/Description	Pipe Size (in.)	Pipe Sch.	Thickness Measurements (in inches) (Coating Thickness)				
				Nom.	0º	90º	180º	270º
G1	(b) (3) (A)		-	-	0.021	0.029	0.024	0.028
G2			-	-	0.031	0.033	0.028	0.030
G3			-	-	0.023	0.022	0.029	0.030
G4			-	-	NA	0.018	0.022	0.023
G5			-	-	NA	0.020	0.020	0.016
G6			-	-	0.025	0.026	0.039	0.022
G7			-	-	0.024	0.035	0.038	0.034
G8			-	-	0.016	0.026	0.033	0.033
G9			-	-	0.016	0.019	0.022	0.020
G10			-	-	0.010	0.012	0.016	0.010
G11			-	-	0.021	0.022	0.011	0.020
G12			-	-	NA	0.031	0.025	0.022
G13			-	-	0.026	0.021	0.024	0.019
G14			-	-	0.024	0.044	0.024	0.029
G15			-	-	0.041	0.031	0.029	0.025
G16			-	-	0.044	0.031	0.033	0.028
G17			-	-	0.017	0.021	0.033	0.019
G18			-	-	0.009	0.007	0.027	0.021
G19			-	-	NA	0.028	0.030	0.023
G20			-	-	0.026	0.026	0.040	0.025
G21			-	-	0.020	0.024	0.038	0.029
G22			-	-	0.037	0.029	0.037	0.035
G23			-	-	0.030	0.036	0.033	0.032
G24			-	-	NA	0.022	0.027	0.028
G25			-	-	NA	0.038	0.027	0.021
G26			-	-	NA	0.024	0.039	0.061
G27			-	-	0.031	0.031	0.057	0.048
G28			-	-	0.028	0.033	0.036	0.033
G29			-	-	0.028	0.026	0.040	0.020
G30			-	-	0.026	0.032	0.035	0.031
G31			-	-	NA	0.027	0.038	0.030
G32			-	-	0.025	0.024	0.021	0.034
G33			-	-	0.031	0.035	0.017	0.017
G34			-	-	0.024	0.027	0.044	0.028
G35			-	-	0.035	0.029	0.028	0.034
G36			-	-	0.036	0.022	0.031	0.023
G37			-	-	0.023	0.024	0.026	0.030
G38			-	-	NA	NA	0.025	NA
G39			-	-	NA	0.039	0.031	0.029
G40			-	-	NA	0.016	0.017	0.026
G41			-	-	0.038	0.038	0.060	0.068
G42			-	-	0.026	0.027	0.027	0.027
G43			-	-	0.021	0.028	0.035	0.029
G44			-	-	0.031	0.026	0.034	0.023
G45			-	-	NA	NA	NA	NA
G46			-	-	NA	0.043	0.028	0.024
G47			-	-	NA	0.021	0.025	0.023

(b) (3) (A)

G48	-	-	0.025	0.026	0.031	0.027
G49	-	-	0.023	0.028	0.040	0.031
G50	-	-	0.023	0.021	0.028	0.026
G51	-	-	0.028	0.028	0.040	0.032
G52	-	-	NA	0.062	0.019	0.025
G53	-	-	0.044	0.053	0.030	0.034
G54	-	-	0.024	0.033	0.021	0.024
G55	-	-	0.026	0.024	0.051	0.032
G56	-	-	0.031	0.042	0.040	0.027

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	Location/Description	Pipe Size (in.)	Pipe Sch.	Thickness Measurements (in inches) (Metal Thickness) Nom.	0º	90º	270º	180º
H1	(b) (3) (A)		10	0.250	0.246	0.244	0.250	0.253
H2			10	0.250	0.232	0.228	0.241	0.228
H3			STD	0.375	0.397	0.382	0.368	0.372
H4			10	0.250	0.261	0.259	0.251	0.247
H5			10	0.250	0.240	0.236	0.237	0.255
H6			STD	0.375	0.369	0.406	0.404	0.386
H7			10	0.250	0.257	0.257	0.255	0.255
H8			10	0.250	0.239	0.248	0.239	0.237
H9			STD	0.375	0.395	0.375	0.384	0.402
H10			10	0.250	0.254	0.252	0.247	0.251
H11			10	0.250	0.245	0.242	0.233	0.248
H12			STD	0.375	0.386	0.375	0.379	0.387
H13			10	0.250	0.223	0.250	0.252	0.252
H14			10	0.250	0.247	0.248	0.243	0.241
H15			STD	0.375	0.364	0.371	0.360	0.373
H16			10	0.250	0.249	0.256	0.251	0.248
H17			10	0.250	0.243	0.243	0.236	0.228
H18			STD	0.375	0.401	0.368	0.398	0.410
H19			10	0.250	0.256	0.258	0.252	0.258
H20			10	0.250	0.237	0.240	0.242	0.239
H21			STD	0.375	0.404	0.404	0.398	0.394
H22			10	0.250	0.268	0.269	0.265	0.269
H23			10	0.250	0.230	0.249	0.244	0.258
H24			STD	0.375	0.403	0.413	0.406	0.395
H25			10	0.250	0.254	0.226	0.254	0.257
H26			10	0.250	0.227	0.241	0.258	0.249
H27			STD	0.375	0.409	0.412	0.402	0.395
H28			10	0.250	0.249	0.250	0.251	0.255
H29			10	0.250	0.253	0.241	0.229	0.230
H30			STD	0.375	0.392	0.394	0.392	0.379
H31			10	0.250	0.245	0.248	0.244	0.247
H32			10	0.250	0.230	0.237	0.247	0.247
H33			STD	0.375	0.392	0.413	0.414	0.389
H34			10	0.250	0.255	0.255	0.254	0.252
H35			10	0.250	0.239	0.243	0.246	NA
H36			STD	0.375	0.376	0.392	0.392	0.392
H37			10	0.250	0.260	0.258	0.256	0.258
H38			10	0.250	0.246	0.246	0.240	0.239
H39			STD	0.375	0.380	0.375	0.396	0.388
H40			10	0.250	0.249	0.250	0.244	0.244
H41			10	0.250	0.242	0.237	0.242	0.238
H42			STD	0.375	0.371	0.387	0.354	0.382
H43			10	0.250	0.241	0.239	0.236	0.235
H44			10	0.250	0.233	0.239	0.243	0.236
H45			STD	0.375	0.404	0.389	0.409	0.413
H46			10	0.250	0.254	0.240	0.248	0.245
H47			10	0.250	0.225	0.213	0.239	0.242

(b) (3) (A)

H48	[redacted]	0.375	0.404	0.386	0.386	0.401
H49		0.250	0.254	0.251	0.250	0.251
H50		0.250	0.248	0.249	0.245	0.245
H51		0.375	0.411	0.407	0.391	0.385
H52		0.250	0.251	0.252	0.251	0.252
H53		0.250	0.239	0.242	0.245	0.243
H54		0.375	0.403	0.416	0.421	0.388
H55		0.250	0.254	0.256	0.255	0.259
H56		0.250	0.250	0.243	0.247	0.246
H57		0.375	0.388	0.404	0.405	0.406
H58		0.250	0.263	0.260	0.263	0.261
H59		0.250	0.254	0.224	0.218	0.237
H60		0.375	0.389	0.385	0.381	0.391
H61		0.250	0.246	0.248	0.246	0.248
H62		0.250	0.224	0.242	0.231	0.248
H63		0.375	0.404	0.405	0.396	0.401
H64		0.250	0.228	0.260	0.261	0.258
H65		0.250	0.234	0.230	0.265	0.246
H66		0.375	0.371	0.373	0.372	0.372
H67		0.250	0.237	0.243	0.238	0.240
H68		0.250	0.242	0.217	0.238	0.236
H69		0.375	0.415	0.419	0.411	0.413
H70		0.250	0.225	0.256	0.252	0.255
H71		0.250	0.243	0.231	0.243	0.241
H72		0.375	0.380	0.368	0.390	0.388
H73		0.250	0.247	0.249	0.244	0.251
H74		0.250	0.239	0.234	0.218	0.242
H75		0.375	0.405	0.393	0.376	0.409
H76		0.250	0.256	0.255	0.252	0.255
H77		0.250	0.254	0.231	0.253	0.250
H78		0.375	0.391	0.396	0.391	0.390
H79		0.250	0.252	0.250	0.245	0.252
H80		0.250	0.226	0.240	0.244	0.242
H81		0.375	0.398	0.406	0.408	0.387
H82		0.250	0.256	0.256	0.250	0.253
H83		0.250	0.235	0.229	0.245	0.240
H84		0.375	0.360	0.376	0.380	0.370
H85		0.250	0.254	0.254	0.250	0.250
H86		0.250	0.261	0.240	0.258	0.241
H87		0.375	0.408	0.397	0.380	0.409
H88		0.250	0.359	0.250	0.252	0.255
H89		0.250	0.238	0.250	0.251	0.253
H90		0.375	0.404	0.387	0.384	0.414
H91		0.250	0.250	0.243	0.243	0.237
H92		0.250	0.246	0.235	0.239	0.232
H93		0.375	0.388	0.381	0.384	0.384
H94		0.250	0.245	0.246	0.239	0.241
H95		0.250	0.239	0.225	0.239	0.239
H96		0.375	0.387	0.405	0.408	0.378
H97		0.250	0.248	0.250	0.246	0.252
H98		0.250	0.237	0.235	0.247	0.238
H99		0.375	0.399	0.385	0.352	0.397

(b) (3) (A)

H100	0.250	0.253	0.253	0.250	0.252
H101	0.250	0.246	0.248	0.249	0.247
H102	0.375	0.393	0.357	0.391	0.387
H103	0.250	0.251	0.250	0.251	0.218
H104	0.250	0.242	0.206	0.246	0.235
H105	0.375	0.391	0.373	0.399	0.402
H106	0.250	0.260	0.261	0.227	0.255
H107	0.250	0.232	0.241	0.245	0.240
H108	0.375	0.388	0.387	0.384	0.382
H109	0.250	0.249	0.251	0.250	0.249
H110	0.250	0.233	0.203	0.210	0.237
H111	0.375	0.404	0.402	0.390	0.407
H112	0.250	0.236	0.248	0.239	NA
H113	0.250	0.241	0.244	0.239	0.244
H114	0.375	0.389	0.387	0.392	0.403
H115	0.250	0.250	0.251	0.243	0.250
H116	0.250	0.245	0.252	0.243	0.252
H117	0.375	0.388	0.392	0.394	0.401
H118	0.250	0.245	0.239	0.241	0.249
H119	0.250	0.235	0.236	0.235	0.222
H120	0.375	0.420	0.409	0.367	0.419
H121	0.250	0.262	0.265	0.253	0.259
H122	0.250	0.224	0.224	0.236	0.236
H123	0.375	0.384	0.368	0.384	0.390
H124	0.250	0.255	0.259	0.193	0.248
H125	0.250	0.234	0.221	0.231	0.237
H126	0.375	0.408	0.406	0.406	0.403
H127	0.250	0.254	0.257	0.256	0.257
H128	0.250	0.255	0.248	0.244	0.239
H129	0.375	0.378	0.384	0.385	0.373
H130	0.250	0.251	0.252	0.249	0.257
H131	0.250	0.240	0.237	0.255	0.227
H132	0.375	0.369	0.383	0.388	0.371
H133	0.250	0.247	0.242	0.235	0.244
H134	0.250	0.224	0.229	0.240	0.235
H135	0.375	0.399	0.385	0.400	0.400
H136	0.250	0.346	0.346	0.349	0.351
H137	0.250	0.238	0.239	0.239	0.239
H138	0.375	0.389	0.370	0.372	0.394
H139	0.250	0.232	0.250	0.254	0.256
H140	0.250	0.203	0.246	0.241	0.229
H141	0.375	0.378	0.390	0.380	0.378
H142	0.250	0.246	0.248	0.244	0.249
H143	0.250	0.244	0.244	0.247	0.246
H144	0.375	0.395	0.375	0.386	0.407
H145	0.250	0.247	0.249	0.248	0.238
H146	0.250	0.233	0.229	0.256	0.240
H147	0.375	0.401	0.411	0.403	0.403
H148	0.250	0.239	0.236	0.244	0.244
H149	0.250	0.237	0.248	0.248	0.241
H150	0.375	0.411	0.420	0.414	0.403
H151	0.250	0.250	0.250	0.249	0.253

(b) (3) (A)

H152	0.250	0.239	0.242	0.244	0.247
H153	0.375	0.407	0.420	0.410	0.403
H154	0.250	0.216	0.241	0.242	0.244
H155	0.250	0.242	0.242	0.226	0.245
H156	0.375	0.399	0.401	0.403	0.387
H157	0.250	0.243	0.246	0.240	0.240
H158	0.250	0.225	0.241	0.238	0.242
H159	0.375	0.386	0.378	0.384	0.396
H160	0.250	0.253	0.247	0.250	0.245
H161	0.250	0.230	0.238	0.240	0.232
H162	0.375	0.393	0.395	0.403	0.384
H163	0.250	0.244	0.246	0.253	0.250
H164	0.250	0.269	0.251	0.192	0.248
H165	0.375	0.394	0.375	0.395	0.396
H166	0.250	0.248	0.251	0.248	0.246
H167	0.250	0.244	0.237	0.248	0.228
H168	0.375	0.388	0.390	0.381	0.390
H169	0.250	0.252	0.251	0.249	0.222
H170	0.250	0.251	0.250	0.245	0.245
H171	0.375	0.370	0.383	0.378	0.356
H172	0.250	0.249	0.242	0.241	0.247
H173	0.250	0.245	0.245	0.245	0.247
H174	0.375	0.386	0.382	0.369	0.359
H175	0.250	0.253	0.254	0.252	0.247
H176	0.250	0.238	0.236	0.235	0.229
H177	0.375	0.374	0.386	0.409	0.395
H178	0.375	0.373	0.360	0.321	0.351
H179	0.250	NA	0.248	0.246	0.243
H180	0.375	NA	0.344	0.387	0.412
H181	0.375	0.371	0.371	0.380	0.351
H182	0.250	0.241	0.240	0.242	0.239
H183	0.375	0.379	0.388	0.376	0.379

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	Location/Description	Pipe Size (in.)	Pipe Sch.	Thickness Measurements (in inches) (Coating Thickness)				
				Nom.	0º	90º	270º	180º
H1	(b) (3) (A)		-	-	0.023	0.024	0.033	0.012
H2			-	-	0.031	0.033	0.014	0.030
H3			-	-	0.022	0.025	0.021	0.019
H4			-	-	0.009	0.008	0.012	0.014
H5			-	-	0.008	0.007	0.009	0.051
H6			-	-	0.023	0.010	0.008	0.007
H7			-	-	0.007	0.009	0.004	0.008
H8			-	-	0.008	0.004	0.006	0.007
H9			-	-	0.009	0.007	0.011	0.006
H10			-	-	0.003	0.004	0.006	0.003
H11			-	-	0.004	0.005	0.007	0.004
H12			-	-	0.007	0.006	0.005	0.006
H13			-	-	0.019	0.003	0.005	0.008
H14			-	-	0.005	0.008	0.012	0.007
H15			-	-	0.018	0.012	0.013	0.006
H16			-	-	0.019	0.009	0.008	0.006
H17			-	-	0.008	0.011	0.007	0.005
H18			-	-	0.009	0.010	0.009	0.007
H19			-	-	0.008	0.005	0.010	0.003
H20			-	-	0.011	0.009	0.010	0.012
H21			-	-	0.007	0.009	0.007	0.005
H22			-	-	0.004	0.005	0.010	0.004
H23			-	-	0.005	0.005	0.011	0.007
H24			-	-	0.007	0.007	0.007	0.008
H25			-	-	0.006	0.019	0.006	0.003
H26			-	-	0.016	0.016	0.016	0.016
H27			-	-	0.007	0.009	0.009	0.007
H28			-	-	0.006	0.006	0.006	0.007
H29			-	-	0.010	0.008	0.036	0.035
H30			-	-	0.006	0.010	0.012	0.009
H31			-	-	0.004	0.005	0.004	0.003
H32			-	-	0.005	0.003	0.005	0.009
H33			-	-	0.008	0.005	0.004	0.011
H34			-	-	0.009	0.006	0.010	0.005
H35			-	-	0.011	0.010	0.008	NA
H36			-	-	0.006	0.008	0.009	0.009
H37			-	-	0.006	0.007	0.008	0.008
H38			-	-	0.005	0.007	0.012	0.020
H39			-	-	0.009	0.009	0.016	0.011
H40			-	-	0.015	0.017	0.011	0.010
H41			-	-	0.010	0.009	0.011	0.014
H42			-	-	0.010	0.006	0.032	0.008
H43			-	-	0.008	0.012	0.013	0.009
H44			-	-	0.017	0.014	0.010	0.009
H45			-	-	0.019	0.018	0.012	0.013
H46			-	-	0.007	0.018	0.007	0.020
H47			-	-	0.012	0.017	0.011	0.012

(b) (3) (A)

H48	-	-	0.004	0.007	0.006	0.012
H49	-	-	0.004	0.008	0.003	0.005
H50	-	-	0.007	0.005	0.006	0.008
H51	-	-	0.013	0.006	0.007	0.029
H52	-	-	0.004	0.006	0.006	0.008
H53	-	-	0.006	0.005	0.003	0.004
H54	-	-	0.007	0.011	0.010	0.008
H55	-	-	0.011	0.009	0.009	0.013
H56	-	-	0.012	0.009	0.009	0.006
H57	-	-	0.008	0.014	0.012	0.011
H58	-	-	0.009	0.009	0.012	0.012
H59	-	-	0.014	0.012	0.012	0.013
H60	-	-	0.012	0.012	0.016	0.013
H61	-	-	0.006	0.008	0.006	0.011
H62	-	-	0.007	0.009	0.008	0.004
H63	-	-	0.015	0.008	0.010	0.015
H64	-	-	0.017	0.005	0.005	0.005
H65	-	-	0.019	0.008	0.010	0.006
H66	-	-	0.011	0.012	0.013	0.011
H67	-	-	0.007	0.005	0.006	0.005
H68	-	-	0.005	0.006	0.008	0.009
H69	-	-	0.007	0.006	0.004	0.004
H70	-	-	0.014	0.005	0.007	0.005
H71	-	-	0.005	0.008	0.008	0.010
H72	-	-	0.008	0.008	0.008	0.011
H73	-	-	0.006	0.003	0.007	0.003
H74	-	-	0.005	0.006	0.007	0.005
H75	-	-	0.009	0.009	0.006	0.004
H76	-	-	0.006	0.005	0.010	0.016
H77	-	-	0.004	0.003	0.008	0.005
H78	-	-	0.008	0.007	0.006	0.009
H79	-	-	0.006	0.008	0.009	0.007
H80	-	-	0.003	0.004	0.009	0.007
H81	-	-	0.007	0.007	0.009	0.006
H82	-	-	0.003	0.003	0.010	0.008
H83	-	-	0.006	0.007	0.006	0.007
H84	-	-	0.015	0.008	0.006	0.007
H85	-	-	0.004	0.005	0.005	0.007
H86	-	-	0.006	0.003	0.008	0.008
H87	-	-	0.006	0.006	0.013	0.006
H88	-	-	0.023	0.006	0.004	0.005
H89	-	-	0.005	0.006	0.007	0.005
H90	-	-	0.008	0.007	0.018	0.006
H91	-	-	0.006	0.006	0.007	0.013
H92	-	-	0.005	0.007	0.006	0.005
H93	-	-	0.008	0.026	0.011	0.011
H94	-	-	0.025	0.013	0.013	0.013
H95	-	-	0.005	0.003	0.003	0.012
H96	-	-	0.007	0.006	0.005	0.008
H97	-	-	0.004	0.005	0.006	0.006
H98	-	-	0.005	0.005	0.009	0.006
H99	-	-	0.011	0.008	0.011	0.012

(b) (3) (A)

H100	-	-	0.006	0.007	0.005	0.011
H101	-	-	0.005	0.005	0.007	0.008
H102	-	-	0.016	0.013	0.006	0.015
H103	-	-	0.006	0.010	0.007	0.019
H104	-	-	0.004	0.018	0.007	0.009
H105	-	-	0.009	0.007	0.010	0.004
H106	-	-	0.005	0.006	0.022	0.009
H107	-	-	0.008	0.005	0.007	0.007
H108	-	-	0.004	0.016	0.010	0.007
H109	-	-	0.006	0.005	0.005	0.005
H110	-	-	0.007	0.006	0.006	0.004
H111	-	-	0.006	0.009	0.004	0.003
H112	-	-	0.004	0.017	0.005	NA
H113	-	-	0.007	0.007	0.003	0.006
H114	-	-	0.016	0.017	0.007	0.009
H115	-	-	0.005	0.006	0.011	0.007
H116	-	-	0.005	0.004	0.008	0.010
H117	-	-	0.018	0.013	0.007	0.010
H118	-	-	0.004	0.008	0.008	0.005
H119	-	-	0.006	0.016	0.013	0.005
H120	-	-	0.008	0.003	0.013	0.004
H121	-	-	0.006	0.006	0.007	0.006
H122	-	-	0.004	0.006	0.011	0.012
H123	-	-	0.007	0.006	0.006	0.007
H124	-	-	0.005	0.008	0.030	0.009
H125	-	-	0.012	0.013	0.013	0.009
H126	-	-	0.007	0.010	0.013	0.011
H127	-	-	0.005	0.005	0.009	0.007
H128	-	-	0.006	0.007	0.006	0.004
H129	-	-	0.013	0.009	0.011	0.008
H130	-	-	0.009	0.008	0.014	0.004
H131	-	-	0.007	0.007	0.016	0.015
H132	-	-	0.009	0.006	0.007	0.007
H133	-	-	0.008	0.010	0.009	0.009
H134	-	-	0.010	0.008	0.012	0.014
H135	-	-	0.008	0.009	0.007	0.008
H136	-	-	0.014	0.014	0.011	0.007
H137	-	-	0.022	0.020	0.033	0.022
H138	-	-	0.015	0.009	0.017	0.013
H139	-	-	0.039	0.015	0.014	0.016
H140	-	-	0.026	0.010	0.018	0.028
H141	-	-	0.021	0.014	0.029	0.019
H142	-	-	0.006	0.004	0.010	0.006
H143	-	-	0.007	0.006	0.005	0.008
H144	-	-	0.007	0.006	0.008	0.006
H145	-	-	0.006	0.005	0.006	0.013
H146	-	-	0.009	0.006	0.027	0.007
H147	-	-	0.006	0.006	0.011	0.005
H148	-	-	0.009	0.020	0.008	0.014
H149	-	-	0.011	0.009	0.016	0.013
H150	-	-	0.014	0.006	0.007	0.006
H151	-	-	0.006	0.006	0.007	0.004

	(b) (3) (A)						
H152	[redacted]	-	-	0.005	0.005	0.005	0.006
H153		-	-	0.008	0.006	0.015	0.006
H154		-	-	0.023	0.006	0.005	0.005
H155		-	-	0.006	0.009	0.011	0.015
H156		-	-	0.009	0.011	0.019	0.009
H157		-	-	0.006	0.005	0.009	0.007
H158		-	-	0.005	0.008	0.008	0.017
H159		-	-	0.009	0.007	0.005	0.007
H160		-	-	0.005	0.010	0.010	0.007
H161		-	-	0.005	0.005	0.006	0.008
H162		-	-	0.004	0.007	0.021	0.003
H163		-	-	0.015	0.012	0.017	0.015
H164		-	-	0.020	0.017	0.046	0.016
H165		-	-	0.014	0.024	0.025	0.013
H166		-	-	0.004	0.005	0.007	0.005
H167		-	-	0.007	0.012	0.008	0.007
H168		-	-	0.020	0.020	0.015	0.020
H169		-	-	0.006	0.008	0.019	0.018
H170		-	-	0.007	0.008	0.005	0.006
H171		-	-	0.007	0.006	0.010	0.013
H172		-	-	0.003	0.006	0.008	0.006
H173		-	-	0.008	0.007	0.010	0.009
H174		-	-	0.008	0.014	0.008	0.021
H175		-	-	0.009	0.006	0.009	0.007
H176		-	-	0.004	0.004	0.008	0.014
H177		-	-	0.020	0.020	0.010	0.006
H178		-	-	-	-	-	-
H179		-	-	-	-	-	-
H180		-	-	-	-	-	-
H181		-	-	-	-	-	-
H182		-	-	-	-	-	-
H183		-	-	-	-	-	-

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	(b) (3) (A)	Thickness Measurements (in inches) (Metal Thickness)				
		Nom.	0°	90°	270°	180°
P1		0.375	0.374	0.382	0.391	0.385
P2		0.250	0.237	0.233	0.234	0.224
P3		0.375	0.356	0.361	0.366	0.356
P4		0.375	0.366	0.354	0.375	0.363
P5		0.375	0.366	0.371	0.360	0.370
P6		0.375	0.362	0.361	0.389	0.374
P7		0.375	0.389	0.396	0.395	0.354
P8		0.375	0.411	0.408	0.387	NA
P9		0.250	0.255	0.255	0.252	0.251
P10		0.375	0.346	0.362	0.355	0.356
P11		0.375	0.414	0.390	0.397	0.420
P12		0.375	0.399	0.396	0.369	0.380
P13		0.375	0.380	0.365	0.360	0.387
P14		0.375	0.391	0.390	0.368	0.375
P15		0.375	0.360	0.381	0.385	0.380
P16		0.375	0.384	0.377	0.385	0.374
P17		0.375	0.341	0.347	0.347	0.343
P18		0.375	0.373	0.372	0.318	0.360
P19		0.375	0.374	0.356	0.366	0.361
P20		0.375	0.354	0.376	0.360	0.359
P21		0.375	0.348	0.339	0.332	0.330
P22		0.375	0.378	0.349	0.316	0.346
P23		0.375	0.367	0.363	0.347	0.384
P24		0.375	0.411	0.413	0.392	0.400
P25		0.375	0.373	0.375	0.373	NA
P26		0.375	0.376	0.357	0.347	0.374
P27		0.375	0.368	0.355	0.350	0.361
P28		0.375	0.410	0.399	0.384	0.408
P29		0.375	0.384	0.368	0.339	0.360
P30		0.375	0.381	0.372	0.333	0.357
P31		0.375	0.400	0.382	0.416	0.396
P32		0.375	0.379	0.368	0.362	0.381
P33		0.375	0.372	0.393	0.359	0.375
P34		0.375	0.328	0.359	0.383	0.344
P35		0.375	0.386	0.391	0.389	0.395
P36		0.375	0.381	0.385	0.387	0.384
P37		0.375	0.378	0.366	0.334	0.387
P38		0.375	0.413	0.410	0.399	NA
P39		0.375	0.417	0.409	0.384	0.410
P40		0.375	0.355	0.337	0.373	0.346
P41		0.375	0.367	0.385	0.386	0.385
P42		0.375	0.356	0.368	0.362	0.320
P43		0.375	0.381	0.373	0.376	0.381
P44		0.375	0.379	0.365	0.375	0.369
P45		0.375	0.401	0.392	0.395	0.387
P46		0.375	0.358	0.371	0.379	0.352
P47		0.375	0.411	0.409	0.369	0.395

(b) (3) (A)

P48	0.375	0.411	0.421	0.427	0.437
P49	0.375	0.376	0.370	0.333	0.349
P50	0.375	0.379	0.372	0.373	0.371
P51	0.375	0.360	0.363	0.382	0.367
P52	0.375	0.396	0.391	0.391	0.390
P53	0.375	0.386	0.379	0.373	0.367
P54	0.375	0.384	0.380	0.363	0.378
P55	0.375	0.380	0.381	0.375	0.370
P56	0.375	0.379	0.381	0.387	0.397
P57	0.375	0.374	0.381	0.360	0.371
P58	0.375	0.361	0.372	0.357	0.357
P59	0.375	0.351	0.377	0.375	0.364
P60	0.375	0.379	0.356	0.320	0.363
P61	0.375	0.396	0.395	0.383	0.397
P62	0.375	0.367	0.355	0.364	0.380
P63	0.375	0.418	0.402	0.405	0.408
P64	0.375	0.377	0.368	0.359	0.357
P65	0.375	0.381	0.363	0.357	0.381
P66	0.375	0.400	0.400	0.394	0.371
P67	0.375	0.360	0.375	0.373	0.374
P68	0.375	0.354	0.371	0.368	0.354
P69	0.375	0.378	0.371	0.363	0.360
P70	0.375	0.370	0.371	0.364	0.359
P71	0.375	0.381	0.396	0.377	0.389
P72	0.375	0.410	0.413	0.400	0.402
P73	0.375	0.396	0.411	0.410	0.409
P74	0.375	0.402	0.374	0.362	0.409
P75	0.375	0.381	0.394	0.389	0.369
P76	0.375	0.392	0.378	0.354	0.377
P77	0.375	0.378	0.371	0.373	0.378
P78	0.375	0.394	0.374	0.371	0.369
P79	0.375	0.373	0.360	0.384	0.361
P80	0.375	0.409	0.393	0.375	0.407
P81	0.375	0.364	0.372	0.361	0.363
P82	0.375	0.371	0.362	0.348	0.362
P83	0.375	0.344	0.353	0.356	0.339
P84	0.375	0.376	0.364	0.352	0.348
P85	0.375	0.381	0.385	0.344	0.383
P86	0.375	0.395	0.383	0.361	0.318
P87	0.375	0.378	0.369	0.350	0.389
P88	0.375	0.341	0.335	0.345	0.354
P89	0.375	0.359	0.366	0.362	0.376
P90	0.375	0.378	0.363	0.354	0.373
P91	0.375	0.378	0.374	0.365	0.377
P92	0.375	0.357	0.358	0.349	0.356
P93	0.375	0.366	0.371	0.365	0.341
P94	0.375	0.382	0.366	0.343	0.348
P95	0.375	0.346	0.380	0.349	0.322
P96	0.375	0.371	0.381	0.377	0.388
P97	0.375	0.370	0.369	0.354	0.373
P98	0.375	0.345	0.390	0.347	0.359
P99	0.375	0.332	0.374	0.367	0.369

	(b) (3) (A)					
P100	[redacted]	0.375	0.386	0.402	0.385	0.403
P101		0.375	0.381	0.382	0.368	0.377
P102		0.375	0.390	0.382	0.362	0.389
P103		0.375	0.360	0.368	0.356	0.372
P104		0.375	0.381	0.389	0.365	0.358
P105		0.375	0.368	0.377	0.360	0.349
P106		0.375	0.354	0.355	0.371	0.399
P107		0.375	0.365	0.378	0.361	0.373
P108		0.375	0.393	0.375	0.356	0.379
P109		0.375	0.397	0.392	0.355	0.359
P110		0.375	0.364	0.372	0.367	0.380
P111		0.375	0.380	0.371	0.339	0.368
P112		0.375	0.371	0.380	0.377	0.376
P113		0.375	0.357	0.367	0.381	0.383
P114		0.375	0.364	0.358	0.363	0.376
P115		0.375	0.370	0.326	0.373	0.386
P116		0.375	0.397	0.371	0.341	0.372
P117		0.375	0.360	0.362	0.352	0.366
P118		0.375	0.373	0.366	0.336	0.366
P119		0.375	0.372	0.359	0.362	0.371
P120		0.375	0.255	0.250	0.243	0.248
P121		0.375	0.253	0.252	0.240	0.248
P122		0.375	0.346	0.353	0.351	0.353
P123		0.375	0.380	0.380	0.354	0.347
P124		0.375	0.376	0.357	0.397	0.391
P125		0.375	0.388	0.377	0.367	0.386
P126		0.375	0.380	0.380	0.345	0.356
P127		0.375	0.378	0.380	0.348	0.381
P128		0.375	NA	0.380	0.370	0.376
P129		0.375	0.360	0.379	0.350	0.350
P130		0.375	0.340	0.349	0.328	0.343
P131		0.375	0.389	0.381	0.366	0.371
P132		0.375	0.366	0.361	0.362	0.361
P133		0.375	0.377	0.378	0.344	0.338
P134		0.375	0.389	0.371	0.367	0.375
P135		0.375	0.360	0.366	0.365	0.358
P136		0.375	0.383	0.381	0.367	0.367
P137		0.375	0.372	0.357	0.349	0.363
P138		0.375	0.379	0.386	0.375	0.360
P139		0.375	0.360	0.354	0.314	0.328
P140		0.375	0.375	0.369	0.345	0.353
P141		0.375	0.371	0.352	0.344	0.344
P142		0.375	0.424	0.392	0.357	0.389
P143		0.375	0.377	0.377	0.397	0.361
P144		0.375	0.385	0.388	0.389	0.395
P145		0.375	0.378	0.375	0.362	0.360
P146		0.375	0.384	0.341	0.354	0.352
P147		0.375	0.386	0.381	0.384	0.361

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	(b) (3) (A)	Thickness Measurements (in inches) (Coating Thickness)				
		Nom.	0º	90º	270º	180º
P1		-	0.013	0.013	0.009	0.011
P2		-	0.017	0.011	0.012	0.011
P3		-	0.010	0.013	0.009	0.008
P4		-	0.023	0.018	0.011	0.016
P5		-	0.012	0.010	0.014	0.009
P6		-	0.010	0.009	0.010	0.008
P7		-	0.007	0.009	0.009	0.011
P8		-	0.011	0.011	0.008	NA
P9		-	0.012	0.010	0.007	0.011
P10		-	0.009	0.006	0.009	0.008
P11		-	0.012	0.007	0.012	0.008
P12		-	0.016	0.010	0.010	0.010
P13		-	0.008	0.007	0.011	0.013
P14		-	0.010	0.016	0.008	0.012
P15		-	0.011	0.007	0.011	0.008
P16		-	0.020	0.016	0.017	0.019
P17		-	0.010	0.010	0.006	0.010
P18		-	0.010	0.010	0.012	0.008
P19		-	0.012	0.010	0.010	0.008
P20		-	0.014	0.009	0.011	0.013
P21		-	0.014	0.011	0.008	0.011
P22		-	0.012	0.010	0.021	0.014
P23		-	0.009	0.008	0.009	0.006
P24		-	0.011	0.009	0.011	0.006
P25		-	0.012	0.011	0.009	NA
P26		-	0.010	0.007	0.013	0.008
P27		-	0.014	0.019	0.031	0.018
P28		-	0.017	0.012	0.012	0.008
P29		-	0.018	0.013	0.012	0.006
P30		-	0.009	0.011	0.011	0.006
P31		-	0.015	0.008	0.010	0.011
P32		-	0.015	0.008	0.006	0.007
P33		-	0.011	0.008	0.014	0.011
P34		-	0.014	0.018	0.014	0.028
P35		-	0.012	0.010	0.009	0.018
P36		-	0.008	0.007	0.010	0.010
P37		-	0.013	0.008	0.009	0.013
P38		-	0.015	0.008	0.006	0.007
P39		-	0.009	0.007	0.008	0.007
P40		-	0.013	0.013	0.010	0.010
P41		-	0.019	0.010	0.009	0.006
P42		-	0.016	0.011	0.013	0.010
P43		-	0.010	0.012	0.008	0.011
P44		-	0.009	0.013	0.006	0.011
P45		-	0.026	0.013	0.009	0.011
P46		-	0.011	0.011	0.019	0.011
P47		-	0.009	0.007	0.008	0.006

(b) (3) (A)

P48	-	0.011	0.006	0.007	0.007
P49	-	0.011	0.006	0.005	0.011
P50	-	0.010	0.007	0.009	0.009
P51	-	0.013	0.006	0.005	0.011
P52	-	0.022	0.016	0.016	0.016
P53	-	0.017	0.007	0.007	0.011
P54	-	0.010	0.006	0.008	0.007
P55	-	0.008	0.012	0.007	0.012
P56	-	0.009	0.008	0.009	0.006
P57	-	0.010	0.008	0.008	0.010
P58	-	0.010	0.010	0.009	0.008
P59	-	0.013	0.009	0.010	0.009
P60	-	0.013	0.012	0.014	0.014
P61	-	0.010	0.010	0.010	0.010
P62	-	0.011	0.006	0.007	0.008
P63	-	0.029	0.016	0.022	0.022
P64	-	0.013	0.011	0.014	0.009
P65	-	0.011	0.013	0.015	0.011
P66	-	0.013	0.010	0.008	0.012
P67	-	0.011	0.011	0.008	0.008
P68	-	0.012	0.009	0.011	0.010
P69	-	0.012	0.011	0.008	0.007
P70	-	0.022	0.007	0.007	0.009
P71	-	0.012	0.008	0.005	0.008
P72	-	0.013	0.011	0.007	0.010
P73	-	0.014	0.009	0.006	0.007
P74	-	0.011	0.006	0.010	0.008
P75	-	0.011	0.008	0.007	0.008
P76	-	0.014	0.010	0.010	0.008
P77	-	0.008	0.007	0.007	0.011
P78	-	0.013	0.006	0.005	0.006
P79	-	0.011	0.008	0.010	0.006
P80	-	0.011	0.007	0.005	0.017
P81	-	0.008	0.006	0.007	0.007
P82	-	0.009	0.013	0.007	0.008
P83	-	0.007	0.006	0.006	0.008
P84	-	0.012	0.008	0.012	0.024
P85	-	0.010	0.009	0.011	0.011
P86	-	0.016	0.011	0.010	0.021
P87	-	0.012	0.008	0.007	0.006
P88	-	0.014	0.013	0.015	0.014
P89	-	0.014	0.011	0.011	0.011
P90	-	0.010	0.007	0.010	0.008
P91	-	0.013	0.011	0.011	0.013
P92	-	0.014	0.010	0.011	0.011
P93	-	0.013	0.011	0.013	0.018
P94	-	0.009	0.009	0.011	0.010
P95	-	0.010	0.013	0.011	0.008
P96	-	0.009	0.007	0.010	0.011
P97	-	0.018	0.014	0.013	0.013
P98	-	0.011	0.009	0.016	0.009
P99	-	0.027	0.011	0.006	0.010

	(b) (3) (A)					
P100	[redacted]	-	0.022	0.009	0.012	0.008
P101		-	0.012	0.006	0.009	0.007
P102		-	0.011	0.010	0.011	0.011
P103		-	0.015	0.008	0.020	0.007
P104		-	0.014	0.010	0.006	0.009
P105		-	0.007	0.008	0.011	0.008
P106		-	0.009	0.007	0.015	0.011
P107		-	0.008	0.008	0.008	0.012
P108		-	0.010	0.008	0.009	0.009
P109		-	0.008	0.008	0.010	0.013
P110		-	0.018	0.012	0.012	0.011
P111		-	0.008	0.008	0.006	0.049
P112		-	0.009	0.009	0.010	0.009
P113		-	0.009	0.007	0.008	0.008
P114		-	0.012	0.007	0.012	0.008
P115		-	0.011	0.006	0.007	0.011
P116		-	0.005	0.012	0.010	0.012
P117		-	0.010	0.009	0.011	0.013
P118		-	0.007	0.006	0.008	0.007
P119		-	0.012	0.011	0.017	0.015
P120		-	0.007	0.008	0.007	0.009
P121		-	0.014	0.008	0.014	0.008
P122		-	0.008	0.006	0.007	0.011
P123		-	0.010	0.007	0.007	0.007
P124		-	0.007	0.007	0.011	0.014
P125		-	0.008	0.007	0.012	0.008
P126		-	0.013	0.009	0.012	0.011
P127		-	0.009	0.008	0.006	0.005
P128		-	0.011	0.007	0.005	0.007
P129		-	NA	0.233	0.233	0.233
P130		-	0.011	0.010	0.010	0.010
P131		-	0.011	0.010	0.012	0.011
P132		-	0.016	0.017	0.02	0.018
P133		-	0.012	0.01	0.01	0.01
P134		-	0.007	0.007	0.011	0.007
P135		-	0.01	0.015	0.011	0.027
P136		-	0.008	0.008	0.008	0.01
P137		-	0.009	0.011	0.012	0.009
P138		-	0.009	0.015	0.009	0.013
P139		-	0.008	0.007	0.01	0.011
P140		-	0.012	0.007	0.009	0.006
P141		-	0.011	0.008	0.015	0.016
P142		-	0.011	0.009	0.011	0.012
P143		-	0.007	0.012	0.014	0.009
P144		-	0.006	0.008	0.007	0.022
P145		-	0.006	0.006	0.01	0.014
P146		-	0.009	0.009	0.009	0.009
P147		-	0.01	0.017	0.007	0.009

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	(b) (3) (A)	Thickness Measurements (in inches) (Metal Thickness)				
		Nom.	0º	90º	270º	180º
S1		0.250	0.246	0.243	0.241	0.242
S2		0.250	0.245	0.245	0.241	0.246
S3		0.250	0.248	0.247	0.245	0.248
S4		0.250	0.244	0.245	0.241	0.243
S5		0.250	0.244	0.241	0.239	0.244
S6		0.250	0.243	0.245	0.247	0.244
S7		0.250	0.247	0.249	0.248	0.249
S8		0.375	0.373	0.373	0.375	0.374
S9		0.375	0.375	0.373	0.373	0.375
S10		0.250	0.244	0.245	0.231	0.243
S11		0.375	0.399	0.387	0.383	0.400
S12		0.375	0.394	0.385	0.374	0.400
S13		0.375	0.375	0.375	0.364	0.375
S14		0.375	0.389	0.390	0.374	0.364
S15		0.375	0.375	0.373	0.365	0.369
S16		0.375	0.401	0.398	0.375	0.399
S17		0.375	0.371	0.368	0.348	0.375
S18		0.375	0.390	0.401	0.375	0.398
S19		0.375	0.375	0.373	0.353	0.369
S20		0.375	0.379	0.390	0.398	0.387
S21		0.375	0.375	0.365	0.369	0.370
S22		0.375	0.365	0.369	0.336	0.361

Table M1 - API STD 570 Thickness Data & TML (Cont.)

TML ID	(b) (3) (A)	Thickness Measurements (in inches) (Metal Thickness)				
		Nom.	0º	90º	270º	180º
F1		0.237	0.241	0.229	0.238	0.228
F2		0.237	0.244	0.244	0.236	0.232
F3		0.237	0.226	0.239	0.242	0.250
F4		0.237	0.246	0.250	0.229	0.226
F5		0.237	0.224	0.234	0.236	0.238
F6		0.237	0.235	0.238	0.237	0.237
F7		0.237	0.234	0.237	0.233	0.236
F8		0.237	0.248	0.248	0.242	0.250
F9		0.237	0.244	0.236	0.239	0.244
F10		0.237	0.248	0.242	0.233	0.237
F11		0.237	0.222	0.229	0.221	0.225
F12		0.237	0.246	0.244	0.239	0.241
F13		0.237	0.221	0.225	0.223	0.221
F14		0.237	0.231	0.228	0.236	0.233
F15		0.237	0.231	0.230	0.240	0.239
F16		0.237	0.235	0.242	0.224	0.221
F17		0.237	0.227	0.231	0.237	0.229
F18		0.237	0.235	0.232	0.233	0.235
F19		0.237	0.229	0.227	0.229	0.225
F20		0.237	0.236	0.233	0.241	0.237
F21		0.237	0.241	0.235	0.228	0.232
F22		0.237	0.236	0.229	0.232	0.235
F23		0.237	0.238	0.235	0.237	0.233
F24		0.237	0.241	0.237	0.239	0.235
F25		0.237	0.244	0.235	0.235	0.241
F26		0.237	0.241	0.237	0.233	N/A
F27		0.237	0.233	0.228	0.235	0.235
F28		0.237	0.231	0.235	0.229	0.238
F29		0.237	0.235	0.225	0.228	0.337
F30		0.237	0.230	0.233	0.228	0.230
F31		0.237	0.226	0.230	0.233	0.228
F32		0.237	0.245	0.238	0.228	0.235
F33		0.237	0.228	0.225	0.225	0.231
F34		0.237	0.224	0.242	0.239	0.240
F35		0.237	0.231	0.225	0.230	0.233
F36		0.237	0.237	0.240	0.233	0.225
F37		0.237	0.235	0.229	0.225	0.224
F38		0.237	0.245	0.243	0.247	0.241
F39		0.237	0.231	0.229	0.222	0.227
F40		0.237	0.245	0.237	0.235	0.235
F41		0.237	0.211	0.216	0.222	0.219
F42		0.237	0.267	0.272	0.269	0.267
F43		0.280	0.257	0.249	0.251	0.258
F44		0.280	0.253	0.272	0.233	0.259
F45		0.280	0.261	0.259	0.252	0.255
F46		0.280	0.260	0.254	0.236	0.258
F47		0.280	0.259	0.258	0.246	0.230

	(b) (3) (A)					
F48	[redacted]	0.280	0.261	0.261	0.248	0.240
F49		0.280	0.228	0.236	0.256	0.254
F50		0.280	0.265	0.239	0.251	0.261
F51		0.280	0.259	0.239	0.233	0.253
F52		0.280	0.261	0.260	0.250	0.257
F53		0.280	0.255	0.253	0.248	0.247
F54		0.280	0.239	0.257	0.219	0.251
F55		0.280	0.258	0.234	0.248	0.257
F56		0.280	0.253	0.251	0.250	0.255
F57		0.280	0.268	0.246	0.261	0.266
F58		0.280	0.266	0.270	0.233	0.267
F59		0.280	0.255	0.257	0.247	0.249
F60		0.280	0.256	0.258	0.246	0.262
F61		0.280	0.229	0.237	0.261	0.253
F62		0.280	NA	0.255	0.255	0.256
F63		0.280	0.249	0.249	0.250	0.251
F64		0.280	0.241	0.256	0.261	0.241
F65		0.280	0.229	0.240	0.248	0.251
F66		0.280	0.259	0.261	0.259	0.259

*Note: (b) (3) (A) [redacted] were labeled to aide in identifying and locating findings reported. The letter "F" is tacked to the pipe supports (PS) numbers to distinguish the FOR PS from the facility designated pipe supports.

Table M2 - API STD 570 Thickness Data & TML (Exterior FOR Piping)

TML ID	Location/Description	Pipe Size (in.)	Pipe Sch.	Thickness Measurements (in inches) (Metal Thickness)				
				Nom.	0º	90º	270º	180º
A1	(b) (3) (A)			0.280	0.265	0.263	0.260	0.263
A2				0.280	0.260	0.258	0.252	0.265
A3				0.280	0.280	0.275	0.276	0.277
A4				0.280	0.256	0.260	0.259	0.258
A5				0.280	0.258	0.245	0.235	0.250
A6				0.280	0.268	0.271	0.244	0.239

Table M3 - API STD 570 Pitting Data & TML (Exterior FOR Piping)

TML ID	Location/Description	Pipe Size (in.)	Pipe Sch.	Measurements (in inches) (Pit Depth)				
				Nom.				
X1	(b) (3) (A)			0.280	0.091			
X2				0.280	0.190			
X3				0.280	0.100	0.140	0.110	0.110
X4				0.280	arge corrosion area at PS (no acces			
X5				0.280	arge corrosion area at PS (no acces			
X6				0.280	0.130			
X7				0.280	0.100			
X8				0.280	0.100			
X9				0.280	0.100	0.120		

Appendix C
Drawings

1. Tank Gallery, FOR, Harbor Tunnel Piping Layout (Drawing 1 through 29)
2. UGPH Piping Layout (Drawing 1 through 4)
3. Exterior FOR Piping Isometric Layout (Drawing 1 through 5)
4. Surge Tank Piping Layout (Drawing 1 through 9)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:	Owner: **US NAVY: Joint Base Pearl Harbor Hickam, Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC.
	Date: 05/24/2022 | Rev No : N/A | Scale: N/A
Drawing Title: Overall Layout [1 of 1]	Description: Facility Piping (1 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:	n - Concrete Saddle Support	GW - Ultrasonic Guided Wave CMLs	Owner: **US NAVY: Joint Base Pearl Harbor Hickam, Pearl Harbor, HI**
(b) (3) (A) [redacted]	- DBB Valve	PAUT - Phased Array Ultrasonic Testing CMLs	
	- Ball Valve	W - Butt Weld	
	- Flange	BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld	
- FOR Piping	- Dresser Coupling	LPS-n - Lateral Pipe Support	Drawn By: InterSpec, LLC. / Modified By: InterSpec, LLC.
PS - Pipe Sipport	- Pipe Reducer	TML - Thickness Measurement Location	Date: 05/24/2022 / Rev No : N/A / Scale: N/A
Drawing Title: Tank 17-20 Layout [1 of 1]		Description: Facility Piping (2 of 29)	

[redacted]

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

(b) (3) (A)

[redacted]

Remarks/Legend:

(b) (3) (A)

[redacted]

- FOR Piping
PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Tank 13-16 Layout [1 of 1]

Description:
Facility Piping (3 of 29)

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer
PS - Pipe Sipport

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Tank 11-12 Layout [1 of 1]

Description:
Facility Piping (4 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:

[redacted]

- FOR Piping
PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Tank 7-10 Layout [1 of 1]

Description:
Facility Piping (5 of 29)

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:	n - Concrete Saddle Support	GW - Ultrasonic Guided Wave CMLs
[redacted]	- DBB Valve	PAUT - Phased Array Ultrasonic Testing CMLs
	- Ball Valve	W - Butt Weld
	- Flange	BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
PS - Pipe Sipport	- Dresser Coupling	LPS-n - Lateral Pipe Support
	- Pipe Reducer	TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title:
Tank 3-6 Layout [1 of 1]

Description:
Facility Piping (6 of 29)

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

- FOR Piping
PS - Pipe Sipport

Remarks/Legend:

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Tank Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Tank 1-2 Layout [1 of 1]

Description:
Facility Piping (7 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

Remarks/Legend:

[redacted]

(b) (3) (A)

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Layout Section 1 [1 of 1]

Description:
Facility Piping (8 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

Remarks/Legend:

(b) (3) (A)

PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Layout Section 2 [1 of 1]

Description:
Facility Piping (9 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 3 [1 of 1]

Description:
Facility Piping (10 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

- FOR Piping
- PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 4 [1 of 1]

Description:
Facility Piping (11 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

- FOR Piping
PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 5 [1 of 1]

Description:
Facility Piping (12 of 29)

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Layout Section 6 [1 of 1]

Description:
Facility Piping (13 of 29)

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 7 [1 of 1]

Description:
Facility Piping (14 of 29)

(b) (3) (A)

(b) (3) (A)

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 8 [1 of 1]

Description: Facility Piping (15 of 29)

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

[Remarks/Legend:

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 9 [1 of 1]

Description:
Facility Piping (16 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

(b) (3) (A)

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 10 [1 of 1]

Description:
Facility Piping (17 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 11 [1 of 1]

Description:
Facility Piping (18 of 29)

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title: Layout Section 12 [1 of 1]

Description: Facility Piping (19 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

Remarks/Legend:

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 13 [1 of 1]

Description:
Facility Piping (20 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

(b) (3) (A) [redacted]

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 14 [1 of 1]

Description: Facility Piping (21 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 15 [1 of 1]

Description: Facility Piping (22 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

- FOR Piping
PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 16 [1 of 1]

Description:
Facility Piping (23 of 29)

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

(b) (3) (A)

[redacted]

PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 17 [1 of 1]

Description:
Facility Piping (24 of 29)

[redacted]

(b) (3) (A)

Remarks/Legend:

(b) (3) (A) [redacted]

PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 18 [1 of 1]

Description:
Facility Piping (25 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PS - Pipe Sipport

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 19 [1 of 1]

Description: Facility Piping (26 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

(b) (3) (A)

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 20 [1 of 1]

Description: Facility Piping (27 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

Remarks/Legend:

(b) (3) (A)

PS - Pipe Sipport

n - Concrete Saddle Support
- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

GW - Ultrasonic Guided Wave CMLs
PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Layout Section 21 [1 of 1]

Description:
Facility Piping (28 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

[redacted]

(b) (3) (A)

[redacted]

(b) (3) (A)

PS - Pipe Sipport

- DBB Valve
- Ball Valve
- Flange
- Dresser Coupling
- Pipe Reducer

PAUT - Phased Array Ultrasonic Testing CMLs
W - Butt Weld
BBW - Bell and Spigot Style Fillet Weld or Bell - Bell Style Butt Weld
LPS-n - Lateral Pipe Support
TML - Thickness Measurement Location

US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.		Modified By:	InterSpec, LLC.	
Date:	05/24/2022	Rev No :	N/A	Scale:	N/A

Drawing Title: Layout Section 22 and Pumphouse [1 of 1]

Description: Facility Piping (29 of 29)

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:

(b) (3) (A)

[redacted]

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	5/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
UGPH Layout [1 of 4]

Description:
UT TML/PAUT CML

UT TML/PAUT CML-JBPH, HI-UGPH-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:
P1-P119- UT TML
1A-5B - PAUT CML

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	5/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
UGPH Layout [2 of 4]

Description:
UT TML/PAUT CML

UT TML/PAUT CML-JBPH, HI-UGPH-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend: P1-P119- UT TML 1A-5B - PAUT CML		Owner: **US Navy - Pearl Harbor, HI**	
		Drawn By: InterSpec, LLC.	Modified By: InterSpec, LLC.
		Date: 5/24/2022 Rev No : N/A	Scale: N/A
Drawing Title: UGPH Layout [3 of 4]	Description: UT TML/PAUT CML		

UT TML/PAUT CML-JBPH, HI-UGPH-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend:
P1-P119- UT TML
1A-5B - PAUT CML

Owner:
US Navy - Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	5/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
UGPH Layout [4 of 4]

Description:
UT TML/PAUT CML

UT TML/PAUT CML-JBPH, HI-UGPH-MAY/2022

(b) (3) (A)

Remarks/Legend:
GW - Ultrasonic Guided Wave CMLs
A (n) - UT CMLs
X (n) - Pitting Corrosion data

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
FOR ISO Layout (1 of 5)

Description:
FOR ISO Layout F-PS17

(b) (3) (A)

[redacted]

Remarks/Legend: GW - Ultrasonic Guided Wave CMLs A (n) - UT CMLs X (n) - Pitting Corrosion data	Owner: **US NAVY:** **Joint Base Pearl Harbor Hickam, Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC.
	Date: 05/24/2022 | Rev No : N/A | Scale: N/A
Drawing Title: FOR ISO Layout (2 of 5)	Description: FOR ISO Layout F-PS17

[redacted]

(b) (3) (A)

Remarks/Legend:
GW - Ultrasonic Guided Wave CMLs
A (n) - UT CMLs
X (n) - Pitting Corrosion data

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
FOR ISO Layout (3 of 5)

Description:
FOR ISO Layout F-PS17

(b) (3) (A)

Remarks/Legend:
GW - Ultrasonic Guided Wave CMLs
A (n) - UT CMLs
X (n) - Pitting Corrosion data

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
FOR ISO Layout (4 of 5)

Description:
FOR ISO Layout F-PS17

ER-JBPHH,HI-RED HILL FACILITY-PIPING-MAY/2022

[redacted]

(b) (3) (A)

[redacted]

Remarks/Legend: GW - Ultrasonic Guided Wave CMLs A (n) - UT CMLs X (n) - Pitting Corrosion data	Owner: **US NAVY:** **Joint Base Pearl Harbor Hickam, Pearl Harbor, HI**
	Drawn By: InterSpec, LLC. | Modified By: InterSpec, LLC. Date: 05/24/2022 | Rev No : N/A | Scale: N/A
Drawing Title: FOR ISO Layout (5 of 5)	Description: FOR ISO Layout F-PS17

[redacted]

(b) (3) (A)

Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML

(b) (3) (A)

- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

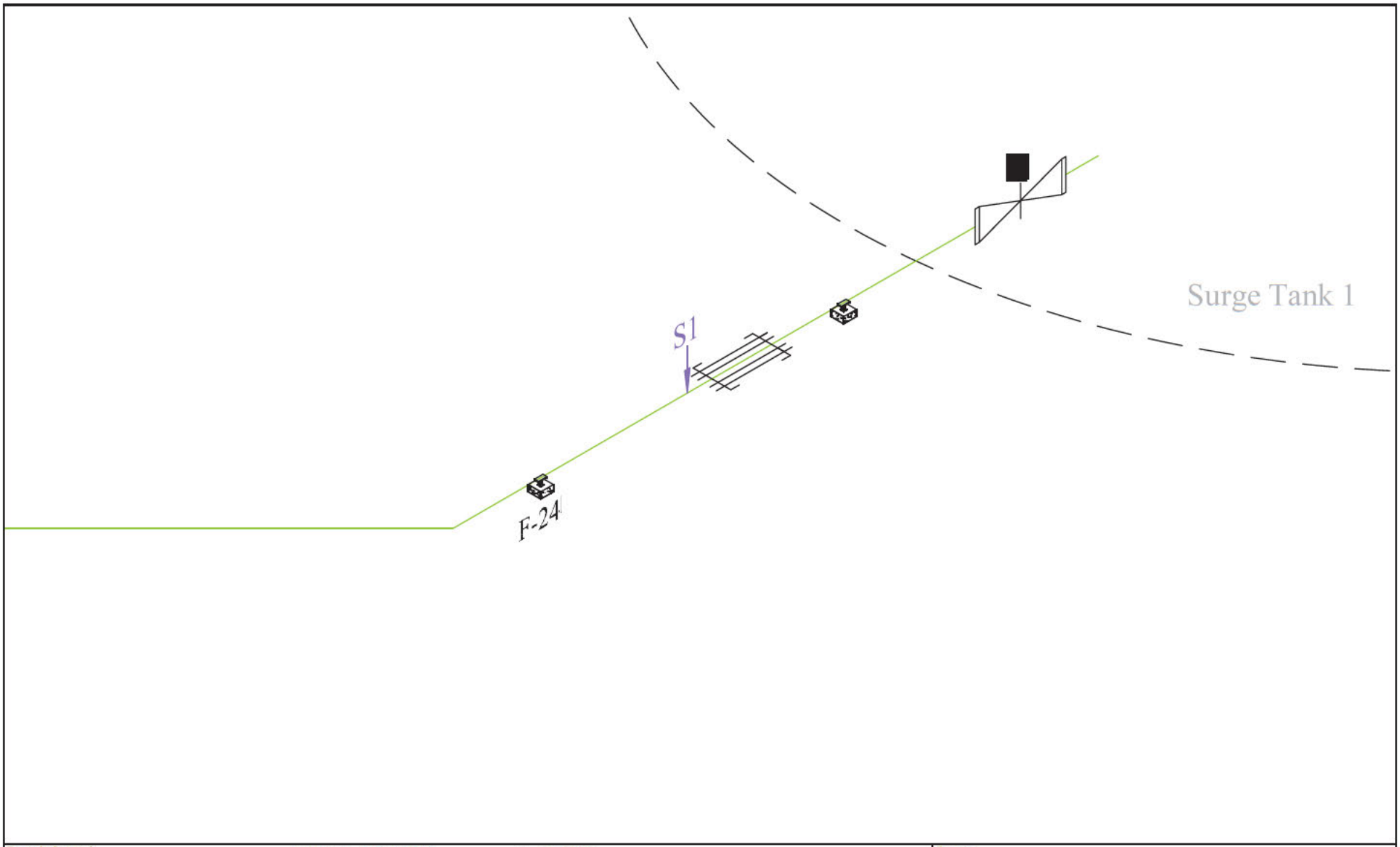
Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [1 of 9]

Description:
Surge Tank Piping

ER-JBPHH,HI-SURGE TANK PIPING-MAY/2022

[redacted]



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

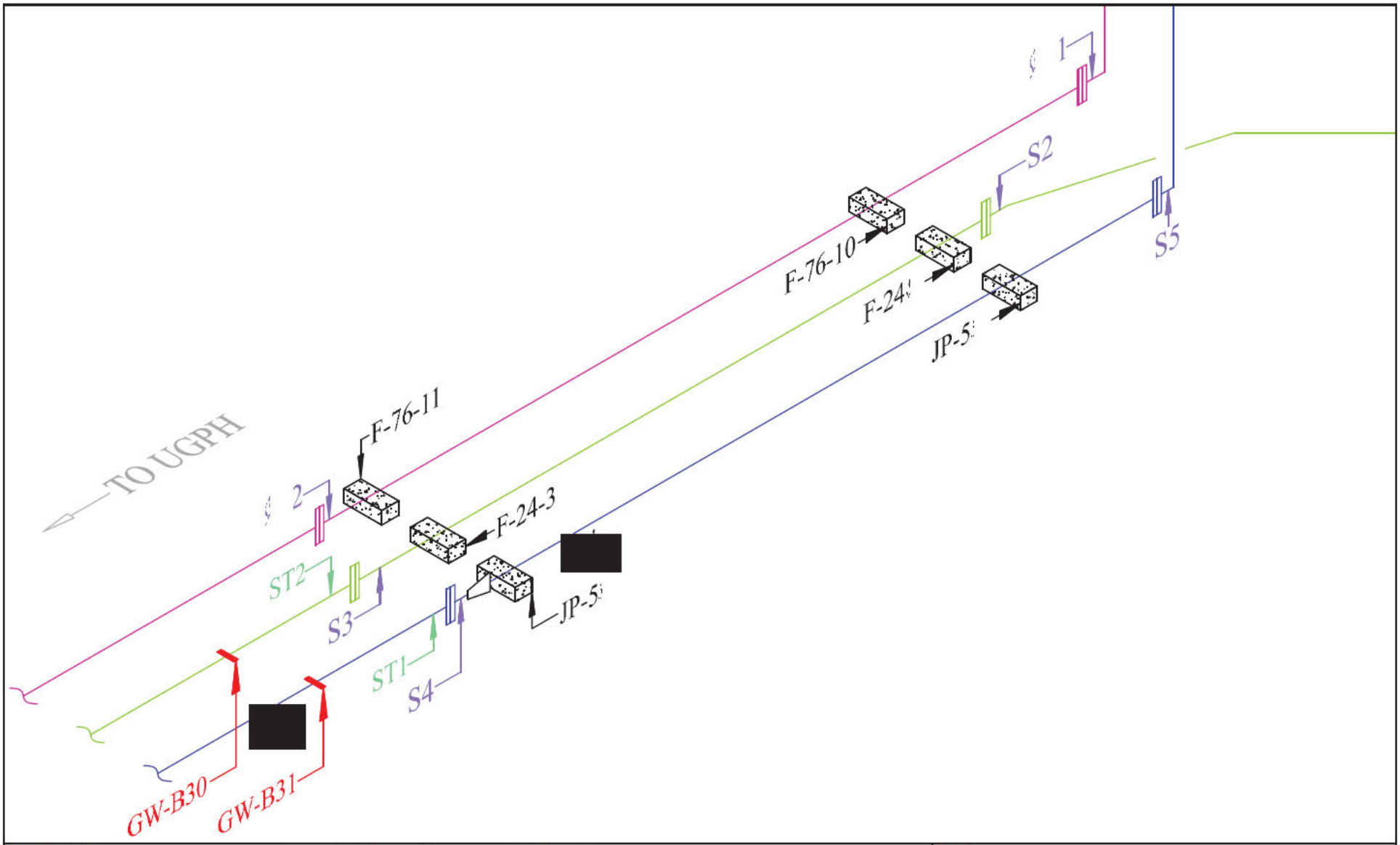
Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [2 of 9]

Description:
Surge Tank Piping

ER-JBPHH,HI-SURGE TANK PIPING-MAY/2022

[redacted]



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

- Reducer

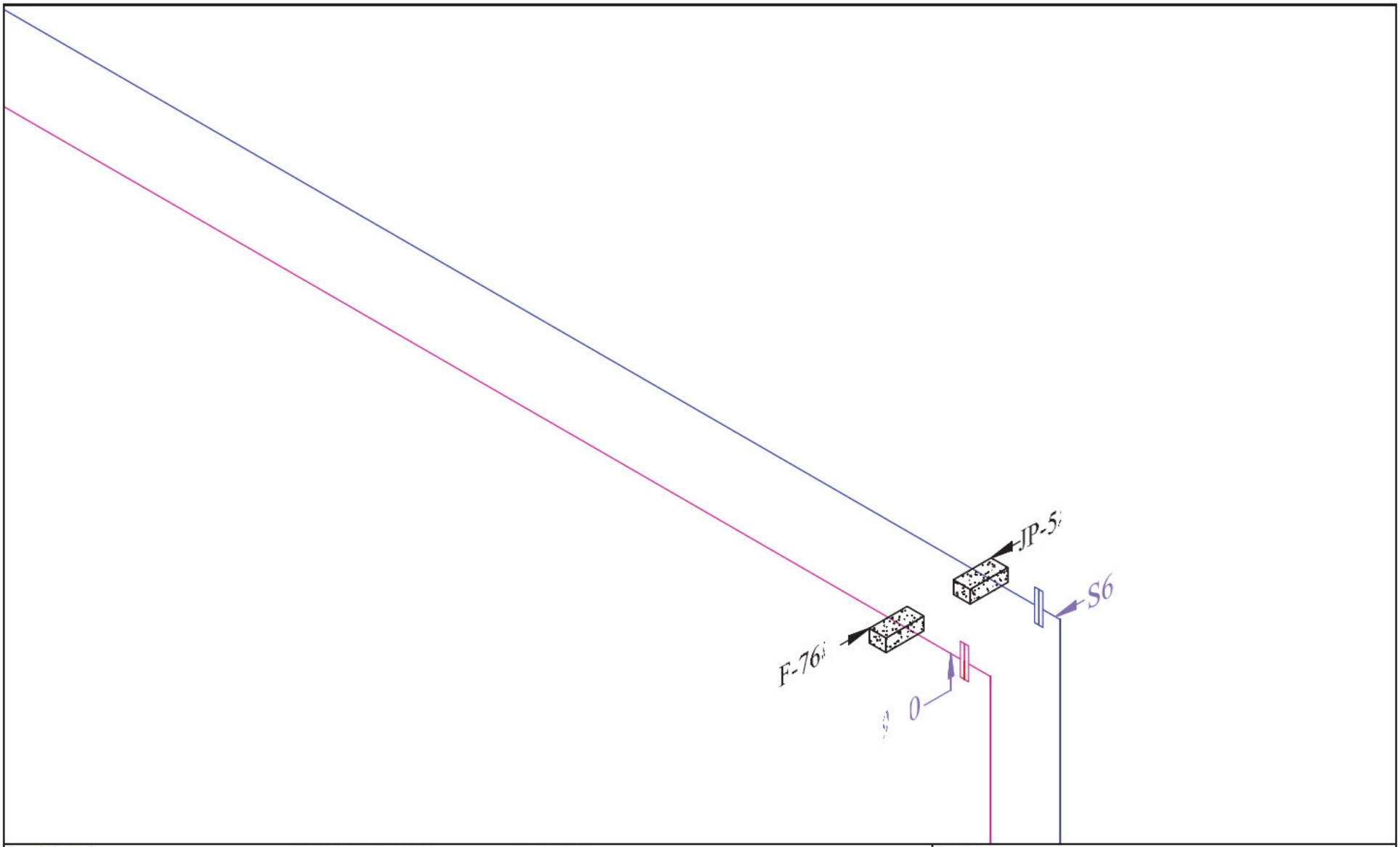
Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [3 of 9]

Description:
Surge Tank Piping

ER-JBPHH,HI-SURGE TANK PIPING-MAY/2022



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

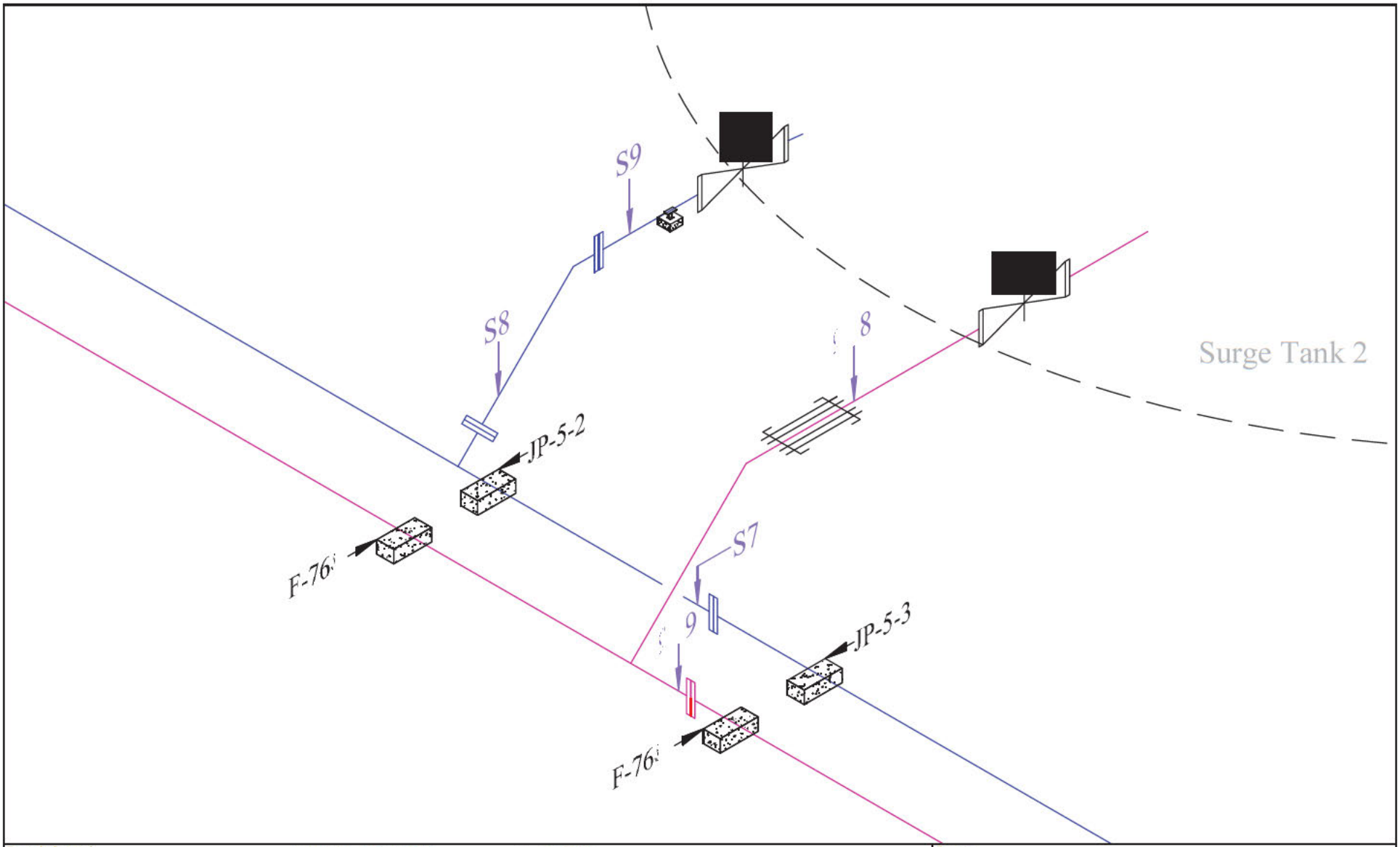
- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
		Scale:	N/A

Drawing Title:
Surge Tank Piping Layout [4 of 9]

Description:
Surge Tank Piping



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

- Reducer

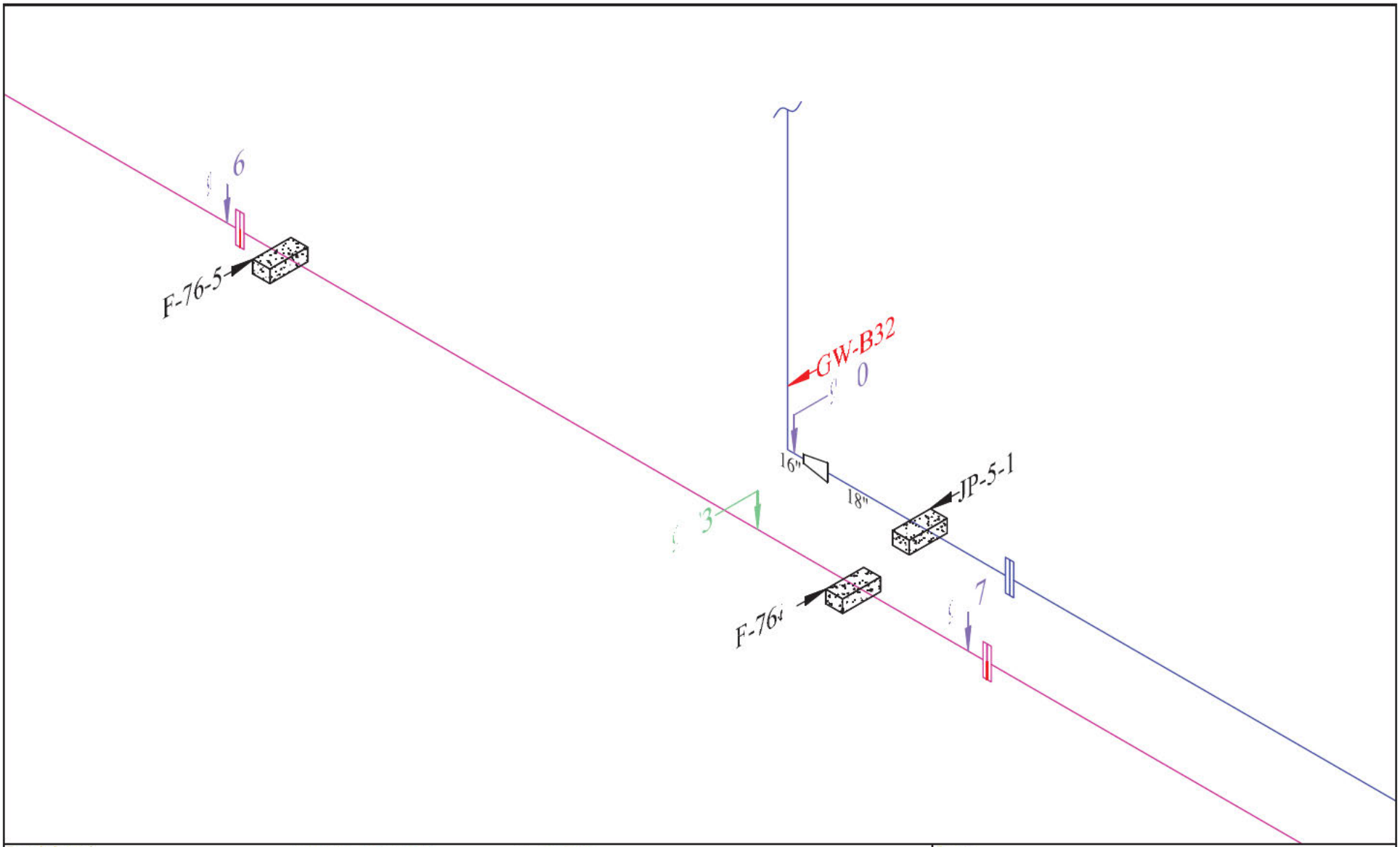
Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [5 of 9]

Description:
Surge Tank Piping

ER-JBPHH,HI-SURGE TANK PIPING-MAY/2022



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

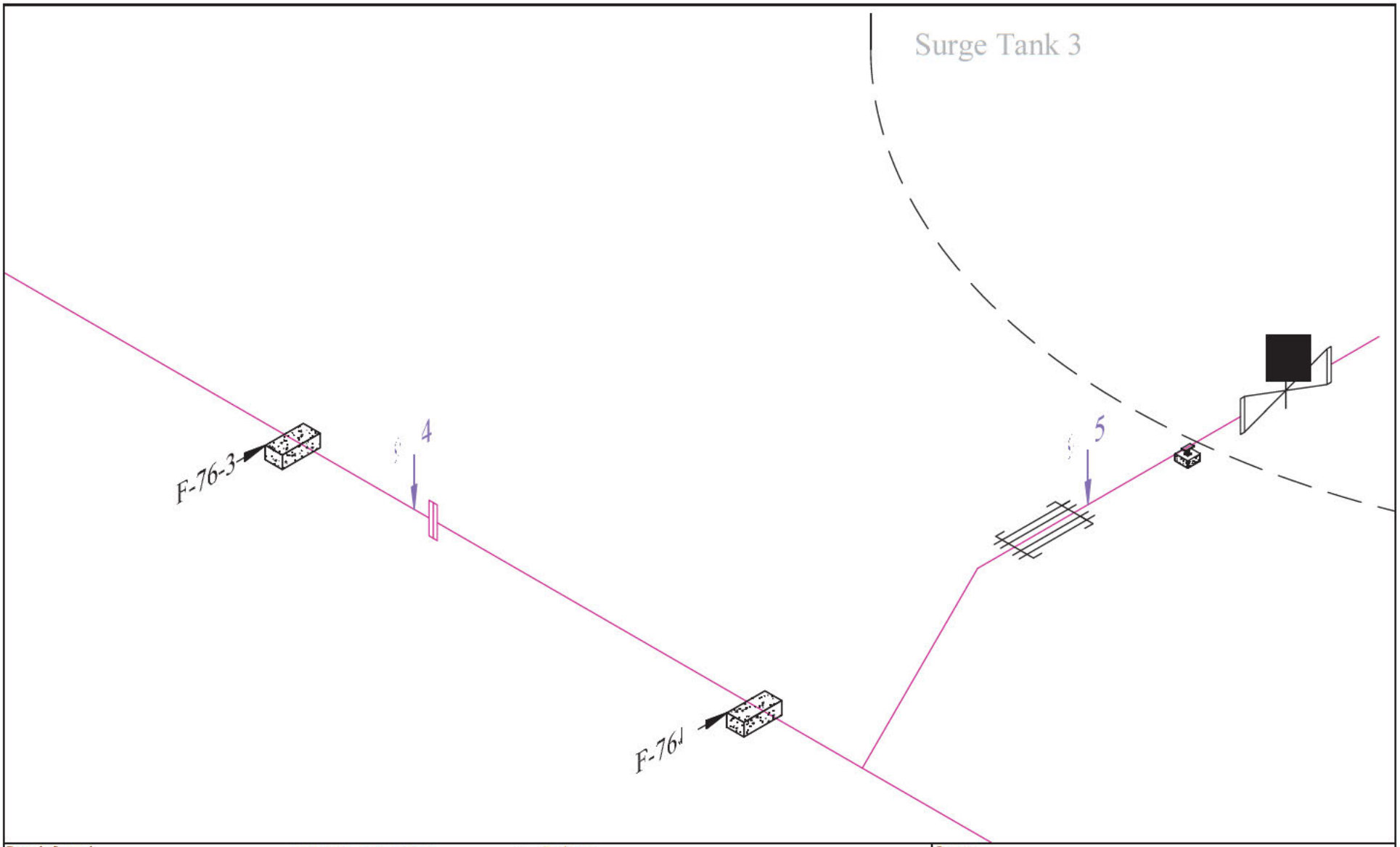
- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [6 of 9]

Description:
Surge Tank Piping



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

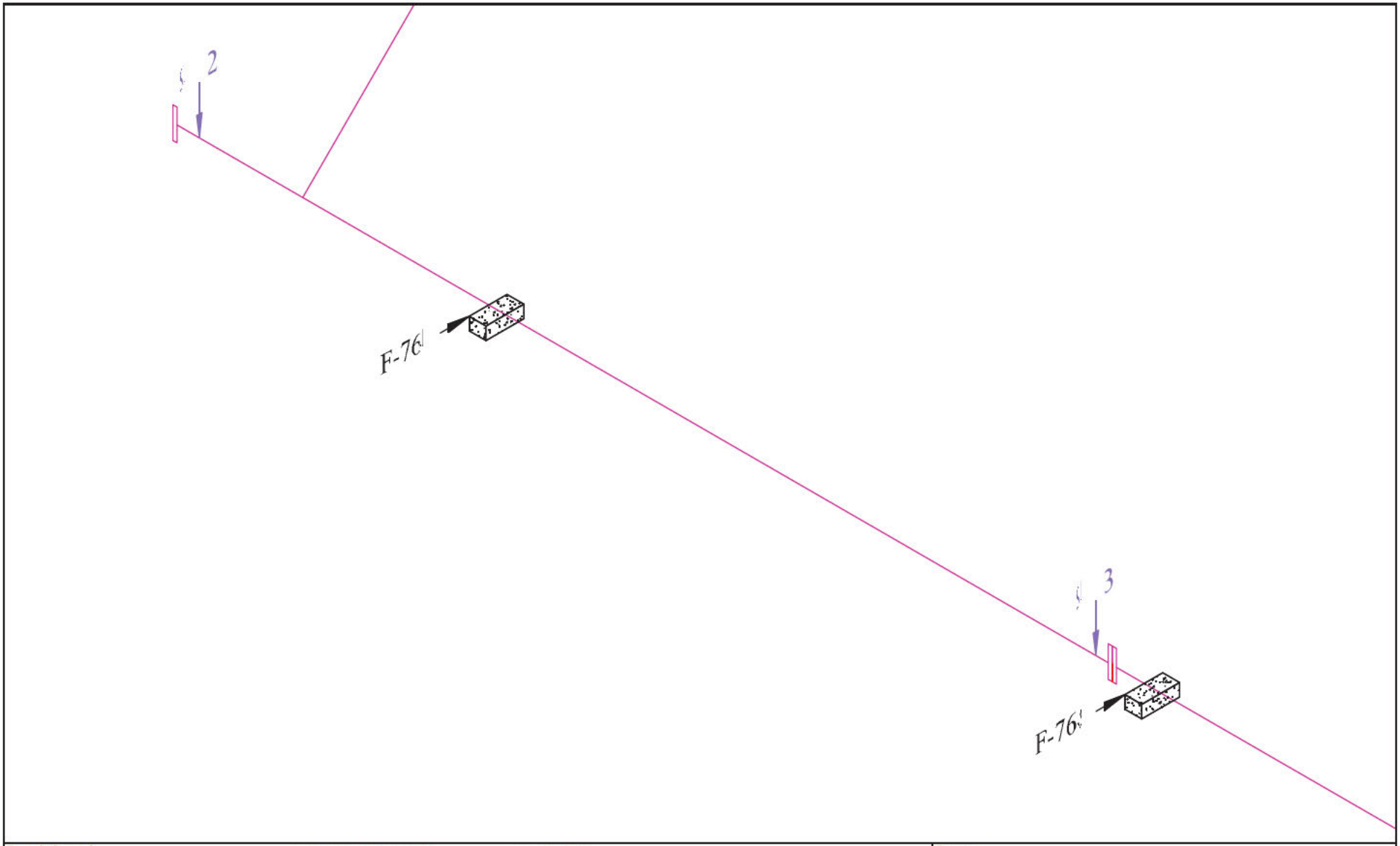
- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [7 of 9]

Description:
Surge Tank Piping



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
GW - LRUT CML
[redacted]

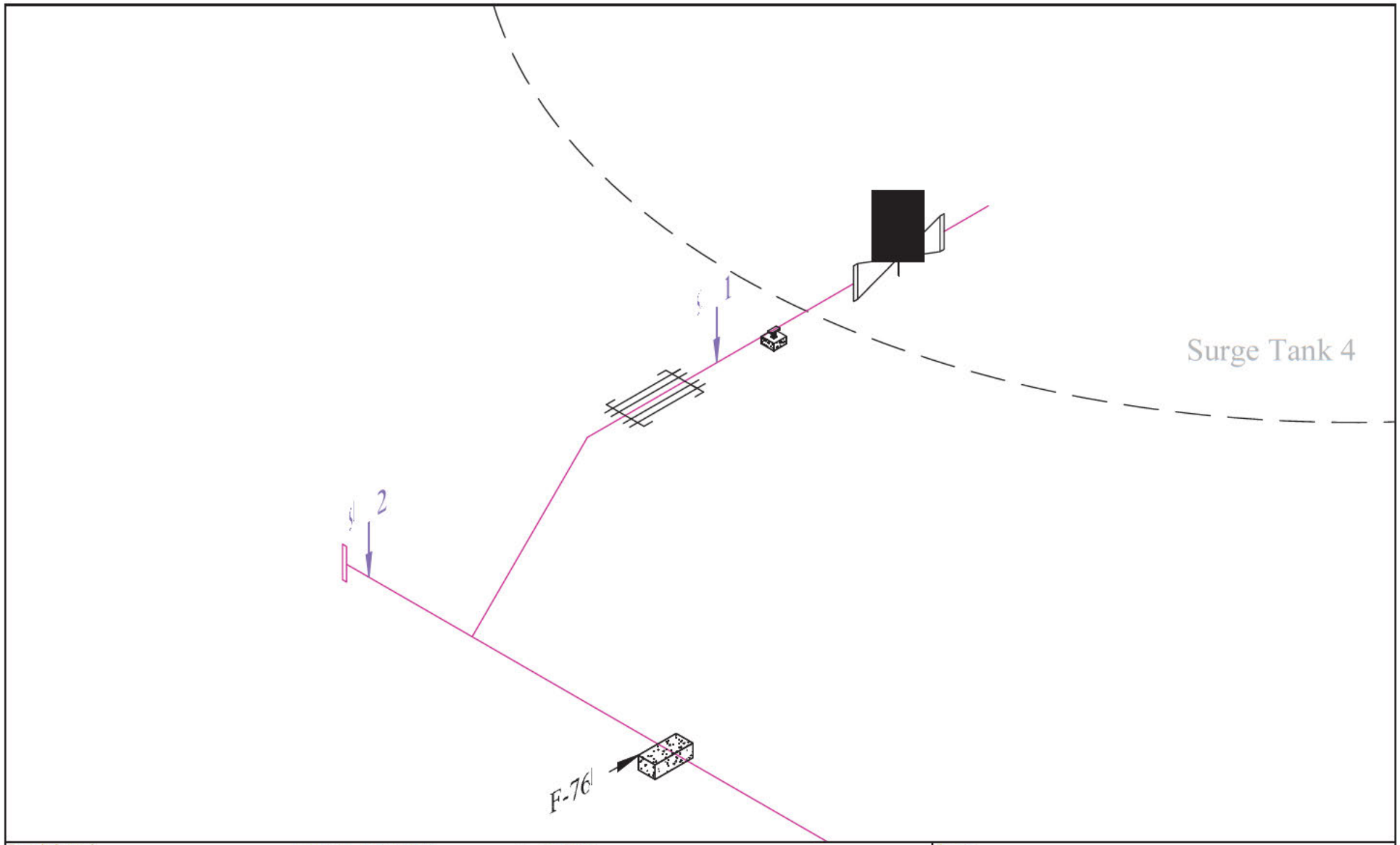
- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [8 of 9]

Description:
Surge Tank Piping



Remarks/Legend:
- Concrete Saddle
- Steal Pipe Support
- Dresser Coupler
- Flange
- Double Block & Bleed

ST1-ST3 - PAUT CML
S1-S22 - UT TML
G (b) (3) (A)
- Reducer

Owner:
US NAVY:
Joint Base Pearl Harbor Hickam, Pearl Harbor, HI

Drawn By:	InterSpec, LLC.	Modified By:	InterSpec, LLC.
Date:	05/24/2022	Rev No :	N/A
Scale:	N/A		

Drawing Title:
Surge Tank Piping Layout [9 of 9]

Description:
Surge Tank Piping

Appendix D

API 570 Checklist and Site Assessment Findings/Discussion Form

[redacted]

Piping Inspection Checklist

Company Name: US Navy - Red Hill Fuel Complex (upper tunnel section)

Location: Pearl Harbor, HI

Inspector: [redacted] Date: May 24, 2022

System: Hill Fuel Complex Piping Pipe Section ID: Tank Gallery, Harbor Tunnel, UGPH, Surge Tank and FOR Piping

A.1.1 PIPING SUPPORTS

a. X Visually inspect for cracking, pitting, and corrosion.
b. X Check clamp bolting is secure and minimum thread engagement.
c. X Check for coating failures
d. X Check attachment welds for cracking and corrosion.
e. X Check that lines subject to thermal and cyclic movement are free from binding
f. X Check that piping has proper supporting for length and weight of piping.

A.1.1.1 Concrete Foundation Support

a. X Inspect for broken concrete, spalling and cracks. especially under bearing surfaces.

b. X Inspect for erosion under foundation of support/s.

A.1.1.2 Wooden Supports

a. NA Inspect for splintered, broken, flattened, dry rotted and cracked membranes, especially under bearing surfaces.

A.1.1.3 Housekeeping

a. X Inspect the area for buildup of trash, vegetation and obstructions. `

B.2 PIPE Wall

B.2.1 External Visual Inspection

a. X Visually inspect wall surface for paint failures, pitting, corrosion, denting, out-of-round and part deformation.

[redacted]

[redacted]

Piping Inspection Checklist

b. X Check interstitial space of double wall, underground piping for product fumes.
c. X Visually inspect weld joints for cracking, pitting, corrosion and signs of leaking (product residue).

d. N/A Perform dye penetrant or mag particle if leaks or cracks are suspected.
e. X Check for proper grounding

B.3 PIPE FITTINGS AND INSTRUMENTS

B1.3.1 Branches, Fittings and Flanges.

a. X Inspect for fatigue cracks or signs of leakage on weld joints and reinforcing plates.

b. X Inspect for deformation and dimpling around branches, caused by excessive pipe deflection.

c. X Inspect for flange leaks and leaks around bolting.
d. X Check flange bolting are secure and have minimum thread engagement.
e. N/A Check that flange deflection shields are installed as required, have a proper fit and is secure.

B1.3.2 Relief Devices

a. X Inspect for flange leaks and leaks around bolting.
b. X Check flange bolting are secure and have minimum thread engagement.
c. X Record inlet and outlet sizes. Inlet: 4"/1" Outlet: 4"/1" (UGPH/Surge tank)
d. X Check that relief system outlet discharges to safe location (outside of building.)
e. X Record certification date 7/1/1997 and 03/19 (MFG Tag)
f. X Record pressure setting 260/150(PSIG) (UGPH/Surge Tank)
g. X Record type and identification number. CLA VAL/Taylor T-8200-1 (UGPH/Surge Tank)

B.1.1.3 Valves

a. X Inspect function of valves, including drain or return-to-tank line.
b. X Check for packing leaks.
c. X Inspect for flange leaks and leaks around bolting.
d. X Check flange bolting are secure and have minimum thread engagement.
e. X Inspect for fatigue cracks, corrosion and pitting.
f. X Check that valve handle has proper fit and is secure.
g. N/A Check that flange deflection shields are installed as required, have a proper fit and is secure.

[redacted]

[redacted]

Piping Inspection Checklist

B.13.4 Pumps, Compressors and Other Rotating Equipment

a. X Inspect mounting bolts and support.
b. X Inspect shaft seal for leakage and seal housing for hot spots.
c. X Inspect shaft sealing liquid reservoir and tubing for liquid level and leaks.
d. X Inspect condition of power lines and connections.
e. N/A Inspect pump operation for vibration, belt squealing, uncommon noises.
f. N/A Inspect casing for fatigue cracks, corrosion, pitting. and damage.
g. X Inspect for flange leaks and leaks around bolting.
h. X Check flange bolting are secure and have minimum thread engagement.
i. X Check safe guards are in place and secure.
j. N/A Check that flange deflection shields are installed as required, have a proper fit and is secure.

k. X Check equipment is properly grounded

B.4 INSULATION

B.1.4.1 Visually Inspection

a. X Check for holes, missing portions, deterioration due to corrosion or abuse.
b. X Check for sufficient sealing, especially around branches and appurtenances.
c. X Check for wetness.

B.5 PRESSURE /TEMPERATURE INDICATORS

B.1.5.1 Physical and Operating Conditions

a. X Check that indicators are securely attached and operating properly.
b. X Check that indicators are in accessible locations and readable.
c. X Check that indicators have current calibration date.
d. X Check for any damage, or corrosion build up.

B.1.6 RECORD FOLLOWING DATA

a.	X ID Number	Tank Gallery, Harbor Tunnel, UGPH, Surge Tank and FOR Piping
b.	N/A Radiography Examination	N/A
c.	X MAWP	275 psi
d.	X MDMT	- 20 F
e.	X Nominal Wall Thicknesses	Varies (See UTT Data)
f.	X Nominal Lengths	See Drawing
g.	X Material	Carbon Steel
h.	X Manufacturer	Unknown

[redacted]

Piping Inspection Checklist

i.	X	Year Built	1942 (Circa) with ongoing modification/upgrades
j.	X	Seamless/welded	Majority Seamed with some Seamless (Welded)
k.	X	Design Code	Unknown (Assumed ASME B31.3)

B.7 PIPING LAYOUT DRAWINGS

B.1.7.1 Record Following Data

a. X Pipe lengths and plains (significant heights).
b. X Type and placement of pipe supports.
c. X Foundation support member dimensions and orientation.
d. X Inside Diameter
e. X Piping part nominal thicknesses.
f. X Branches, fittings and instrument - layouts, sizes and uses.
g. X Flow arrows and identification (Material, NPS, System ID, etc.)

B.1.8 UT THICKNESS READINGS

a. X Designate TML location on layout drawings as required. (Normally TML's are designated down stream of each flow transition and at each pipe support.)

b. X At each TML, record measurements at - (4) points, (1) in each quadrant for 2 inches and greater, (1) point for nozzles less than 2 inches.

B.9 HYDROSTATIC TESTING

B.1.9.1 Record Following Data

a. N/A Actual pressures, temperatures, liquid levels and time duration of test
b. N/A Calibration dates of test instruments used (i.e. pressure gages, temperature gages, transducer etc.)

c. N/A Drawings indicating test sections.
d. N/A All Forms in API - 1110 filled out as required.

B.10 CATHODIC PROTECTION FOR UNDERGROUND PIPING

B.1.10.1 Record Following Data

a.	NA	Soil Resistivity	
b.	NA	Soil Potential	
c.	NA	Water table below ground level	

[redacted]

SITE ASSESSMENT FINDINGS AND DISCUSSION FORM

The following table highlights the overall site findings and assessment with regard to critical elements of the system and integrity management procedures and programs that contribute to or determine requirements for integrity management.

General piping system overview and relative age:	1940s (with subsequent upgrades)
Previous assessments and inspection history	• EEI/APTIM have completed previous assessment & NDE and repairs (2010 appears to be the first year this is known to have been done) • The section of [redacted] JP-5 Piping from Tank 20 to [redacted] was evaluated in July 2021 (AB&A/InterSpec).
Piping leak history	There was a pipe related event in May of 2021. (RCA and analysis conducted by others)
Use of underground piping in structural casings and double-wall secondary containment piping systems	N/A
Cathodic system history and inspection findings	Survey conducted on the FOR piping (Dec. 2021) Report was provided and reviewed.
*Piping s*ervice class per API 570 Categories 1 (severe) to 3 (limited)	Class 1
Conclusions regarding pressure testing criteria and adequacy of current pressure testing	Limited by expansion joints and non-standard flanges, fittings and welds (no known pressure testing was completed in this segment)
Piggability	Not applicable to this report (Study conducted by others during 2016 IMP)
Coating type and condition – Underground piping	N/A
Coating type and condition – Aboveground piping	Appears to be Macropoxy 646 coating system on most of the newly coated piping. Majority of the existing coating type is unknown but appears to be epoxy based coating with lead-based primer. Large portion of the facility piping has satisfactory coating with isolated areas of moderate to major coating failure.
Non-standard piping components and fittings	Several flanges, fittings and welds are not per current industry standards.
Establish CMLs (condition monitoring locations)	See Thickness data for TMLs and NDE CMLs
Determine long term corrosion rates and remaining system life per API 570	See Piping Calculations
Adequacy of thermal relief system to prevent overpressure condition	There is differential thermal relief (DTR) system on DBBs and header piping in UGPH have pressure reliving device (PRD). See report body for areas identified without a PRD
Adequacy of over pressure prevention system when a high-pressure system feeds a lower pressure class system	Exhibiting PRDs appear to adequate for overpressure protection. See report body for areas identified findings about PRDs

[redacted]

[redacted]

Inspection for Specific Types and Locations of Deterioration and Failure (Aboveground)

Injection Points and Mix Points	None
Deadlegs	Dead legs identified are documented in the body of report. See body of report.
Corrosion Under Insulation (CUI)	Fireproofing insulation only on dresser coupling for tank 2, 4, 6, 8, 10, 12, 14 and 16. Insulation at Tank 12 was removed during the for close visual inspection of pipe and dresser coupling was completed during the July 2021 API 570. Some corrosion noted but CUI does not appear to be a corrosion mechanism for this facility.
Soil/Air Interfaces (SAI) - Concrete/Air (CAI) Interfaces	Visual inspection and some LRUT conducted at SAIs and CAIs. Section of the exterior FOR line by ADIT 3 was also inspected at the SAI. Some CAI corrosion noted and documented in the report. No reportable indication noted
Service Specific and Localized Corrosion Inspection	None observed and none expected for main product lines. Very minimal water bottom pitting noted on piping that were opened during this inspection. Thickness survey was also conducted at areas that have a potential to trap water (near valves, low areas in section of piping and at the lowest elevation of the pipe run). UTT did not reveal a concern for water bottom on fuel line. The FOR line did however have moderate to major corrosion due to product carried. See report body for locations identified.
Erosion and Corrosion/Erosion	None observed and none expected on product piping (refined product stored at this facility)
Environmental cracking	None observed and none expected
Corrosion beneath Linings	N/A
Fatigue Cracking	None observed and low likelihood
Creep Cracking	None observed and low likelihood
Brittle Fracture	None observed and none expected
Freeze Damage	None observed and none expected
Contact Point Corrosion	Some metal to metal contact points were observed but no large-scale corrosion cell observed at pipe supports. Recommendation is made for Teflon shims/insulation strip between pipe and saddle. See body of report and Table E for areas identified.

[redacted]

[redacted]

Relevancy and Compliance

Internal Visual Inspection	Section of opened pipe at tanks 18 and 20 were visually inspected during the July 2021 inspection cycle. Other areas that were open for repairs were additionally inspected during this inspection cycle. No major internal pitting noted.
On-Stream Inspection	Periodic on-stream inspection is performed at this facility by facility personnel but no know on stream inspection documented or provided for review.
Thickness Measurement Inspection	Performed during this inspection and previous inspections
External Visual Inspection	This is been performed periodically. Deficiencies identified are submitted in this report
External Inspection of Buried Equipment	N/A
CUI Inspection	Performed during the 2021 API 570 inspection cycle and this inspection at tank 2, 4, 6, 8, 10, 12, 14 and 16.
Vibrating Piping Inspection	Not expected but can only be performed during an on-stream inspection while pipe is in use and operating.
Supplemental Inspection	Periodic NDE is performed
Condition Measurement Locations (CMLs)	Performed during this inspection and previous inspections
Condition Monitoring Methods	Ultrasonic thickness testing and visual surveys, Guided wave (GW) inspection and Phased Array Ultrasonic Testing (PAUT) conducted at select locations
Pressure Testing of Piping Systems	There is no known pressure testing record
Material Verification and Traceability	Destructive testing and metallurgical lab testing were conducted on samples of piping in May 2000 and August 2018
Inspection of Valves, Gages and Pumps	Accessible section of valves and flanges were inspected (external only)
In-Service Inspection of Welds	Phased Array Ultrasonic Testing (PAUT) conducted at select locations
Inspection of Flanged Joints	Visual inspection

[redacted]

Summary of Underground Pipe Compliance Requirements

(This section applies for primarily buried underground piping. There is a small section of buried piping associated with the FOR line at ADIT 3. While piping at Red Hill fuel complex is primarily aboveground and available for inspection; some of this methods were applied for portions of piping that pass through bulkheads)

Above-grade Visual Surveillance	• Completed for section of FOR piping at ADIT 3 • (**) Visual surveillance was completed for all bulkhead penetration (surveyed for concrete discoloration, casing discoloration and for noticeable odor
Close-Interval Potential Survey (CIP)	N/A
Pipe Coating Holiday Survey	N/A
Soil Resistivity	N/A
Cathodic Protection Monitoring	Survey conducted on the FOR piping (Dec. 2021) Report was provided and reviewed.
In-Line Inspection (ILI) – Intelligent Pigging	N/A
Video Cameras	• (**) Borescope inspection was utilized for accessible section of concrete penetration, crevice and pipe casing
Excavation	N/A
Externally Applied Screening Techniques (LRUT/Guided Wave)	(**) LRUT of the selected concrete bulkhead penetrations and concrete support contact points were conducted.

(**) Indicates application of techniques and methodology employed to facilitate the inspection of portions of piping that pass through bulkheads.

General and additional comments: See report section and summary tables for general condition of section of piping inspected

Appendix E

Photographs

(b) (3) (A)

[redacted]

and 16

)

E.3 Pipe-to-flange attachment (nonstandard weld attachment/unknown fit-up to flange) (TYP)

(b) (3) (A)

E.4 Pipe-to- up to flange) (TYP)

E.5 DBB DBB skin valves

E.6 Asbestos or bitumen encapsulated asbestos coating from to about

(b) (3) (A)

er (

(b) (3) (A)

E.9 Topside view of the three-product piping past Tank 7 and 8

(b) (3) (A)

n)

(b) (3) (A)

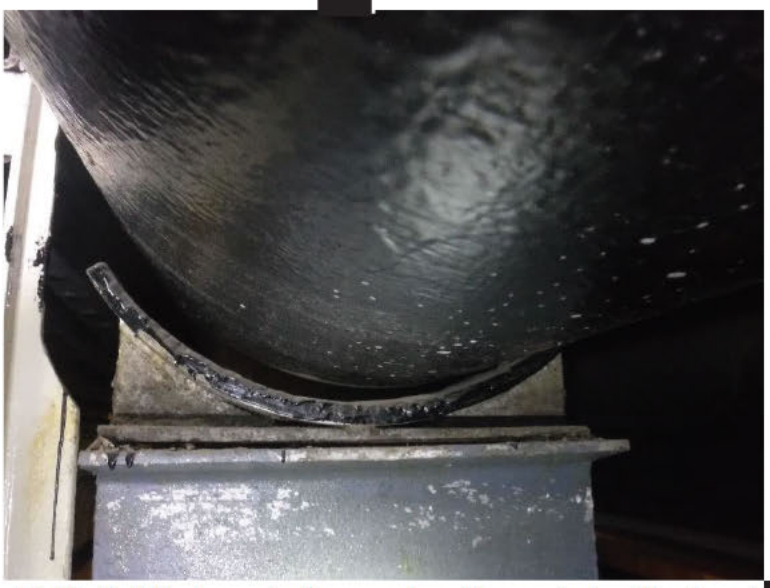
E.12 Example of loose dresser coupling joint harness on [redacted] lateral (Tank 6 shown)

(b) (3) (A)

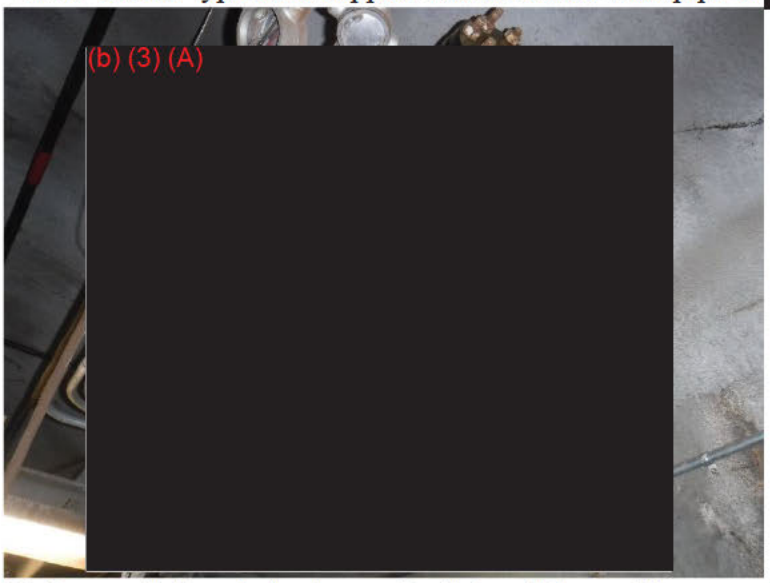
E.1 pipe cap)

E.15 Small welded-on patch plate on F-24 header by Tank 3 "Tee"

[redacted]



E.16 Saddle type steel support not in contact with pipe at [redacted]

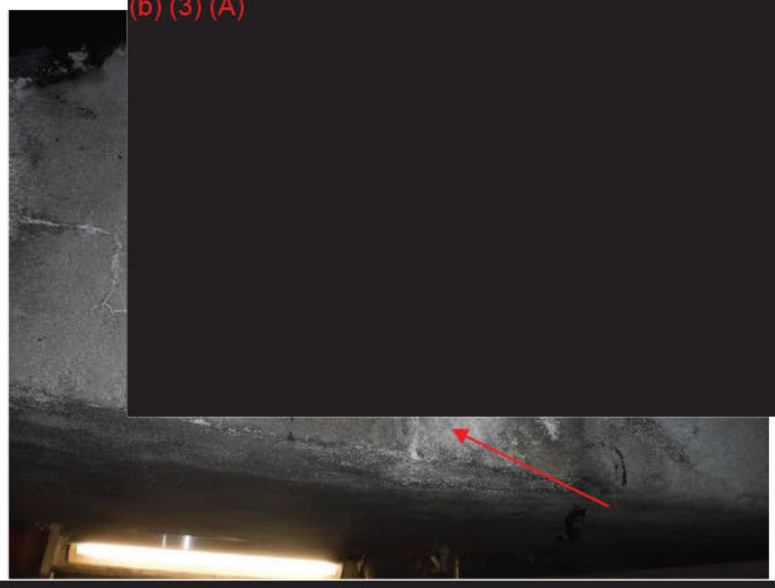


E.17 Exposed electrical wires at Tank 1 and flanged (unrestrained pipe)

E.18 Efflorescence formation on anchor bulkhead between [redacted] and [redacted] on [redacted] line

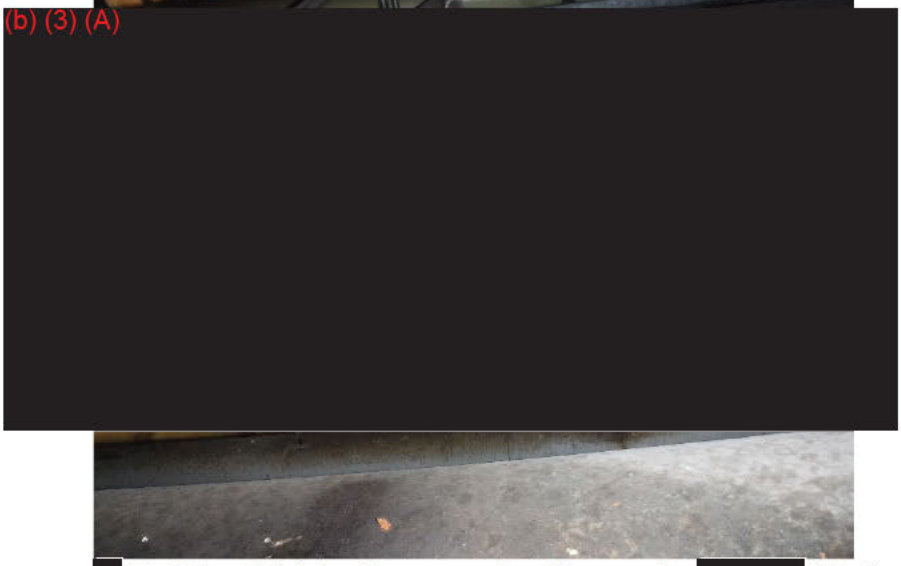
[redacted]

(b) (3) (A)



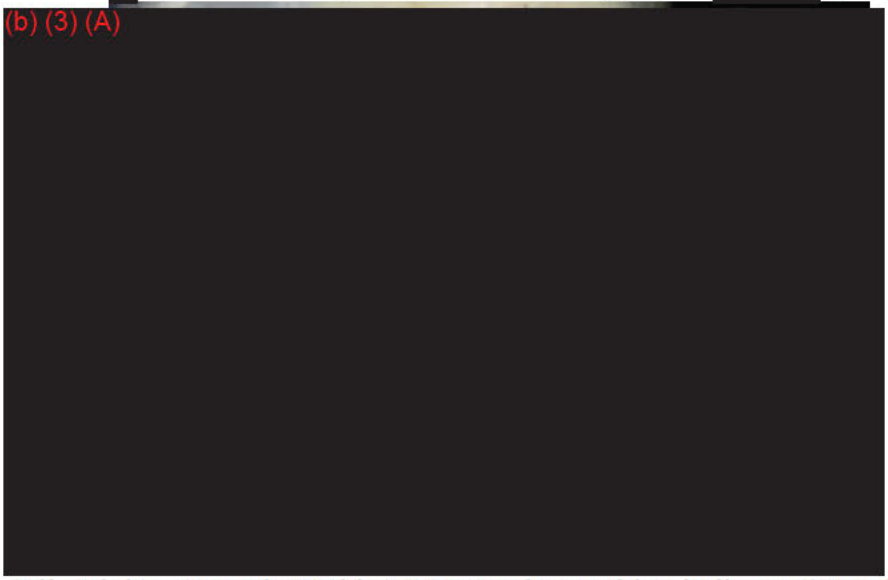
E.

(b) (3) (A)



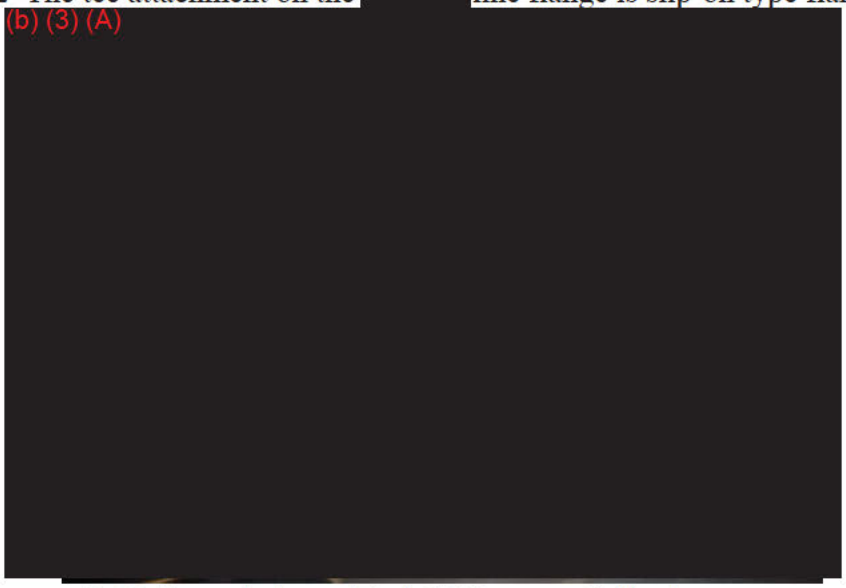
20 Material drips from tunnel ceiling on the (JP-5) pipe

(b) (3) (A)

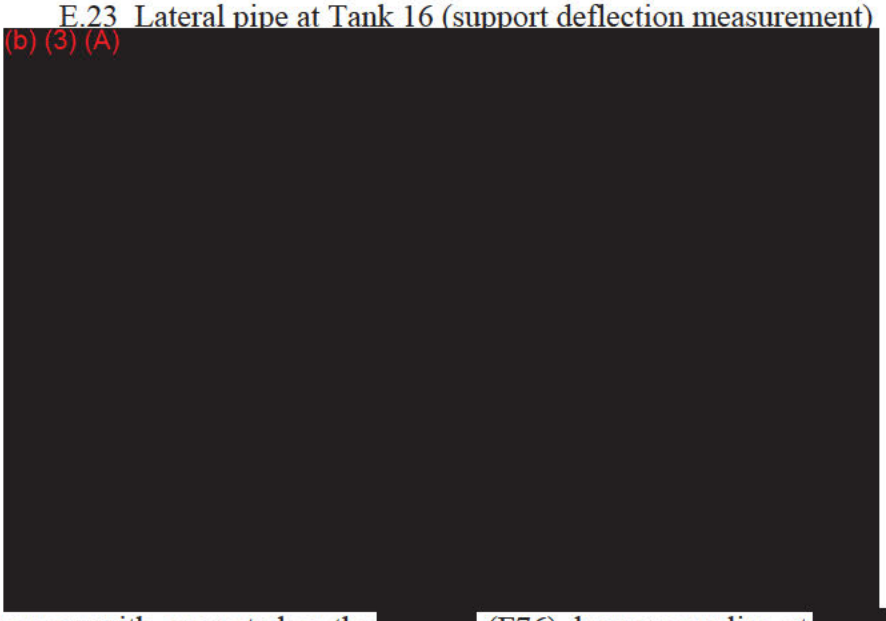


E.21 Oil staining on Tank 15 skin DBB at valve position indicator (Note length of VPI stem)

E.22 The tee attachment on the line flange is slip-on type flange (Info only)



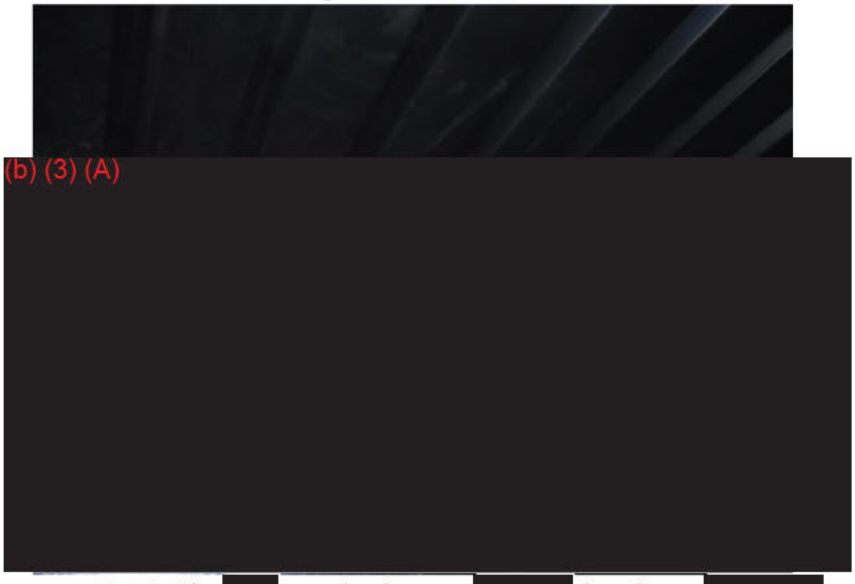
E.23 Lateral pipe at Tank 16 (support deflection measurement)



E.24 Joint harness with gap noted on the (F76) dresser coupling at

[redacted]

E.25 Unrestrained blind flange at Tank 14 (Tank is out-of-service)



E.26 Six- patch plate on header at

E.27 Ten- patch plate on header at

[redacted]

(b) (3) (A)

E.28 Socket weld on the 32- line between

E.29 UTT testing of inactive corrosion area identified on 32-line between

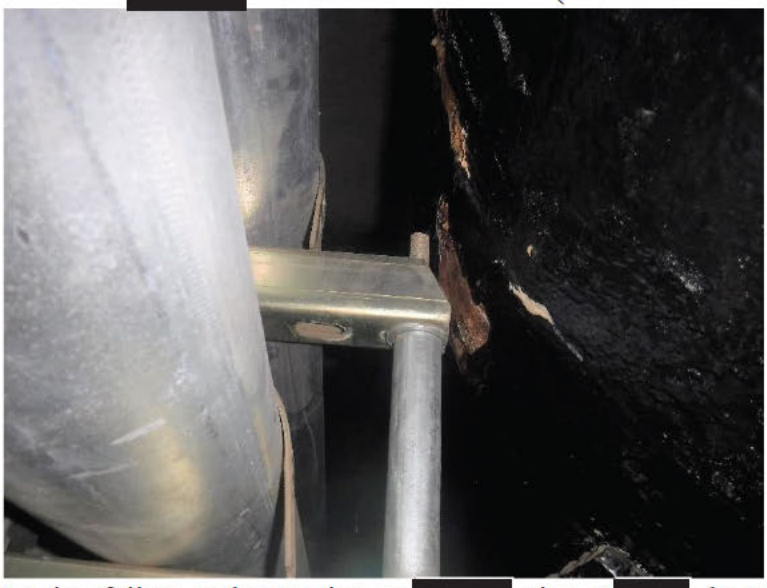
(b) (3) (A)

E.30 isolation valve, reduction in pipe diameter and HPV at

[redacted]

E.31 Corrosion of fasteners on the [redacted] header to lateral tees between Tank 9 and 10

E.32 Rope tied to the [redacted] drain valve at Tank 10 (unknown reason) note missing plug



E.33 Coating failure and corrosion on [redacted] pipe at [redacted] due to conduit strut

[redacted]

(b) (3) (A)

(b) (3) (A)

E.35 Nonstandard pipe repair (square corners) on at and corrosion on support

(b) (3) (A)

E.36 dresser coupling at

[redacted]

E.37 Oil type staining at the bottom of dresser coupling (See note about oily exudate)

(b) (3) (A)

[redacted]

E.38 Coating failure on piping between [redacted] and UGPH wall

(b) (3) (A)

[redacted]

E.39 Coating failure on piping between [redacted] and UGPH wall

[redacted]

[redacted]

E.40 Stairway guardrail post in contact with pipe past [redacted] on [redacted] line

(b) (3) (A)

[redacted]

wall

(b) (3) (A)

[redacted]

E.42 Staining around LPD on [redacted] line between [redacted] and UGPH

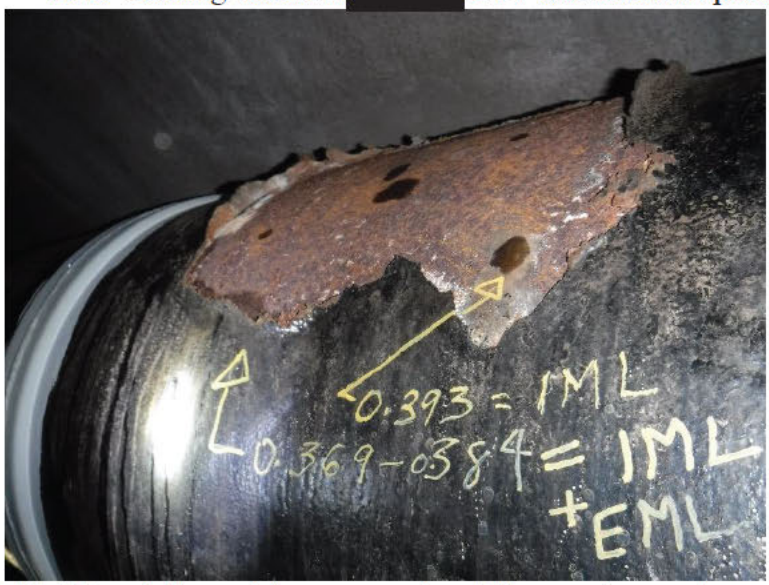
[redacted]

E.43 Flange stud engagement inspection with UTT

E.45 Flange with insufficient stud engagement

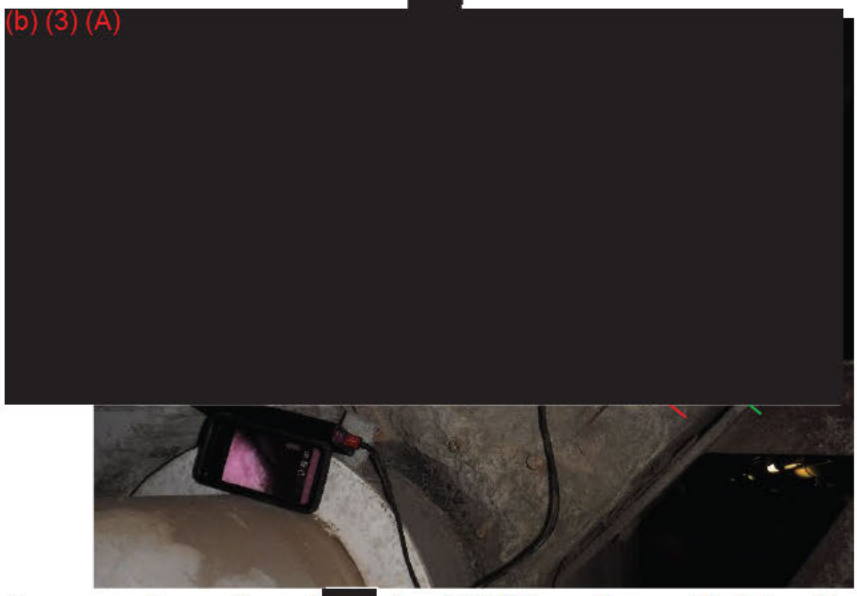
(b) (3) (A)

E.46 Coating failure at UTT and visual inspection)



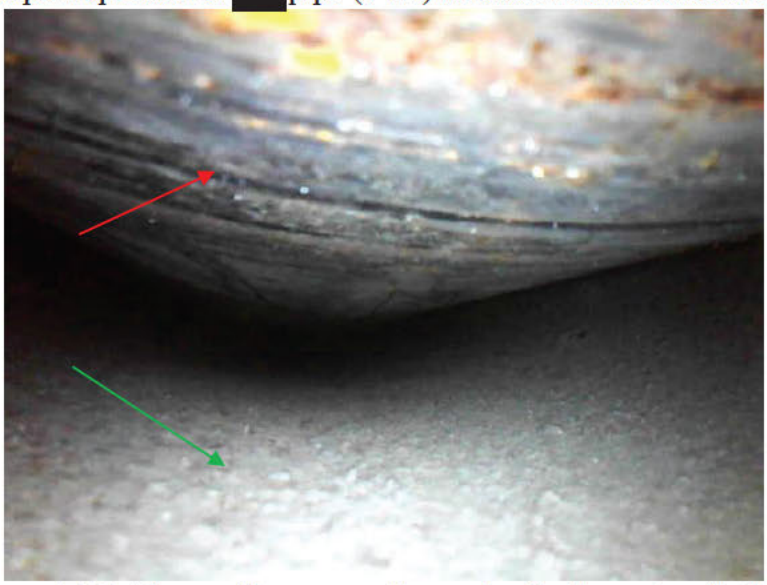
E.47 Wrap failure with some coating failure and corrosion on

E.48 Saddle 32 on the line with shims



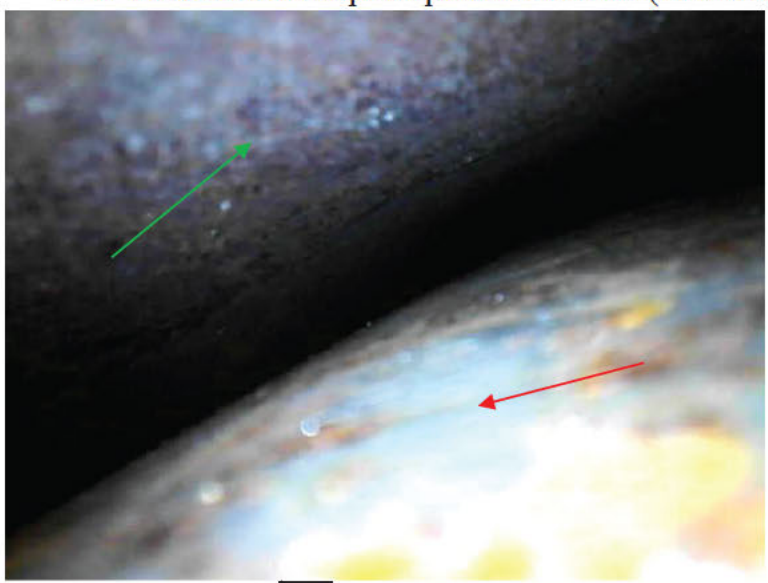
Note the original [redacted] pipe with anchor ring within a few inches from the surface of the bulkhead. See E.51 for end anchor ring.

E.49 Borescope inspection of [redacted] pipe (F-24) in a sleeve at bulkhead between [redacted]



Space between sleeve and pipe. Red arrow is carrier pipe and green arrow is sleeve.
The original [redacted] pipe I used as the sleeve with a [redacted] pipe as the carrier pipe

E.50 Photo of borescope inspection in sleeve (no finding)

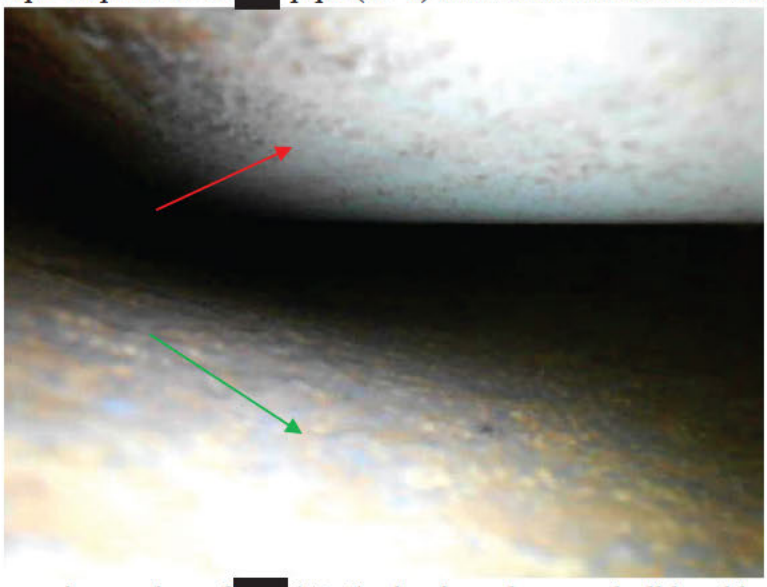


Space between sleeve and pipe. Red arrow is carrier pipe and green arrow is sleeve.
The original [redacted] pipe I used as the sleeve with a [redacted] pipe as the carrier pipe

E.51 Borescope inspection of [redacted] pipe between sleeve and bulkhead at [redacted]

Borescope inspection conducted via the small opening on the end ring that is seal welded to the sleeve.

E.52 Borescope inspection of [redacted] pipe (JP-5) in a sleeve at bulkhead between [redacted]



Space between sleeve and pipe. Red arrow is carrier pipe and green arrow is sleeve.
The original [redacted] pipe I used as the sleeve with a [redacted] pipe as the carrier pipe

View at 7 to 6 o'clock

E.53 Borescope inspection of [redacted] (JP-5) pipe in a sleeve at bulkhead between [redacted]

A wood shim was noted between pipe ad sleeve. (Note the nails). LRUT did not indicate corrosion at this penetration but wood shim is not standard practice for sleeve spacer.

View at 4 o'clock

E.54 Borescope inspection of [redacted] (JP-5) pipe in a sleeve at bulkhead between [redacted]

[redacted]

(b) (3) (A)

Space between pipe and the concrete bulkhead was used to perform borescope inspection of the pipe via cavity.

E.55 Borescope inspection of [redacted] pipe between pipe and bulkhead at [redacted]

Space between pipe and the concrete bulkhead was used to perform borescope inspection of the cavity.

E.56 Borescope inspection of [redacted] pipe between pipe and bulkhead at [redacted]

Red arrow is pipe and green arrow is the anchor plate/ring welded around the pipe. The plate/ring is approximately [redacted] inches from the surface (near the middle of the bulkhead).

E.57 Borescope inspection of [redacted] pipe between pipe and bulkhead at [redacted]

[redacted]

E.58 Pipe support base plate and angle iron corrosion ([redacted]

(b) (3) (A)

[redacted]

E.59 Dent measurement (Typical)

E.60 DFT testing (Typical)

[redacted]

E.61 Coating failure and surface corrosion at threaded LPD (at [redacted] on [redacted]

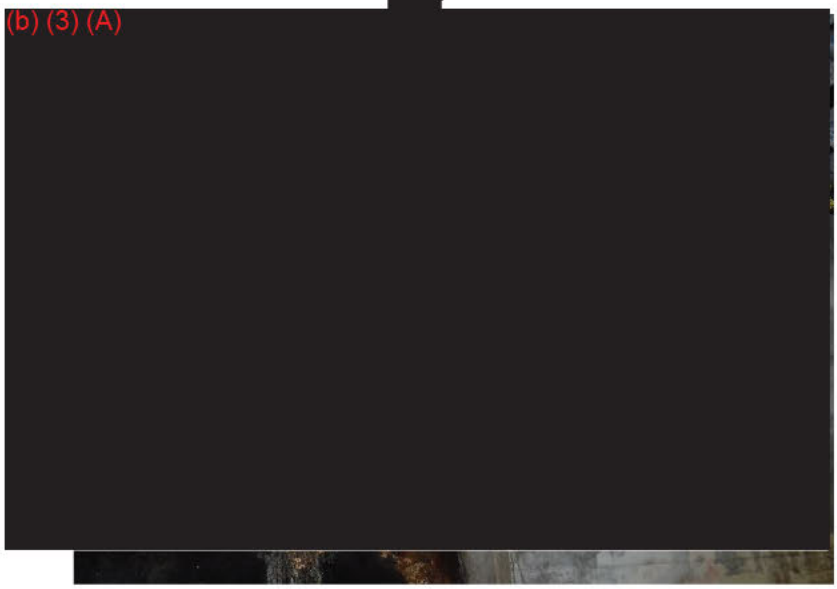
(b) (3) (A)

E.62 Coating failure and corrosion at anchor saddle and pipe ([redacted]) [redacted] line

E.63 Coating failure (no corrosion) [redacted] line at [redacted]

[redacted]

(b) (3) (A)



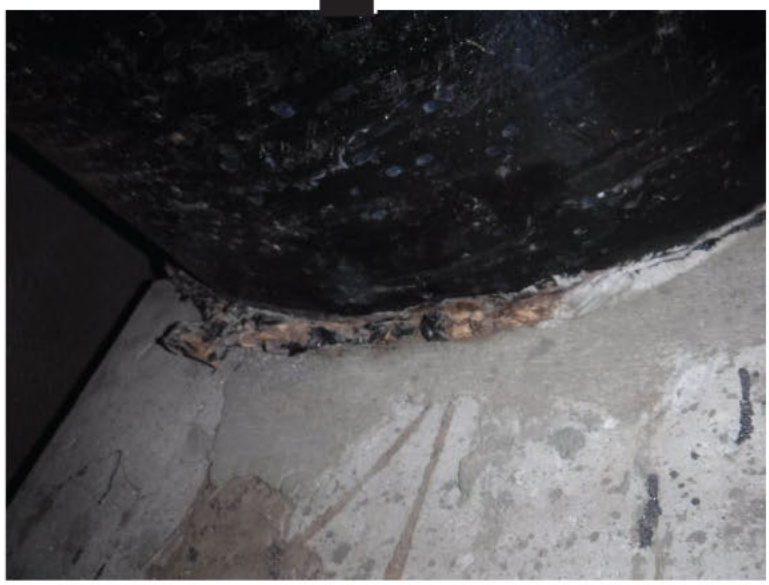
E.64 Coating failure and corrosion at concrete bulkhead penetration [redacted]

Thickness testing was conducted at all branch welds when it is located near the bottom of the pipe at all locations to inspect for microbial induced corrosion (MIC)

E.65 UTT for MIC at all branch fitting [redacted] between [redacted] shown)

E.66 Staining on threaded plug on JP-5 [redacted] line at [redacted]

[redacted]



The Newspaper was a Saturday, January 3rd 1942 Honolulu Star Bulletin.

The stuffed newspaper was removed for crevice/corrosion inspection of saddle contact point and to determine the reason for the stuffed paper.

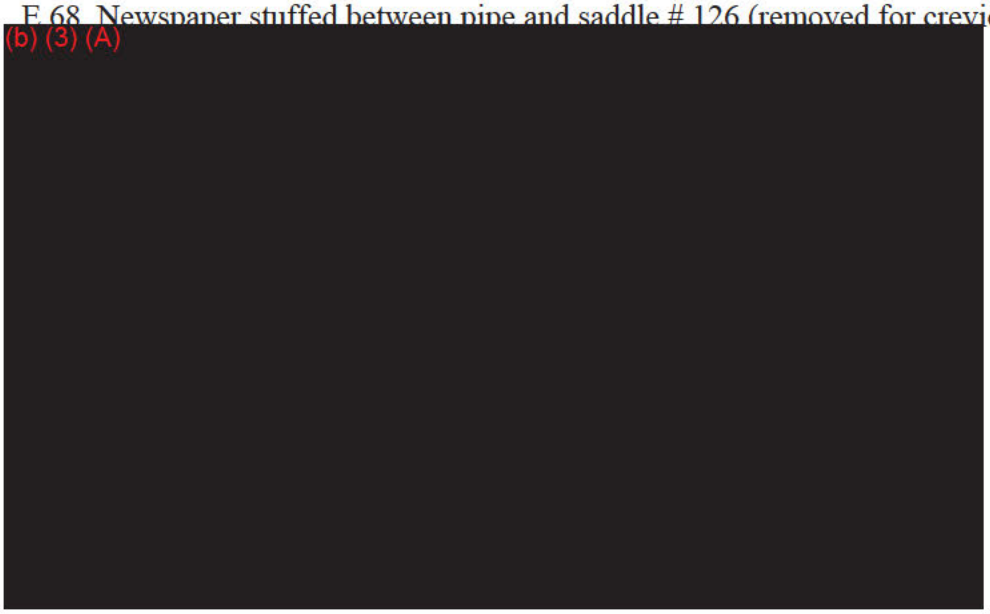
E.67 Newspaper stuffed between pipe and saddle # 126 (removed for inspection)

Note the piping and coating appears to be original to the facility. Same black coating noted on the newspaper. Reason for the paper is unknown but likely to seal the concrete form boards during construction.

No crevice corrosion noted between the saddle and pipe.

E.68 Newspaper stuffed between pipe and saddle # 126 (removed for crevice/corrosion)

(b) (3) (A)

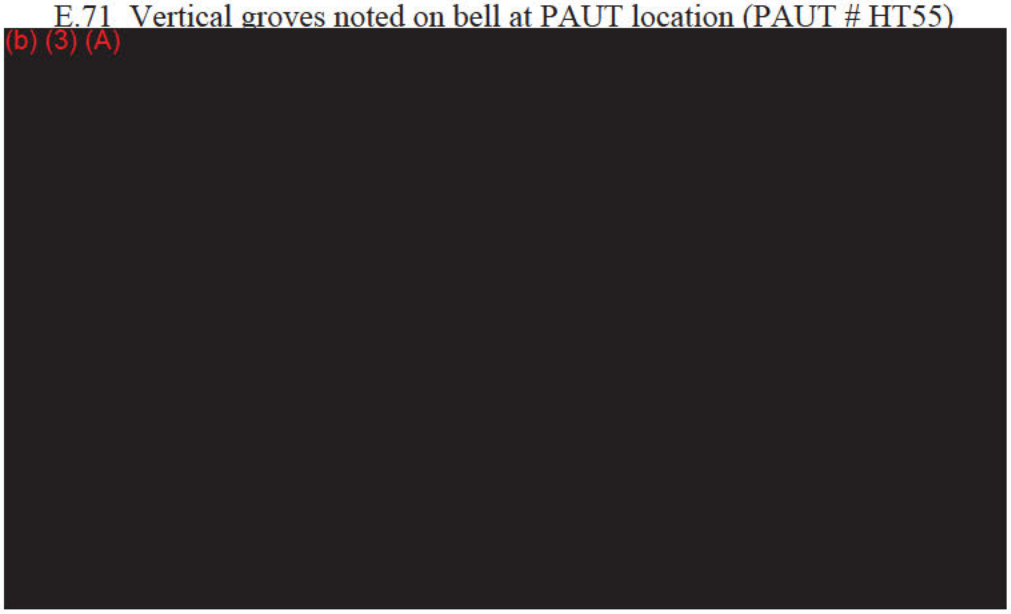


E.69 Plates tack welded to the pipe (use unknown). Location shown is between [redacted]

E.70 Typical bell-bell welded with coating removed (Welder ID stamps noted at welds)

E.71 Vertical groves noted on bell at PAUT location (PAUT # HT55)

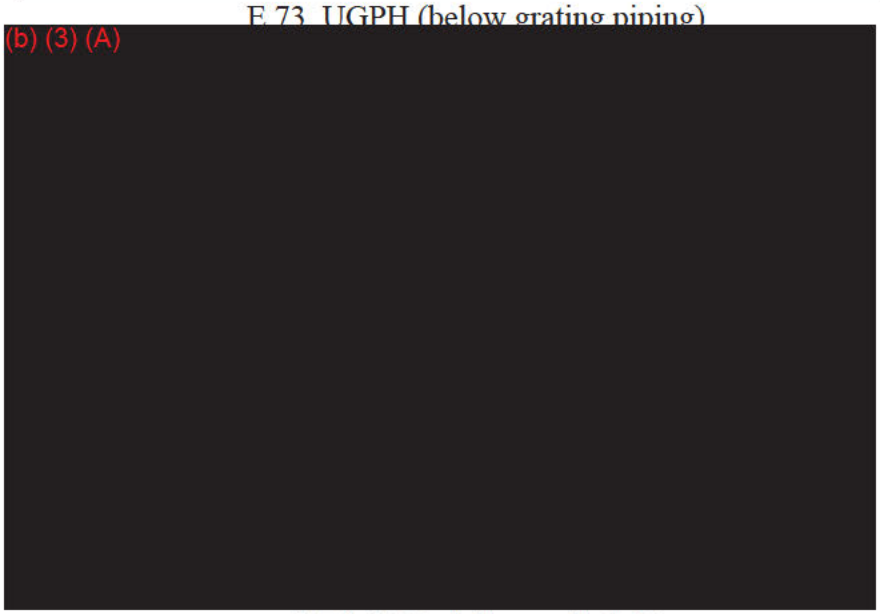
(b) (3) (A)



E.72 UGPH (above grating piping)

[redacted]

E.73 UGPH (below grating piping)



E.74 FOR piping at pit S-23

E.75 FOR piping outside of [redacted] 3 (majority of this piping is corroded)

[redacted]

E.76 PAUT daily calibration using standard block (Typical)

E.77 UTT daily calibration using standard block (Typical)

(b) (3) (A)

E.78 Typical LRUT setup

Appendix F

JP-5 repair Highlights; Tank 20 – Tank 10

[redacted]

JP-5 repair Highlights; Tank 20 – Tank 10

The section of [redacted] JP-5 Piping from Tank 20 to [redacted] was evaluated in July 2021 along with various NDE. This section of piping was not re-evaluated during this trip since it was undergoing active repairs. Several sections of piping spools were replaced or in the process of being repaired.

InterSpec took the opportunity, when available, to visually survey the interior portion of the piping that were cut open. This was achieved at the end of the pipe header flange by tank 19 and 20 (just past [redacted] at spool cut out by [redacted] and at the rolled offset by [redacted] The interior portion of the pipe inspected did not have any significant pitting with an average pit depth of 0.030″. The repairs appear to be following industry practice and requirements of API 570 with several hold points scheduled for the required NDE and visual inspection by the repair contractor.

(b) (3) (A)

[redacted]

New flange with spectacle blind (tank 20 after tee)	New pipe spool at [redacted]

[redacted]

(b) (3) (A)

pool cut out at	at

(b) (3) (A)

Coating removed near (presumably for socket weld pipe repair)	Coating removed b/w (presumably for socket weld pipe repair)

(b) (3) (A)

Rolled Offset by	Interior view of pipe at the rolled offset by
(b) (3) (A)	
New rolled offset (Tank 19)	New pipe spool after the eccentric reducer coupling (Tank 19)
(b) (3) (A)	
Tank 19 pipe (Note no ioslation valve)	Lateral restraint pipe at (pipe spool mounted between flange and tunnel wall)

APPENDIX 'D' - TRIP REPORT

Transmittal

Transmittal/Review/Approval

TRANSMITTED FOR:	SUBMITTAL NO.	DATE SUBMITTED:
APPROVAL	010	Jun 17, 2022

CONTRACT NO	CONTRACT TITLE	DATE NEEDED BY:
N39430-20-D-2242 DO N3943022F4333	Fuel Transfer Infrastructure Assessment - Red Hill Bulk Storage Facility	

PART I: FOR CONTRACTOR USE

FROM (CONTRACTOR)	TO:
Austion Brockenbrough & Associates, LLC	NAVFAC EXWC

SUBMITTAL PRIORITY? ○ HIGH ◉ NORMAL
SCHEDULE REFERENCED? ○ YES ◉ NO
PREPARED BY QC MGR? ◉ YES ○ NO
CRITICAL PATH? ◉ YES ○ NO

Add Del

ITEM NO.	ITEM DESCRIPTION	SPEC SECTION & PARAGRAPH DWG NO.	ACTIVITY ID
001	Field Investigation Trip Report		
002	Preliminary Piping Inspection Trip Report		

QC MANAGER REMARKS: (INCL COMMENTS FOR DETAILED REVIEWERS)

It is hereby certified that the material submitted herein conforms to contract requirements and can be installed in the allocated spaces.

QUALITY CONTROL MANAGER NAME/SIGNATURE:	DATE:
[redacted] (b) (6) [redacted]	Jun 17, 2022

FOR GOVERNMENT REVIEW ROUTING ○ YES ○ NO ○ N/A

FROM: (FEAD/ROICC)	TO: (REVIEWER)

FEAD/ROICC CONSTRUCTION MANAGER COMMENTS FOR REVIEWER:

FEAD/ROICC CM NAME/SIGNATURE:	DATE:

PART II: FOR REVIEWER USE ○ REVIEW REQUIRED

DETAILED REVIEWER RECOMMENDATION:

DETAILED REVIEWER COMMENTS:

DETAILED REVIEWER NAME/SIGNATURE	TITLE	DATE:

PART III: FOR APPROVER USE

FROM:	TO:

SUBMITTAL IS:

APPROVER'S COMMENTS:

APPROVER NAME/SIGNATURE	TITLE PROJECT MANAGER/CONSTRUCTION MANAGER	DATE:

Austin Brockenbrough
ENGINEERING + CONSULTING

June 17, 2022

(b) (6)
POL Facilities Engineering Division, Code SH25 - NAVFAC EXWC
1000 23rd Avenue
Port Hueneme, CA 93043-4370

Re: Site Investigation Trip Report, Fuel Transfer Infrastructure Assessment, Red Hill Bulk Fuel Storage Facility; A/E Contract No. N39430-20-D-2242, Delivery Order No. N3943022F4333

Dear (b) (6)

Brockenbrough had a facility assessment team on site at the Red Hill Bulk Fuel Storage Facility, JBPHH, Hawaii, on March 21st thru May 24th, 2022, to perform an assessment of the POL piping, fire protection systems, and other transfer assets. This site visit was performed under A/E Contract No. N39430-20-D-2242, Delivery Order N3943022F4333 as required by the Scope of Work dated 20 January 2022. Assessment team included an API 570 pipe inspection team, a Fire Protection team, and a Life Cycle Sustainment team. Specific investigation tasks are listed in more detail below. Representatives from Brockenbrough and our teaming partners were on site continuously for the entire two-month period listed above.

Piping Assessment Field Investigation Notes:

- Brockenbrough API 570 Inspectors / POL Engineer's performed a walkthrough of all piping systems for the JP-5, F-24, F-76, and FOR piping. The line was investigated and compared to existing drawings and previous piping inspection notes were evaluated.
- Brockenbrough Structural Engineer performed a detailed assessment of all fuel piping supports (Concrete and steel).
- Brockenbrough's Teaming Partner, InterSpec, performed a detailed Visual Inspection of all piping systems for JP-5, F-24, F-76, and FOR piping.
- InterSpec also performed several enhanced inspection activities for the piping systems including Guided Wave Inspection of the piping at locations where it penetrated concrete and Phased Array Inspection of a selection of the fuel piping welds.
- While on site, Lead was identified within the pipe coatings that were being removed to facilitate the Phase Array Inspection of the Welds. A modification was executed to handle and dispose of this lead material.
- In general, all piping systems were found to be in overall "Fair" condition, but with several localized areas of coating failure and significant to severe corrosion and piping wall loss noted. Locations and additional quantitative details of the anomalies will be provided within the Transfer Pipeline Assessment Report.

- The detailed Preliminary Trip Report from has been provided as an appendix to this trip report and details the initial significant findings from the visual piping inspection

Fire Protection Assessment Field Investigation Notes:

- Brockenbrough's teaming Partner, Jensen-Hughes, has a fire protection assessment team on site and performed a walkthrough of all piping systems for the fire protection systems that protect the piping and tank galleries.
- The fire protection system components were evaluated using the system as-built drawings from FY15 Project P1551 "Upgrade Fire Suppression and Ventilation Systems" to determine if the system was installed per the design.
- Additionally, the overall capacity and operation of the existing system was assessed to determine if adequate protection would be offered in the event of an emergency. This assessment included confirming the findings of the 2010 Audit Report prepared by the Department of the Navy.
- Systems investigated while in the field include the water standpipe system, the fire-foam sprinkling system (lower tunnel), the water sprinkling system (upper tunnel), fire detection, alarm, and mass notification equipment, smoke ventilation system, fire foam retention components, plus pumps, water supply, and all other aspects of the alarm and suppression system.
- Various meetings were held while at the site, including discussions with FLC personnel and NAVFAC Pacific fire protection subject matter expert.
- Equipment cut sheets and product data were investigated to support the fire system assessment, but also to provide information to the life cycle sustainment effort being performed concurrently by Brockenbrough.
- In general, the as-built drawings were not accurate as to the location of various fire system devices (approximately 85% of devices did not match the location shown on the as-built drawings). However, the system was found to be generally in satisfactory condition, with most device locations acceptable per applicable codes and standards. It appears that the issue is mainly with the accuracy of the as-built drawings, not the location of the components.
- The Fire Protection Assessment Report being submitted as a primary deliverable of this task order will offer more details on the findings and recommendations for the fire protection system of this fuel facility.

Life Cycle Sustainment Plan Effort Field Investigation Notes:

- Brockenbrough Engineers performed a walkthrough of all piping systems, infrastructure equipment, and fire protection components as part of the field investigation for the life cycle sustainment assessment.
- Available product data was gathered from all applicable equipment and components and all applicable systems were investigated and assessed to determine age, condition, and operability factors.

- Document research was performed in an attempt to determine age, make/model, capacity, and other pertinent information on all applicable components and equipment.
- Various meetings and informal discussions were held while at the site, including discussions with FLC personnel, and NAVFAC Pacific personnel, and several other pertinent representatives.
- Life cycle personnel coordinated closely with the fire protection assessment team for information and evaluation of the fire protection systems and equipment.
- In general, the various system components and equipment that support the red hill fuel system were found to be generally in fair condition, with many of the items serviceable but approaching their expected service life, and thus requiring significant maintenance or repair to remain in operation.
- The Life Cycle Sustainment Report being submitted as a primary deliverable of this task order will offer more details on the findings and recommendations for the overall condition findings and potential required maintenance and routine repairs of this fuel facility.

The above summary represents the initial findings of the Brockenbrough lead field team from our recent site visit. These findings should be considered legitimate, but preliminary. As we continue to process the data and further develop our analysis, significant finding items may be added, subtracted, or adjusted from what is stated above.

Please contact us if you have any questions or need more information.
Sincerely,

[redacted]enbrough & Associates, LLC

(b) (6)
[redacted]

Project Manager/Mechanical Engineer

Enclosures: InterSpec Preliminary Trip Report

Inter Spec LLC
Environmental Inspection Services
464 S Independence Blvd, C-104, Virginia Beach, VA 23452
www.interspecllc.net

Office: 757-622-6299
Fax: 757-622-9103
Toll Free: 800-546-7853

June 6, 2022

Trip Report: Red Hill Bulk Fuel Storage Facility
Location: Joint Base Pearl Harbor Hickam; HI

Attention: (b) (6) - Fuels Infrastructure (Austin Brockenbrough & Associates, LLC)
Subject: Draft Summary of Findings and Work Completion Report

This trip report summarizers the work completed and presents a draft finding of inspection conducted between March 22 through May 17, 2022 of the tunnel aboveground piping systems designated for inspection at the Red Hill fuel complex in Hawaii. The inspection was performed by a certified API-570 inspector from InterSpec, LLC. All data was collected in accordance with the guidelines set forth in API Standard 570, the appropriate ASME Codes, 40 CFR 112, and other supporting documents. Note: findings discussed in this trip report are not intended to be comprehensive, and the data collected requires analysis before a complete report is issued.

The project included mobilization of equipment and personnel to support the activities outlined in the SOW. The following inspections and tasks were completed:

i. Guided wave (GW) or long-range ultrasonic testing (LRUT) of the selected concrete bulkhead penetrations and concrete support contact points. A representative sample of bulkhead penetrations and concrete support contact points were examined at the Tank Gallery, Harbor Tunnel, and Surge Tank. A total of 32 LRUT data acquisition setups were completed (note some locations yielded poor data due to pipe geometry or low amplitude signals).
ii. Conducted manual and semi-automated Phased Array Ultrasonic Testing (PAUT) examinations of 86 welds. A representative sample of welds were examined at the Tank Gallery, Harbor Tunnel, Surge Tank, and Underground Pump House (UGPH).
iii. A hands-on API-570 visual inspection of the primary piping, header piping, and associated valves and equipment for the [redacted], the (b) (3) (A) [redacted] jet propellant grade 5 (JP-5), and the [redacted] diameter [redacted] pipelines. Piping associated with Surge Tanks and the FOR lines from the Tank Gallery to Tank 311 were inspected. The UGPH piping, pumps and pressure reliving devices/piping were also closely inspected and findings documented. The section of [redacted] JP-5 Piping from Tank 20 to MOV 0163 was not evaluated during this trip (An API-570 inspection along with various NDE was completed on this section of piping in July 2021). An appendix will however be provided highlighting the status of this segment of piping and work completed at the time of demobilization.
iv. Sections of piping inspected were also evaluated with ultrasonic thickness at selected locations to evaluate for internal and external corrosion and to establish Condition Monitoring Locations (CMLs) in accordance with API-570 and per the project scope. Dry Film thickness (DFT) readings were also conducted throughout the facility piping.
v. Project also included removal of lead-based paint at 86 locations to support the PAUT weld examinations. All activity related to coating removal, collection, and disposal was managed by trained personnel per industry standard and Facility/OSAH regulations.
vi. All PAUT weld examination locations required surface preparation (weld spatter filling) to ensure adequate coupling to aid the transmission of ultrasonic energy.
vii. At the completion of the project, all areas where coating was removed was coated with a Kem Kromik Universal Metal Primer.

I. **Preliminary Results of LRUT:** [redacted]

The LRUT data collected were field analyzed for accuracy, signal amplitude, and range. The preliminary data did not indicate any significant areas of reportable indications to warrant integrity concern. A full data analysis will be performed using the MsS data analysis and reporting software to validate all collected data. The data, analysis, data summary supporting drawing, and photos will be provided in the draft final of the inspection report. Twenty (20) locations were proposed for LRUT screening.

II. **Preliminary Results of PAUT Weld Examinations:**

The purpose of this Phased Array Ultrasonic Testing (PAUT) weld examination was to detect any service induced defects such as cracking or erosion/corrosion that may be present in selected welds and heat affected zones. Welds selected are intended to be a representative sample of facility piping and selected based on areas that could see higher than normal stress due to pipe movement, cyclic stresses, or boundary restraints (sections between anchor points). The primary focus of the PAUT weld examination was the circumferential welds, but select abutting longitudinal welds were also examined for completeness when possible. The original welding flaws were considered non-relevant for this inspection since there is satisfactory service history. A combination of manual and semi-automated PAUT was performed and results documented. The preliminary PAUT data indicated there was no service induced defects on all tested welds. The inspection data and results will be provided in the draft final of the inspection report. Eight-six locations were proposed for PAUT weld examination.

III. **Preliminary Results of API-570 Inspection:**

A hands-on API 570 visual inspection of the primary piping, header piping, and associated valves and equipment for the F-24, the [redacted] diameter jet propellant grade 5 (JP-5), and the [redacted] diameter (F-76) pipelines was completed. Piping associated with Surge Tanks and the FOR lines from the Tank Gallery to Tank 311 was also inspected. The UGPH piping, pumps, and pressure reliving devices/piping were also closely inspected and findings documented. The inspection consisted of close visual examination of the piping to include coating inspection, pit measurements/sizing, corrosion evaluation, dent measurements/sizing, support inspection, soil-to-air/concrete-to-air interface inspections, crevice inspection at saddle and supports, along with other piping system integrity consideration. Inspection also included documenting/reviewing previous repairs. Attached is a summary of inspection findings grouped by location at this facility:

A. Tank Gallery Piping
B. Harbor Tunnel Piping
C. UGPH Piping
D. Surge Tank Piping
E. FOR Piping

[redacted]

InterSpec, LLC.
API-570 #34301
CWI #10041021
NACE CP 2 (Cert No. 41291)

[redacted]

[redacted]

SUMMARY OF INSPECTION FINDINGS

A. Tank Gallery Piping

A1) Brass/bronze (low melting point) valve attached to the end blind flange of the [redacted] (F24) line near Tank 15/16.

(b) (3) (A)

[redacted]

A2) Minor staining on the upstream throat plug of the DBB skin valve for Tank 16. Monitor as needed; note: plug cannot be removed without draining the tank.

(b) (3) (A)

[redacted]

A3) There is an HPV valve on Tank 16 before the skin valve that is missing a plug. Some

(b) (3) (A)

[redacted]

A4) Coating failure and corrosion on tank [redacted] (F-24) pipe at [redacted].

[redacted]

A5) The [redacted] (F-24) line appears to have some type of thick asbestos or bitumen encapsulated asbestos coating from [redacted] to about [redacted]. Inspection of the pipe in this area is limited. There is one location near [redacted] 38 that appear to be a dent underneath the thick coating around the 7 o'clock position. Size could not be verified.

(b) (3) (A)

[redacted]

A6) Moderate corrosion on the base of plate and vertical member of [redacted] and [redacted] on [redacted] (F-24) line.

A7) Rail tie used a shim between pipe and pipe saddle support at [redacted] on [redacted] (F-24) line.

A8) Pipe not adequately supported at [redacted] on [redacted] (F-24) line. Note: saddle is not engaged, wood shim used, saddle not secured to the I-beam.

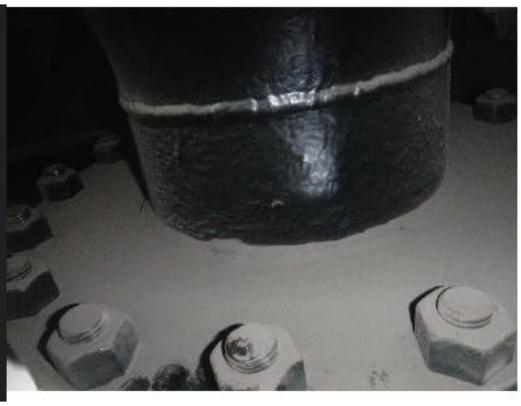
(b) (3) (A) [redacted]

A9) Long segment of the [redacted] (F-24) pipe is unsupported. One location has (b) (3) (A) [redacted] of unsupported pipe between [redacted] The pipe is also not adequately supported between [redacted] with only partial support on one side.

A10) Threaded 2-inch carbon steel LPD valve mounted on the underside of the [redacted] (F-24) between [redacted].

A11) Facility piping at the tank tees has nonstandard (No ASME B16.5) rated flanged fittings and non-standard weld tie-ins. Noted throughout the facility (tees between tanks). Tank 13/14 shown.

(b) (3) (A) [redacted]



[redacted]

A12) The dresser coupling joint harnesses on the [redacted] at Tank 6 lateral has two rods that are loose. Notable movement/gap on the bottom harness lug and deflection rings. A gap of 0.250" to 0.300" measured on both top and bottom joint harnesses.

(b) (3) (A)

A13) There are coating failure and contact/bimetallic corrosion on the [redacted] (F-24) line between [redacted] Pipe corrosion is due to contact with Unistrut.

A14) There is a 3-inch welded and flanged branch connection on top of [redacted] (F-24) line

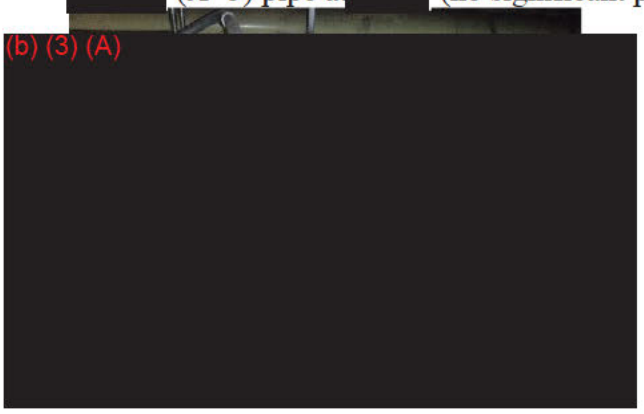
(b) (3) (A)

A15) There is a threaded fitting with brass (low melting) valve on top of the [redacted] (JP-5) pipe at [redacted]. Note: these types of valves are not intended to be used on fuel systems. Some staining noted at the packing nut.

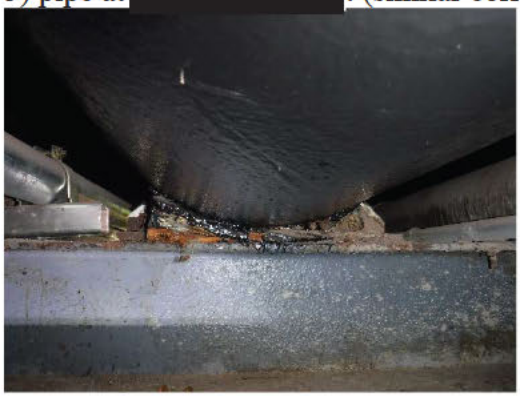
(b) (3) (A)

A16) Coating failure and some corrosion due to material drips from tunnel ceiling on the [redacted] (JP-5) pipe at [redacted] (no significant pitting noted).

(b) (3) (A)

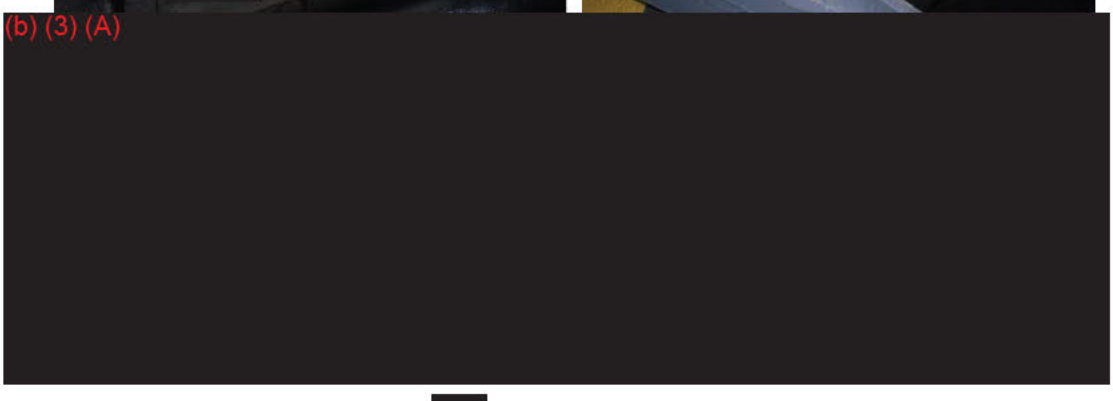


A17) Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe at [redacted]. (similar corrosion at [redacted])



A18) There is a threaded [redacted] gate valve by Tank 7 and 8 that extends down from the HPV on [redacted] (JP-5) down below the pipe. Possibility to get damage by impact.

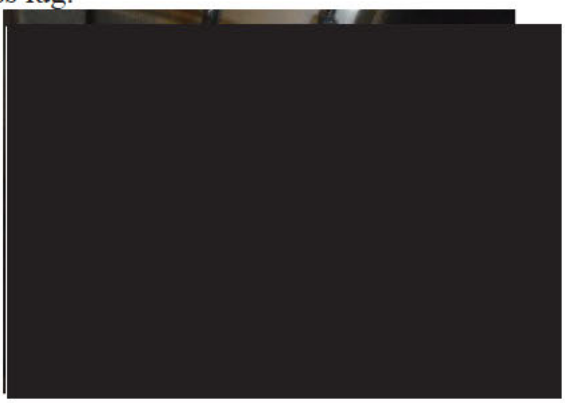
(b) (3) (A)



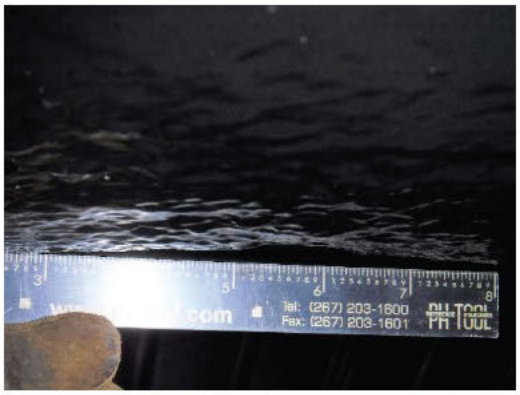
A19) There is a threaded bronze/brass (low melting) valve attached on the top of the [redacted] (F-76) header pipeline between [redacted]. The valve is used to bleed air from the end of the pipe. Note: these types of valves are not intended to be used on fuel systems. Some staining noted at the packing nut.

(b) (3) (A)

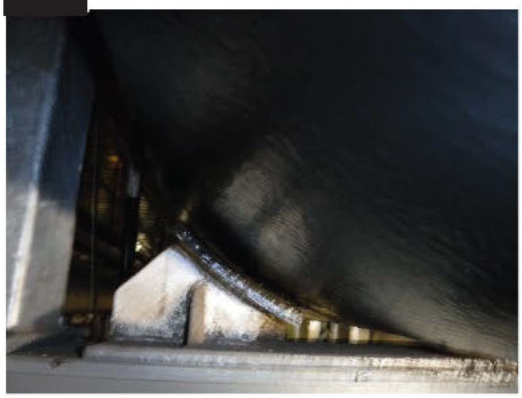
A20) Dresser coupling to Tank 14 is missing the deflection ring on the [redacted] line. Small cap noted between the washer and harness lug.



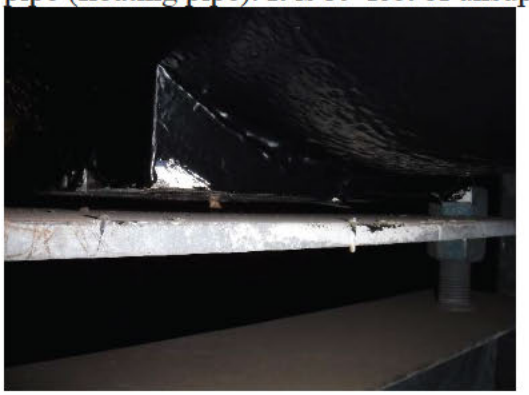
A21) Area of in inactive corrosion area between P[redacted]). Pit depth = 0.196" – 0.200" and UTT of 0.430" on unaffected area resulting in remaining thickness of 0.219" to 0.250".



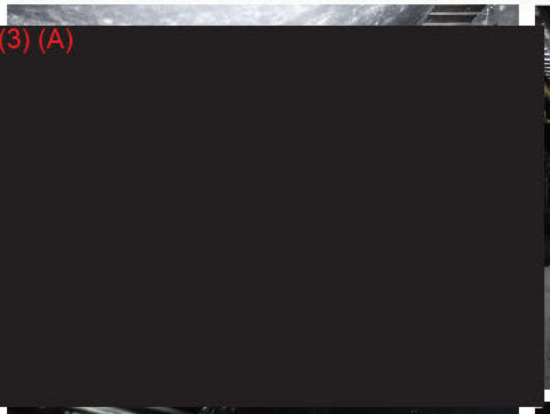
A22) The [redacted] (F-76) pipe is not fully supported at [redacted] (Partial only). Also noted on [redacted]



A23) The second pipe support from Tank 9 for the [redacted] pipe is not in contact with the pipe (floating pipe). It is 39-feet of unsupported pie from tank to the tee.

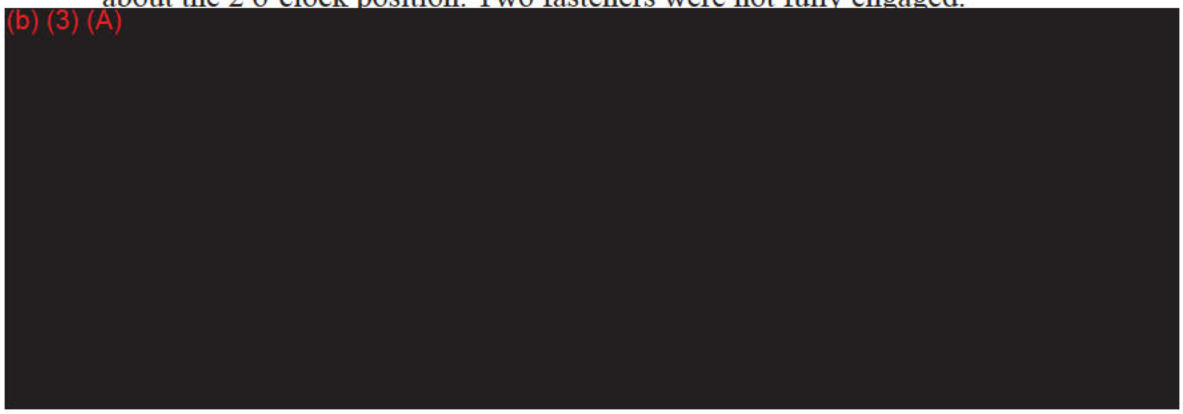


A24) Several of the fasteners on flange from the [redacted] (F-76) header to lateral tees between Tank 9 and 10 have moderate corrosion.



A25) The branch piping on [redacted] (F-76) header has a welded and flanged branch fitting at about the 2 o'clock position. Two fasteners were not fully engaged.

(b) (3) (A)

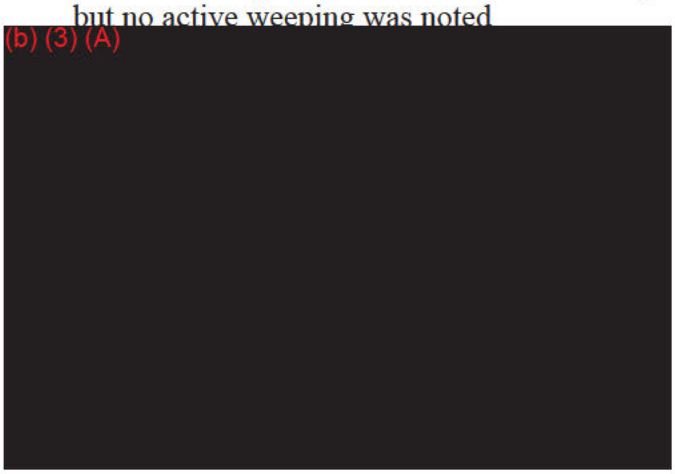


A26) Coating failure and some corrosion due to material drips from tunnel ceiling on the [redacted] (F-76) pipe at PS 66 (no significant pitting or thickness loss noted).

(b) (3) (A)

A27) There is a branch connection on the [redacted] (F-76) by Tank 5 and 6 that has a 1-inch threaded fitting and valve. Some fuel staining was noted around the flange and pipe, but no active weeping was noted.

(b) (3) (A)



A28) Some staining noted on the [redacted] (F-76) flange tie-in between Tank 3 and 4 (no active weeping noted). *Note: the staining did not appear to be* [redacted] *(based on odor and gas meter testing) and had the viscosity of oil. InterSpec suspects this oily substance is caused by one of the two following reasons: oil used to lubricate the bolts or areas rich in polyamide or amine content in the epoxy coating that caused yellowing/blushing and/or an oily exudate. Chemical reactions that form the exudate creates a chain of reactions that can lead to a sticky, oily, or waxy film appearing on the surface of the cured epoxy coating. Amine blush testing or lab testing is suggested to fully determine the fluid type. Review of prior history at this flange and work completed will aid in determining the exact source. Industry standard including gasket manufacturers do not recommend tightening or torqueing a flanged fitting while it is in service*

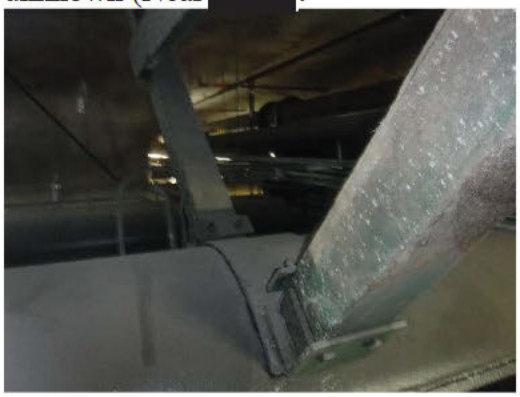
(b) (3) (A)

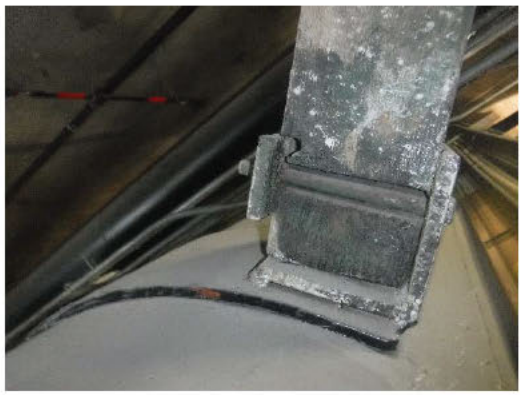
[redacted]

(b) (3) (A)

[redacted]

A29) Wood support extending from the [redacted] to tunnel ceiling. Use and function unknown (Near [redacted].





[redacted]

A30) One joint harness with gap noted on the [redacted] dresser coupling at [redacted]. There are no deflection rings and adapters on the harness lugs. Note: lugs are installed backwards.

(b) (3) (A)

A31) Note: a section of the [redacted] (JP-5) was undergoing repairs at the time of the inspection. Sections of pipe were isolated, cut, or blanked off.

B. Harbor Tunnel Piping (*Note: All clock positions; when listed, are looking towards the UGPH)*

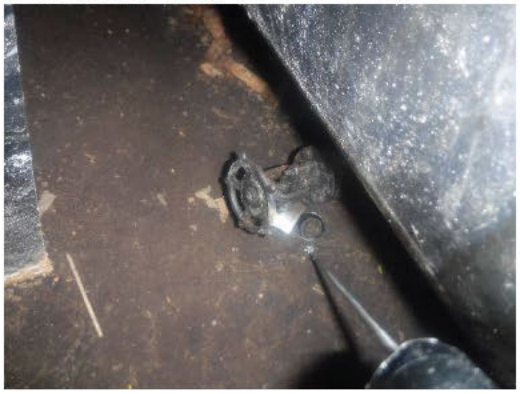
B1) Moderate coating failure and corrosion on pipe, flange, and fasteners noted on all three lines (segment from [redacted] to the UGPH bulk head). Corrosion due to drips from tunnel ceiling; there is currently a yellow tarp hanging above the pipes in this area. Notable corrosion was on the [redacted] (JP-5) line.

(b) (3) (A)

B2) HPV are threaded valves, nipples, and ball float trap. Staining and weeping were noted around the threaded fitting on the [redacted] (F-76) past isolation valve #0151. Similar staining and weeping were noted on the plugged HPV valve just before the bulkhead to UGPH on [redacted] line.

(b) (3) (A)

B3) Staining noted around the threaded LPD on the [redacted] (F-76) just before the bulkhead to UGPH. This LPD is directly below the plugged HPV valve mentioned above. Note: a total of three threaded LPDs noted on the [redacted] (F-76) line between [redacted] and the UGPH bulkhead.



B4) Some staining and wetting was noted on the threaded LPD assembly on [redacted] (F-76) LPD just past [redacted] note the drip pan)

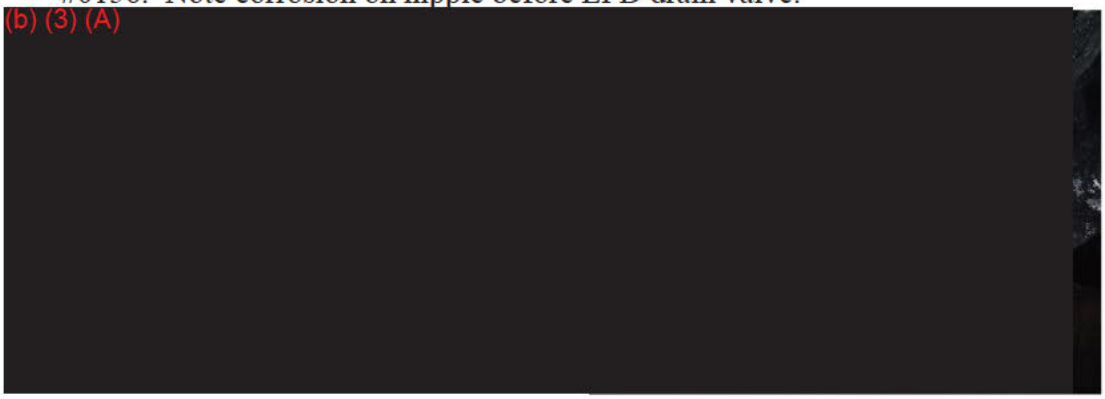
(b) (3) (A)

B5) All three piping from [redacted] to the UGPH bulk head have several threaded LPDs. Corrosion noted on the threaded LPD assembly (including flange, nipples, and fittings). Notable finding is the [redacted] (JP-5) line just past [redacted]

(b) (3) (A)

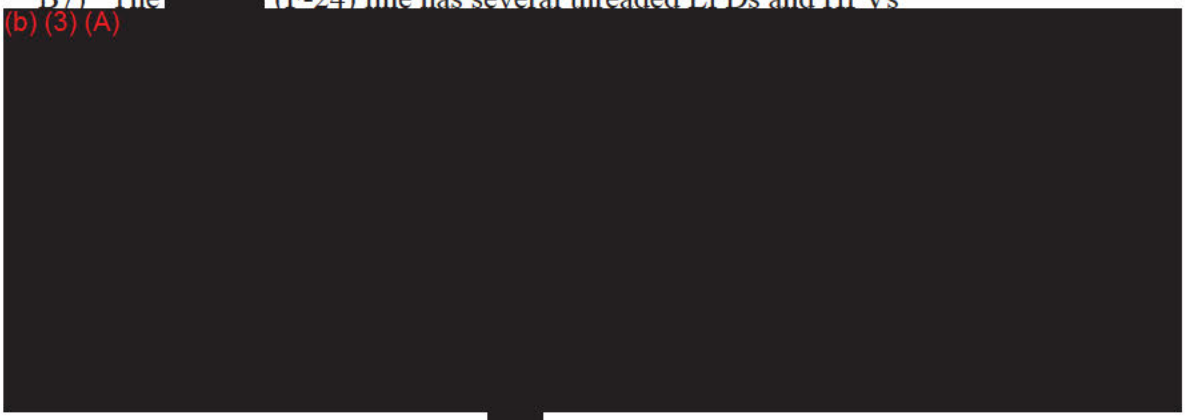
B6) Another LPD with notable corrosion is on the [redacted] (JP-5) line past isolation valve #0156. Note corrosion on nipple before LPD drain valve.

(b) (3) (A)



B7) The [redacted] (F-24) line has several threaded LPDs and HPVs

(b) (3) (A)



B8) LPD with notable corrosion on the [redacted] (F-24) line just before the bulkhead to UGPH. Note: corrosion on nipple before LPD drain valve.

B9) Twin Seal DBB flange holes are drilled and tapped, when there is no possibility of fitting a hexagonal nut behind the flange when manufactured. The [redacted] DBB valve on the F-24 line (Valve # 0159) has four studs on the top and four studs on the bottom with minimal thread engagement to the DBB flange (tank side flange). Threaded engagement of only 0.250 to 0.550 inches was measured. There is also one stud on the other side of the DBB flange (UGPH side) that is not fully engaged with less than 0.500 inches measured. Red arrow shows measured engagement depth of studs (white dots/lines marked with white paint on the flange)

(b) (3) (A)

B10) Several areas of coating failure (minor to moderate noted on all three lines in the harbor tunnel). Location will be provided.

(b) (3) (A)

B11) Four arc strikes/weld lines between the 7 to 10 o'clock position; each approximately long, noted near miter weld on (F-76) line just before . Do not know what the purpose and cause of these weld features are, but arc gouge depth of 1/32" to 3/32" was measured.

(b) (3) (A)

B12) Nonstandard flange configuration (blind flange) noted on the (JP-5) line near P/S 650. A welding neck-flange with flat plate welded is used. Replace with ASME B16.5 rated flange. Note: ASME B16.5 class 150 blind flange has a minimum flange thickness of 1.190". The center plate in the current configuration has

(b) (3) (A)

B13) Some moderate oil staining noted on DBB valve (# 0156) gear box near ADIT 2 wye.

(b) (3) (A)

B14) Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points. PS 685 and shown respectively.

B15) Several dents were present on all three lines within the harbor tunnel. Note: the initial assessment indicates these dents are within acceptable limits based on latest edition of API RP 1183; *Assessment and Management of Pipeline Dents*. Plain dents regardless of shape with depths up to 10 % of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). All the dents were also noted to be within acceptable limits API 579 section 12 Level 1 assessment (acceptable if dent is ≤ 7% of the pipe diameter). Field data review/processing required. Full assessment in the Draft Final.
Deepest noted dents: (F-24) = 0.320", (JP-5) = 0.460" (at , (F-76) = 0.392"

B16) Majority of the piping support in the harbor tunnel has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the (F-24) and (JP-5) lines. The (F-76) line was mostly supported on concrete saddles with some welded steel anchor

(b) (3) (A)

B17) Several threaded valves and nipples noted on all three piping from [redacted] to the beginning of the Tank Gallery section. These are used as LPDs and HPVs. Minor staining was noted on some threaded fittings, but no active weeping or leaks were noted during the inspection (note: system was not in operation or pressurized during the inspection)

(b) (3) (A)

[redacted]

B18) Isolation DBB valve # 152 on the [redacted] (F-76) line by ADIT 2 wye past [redacted] is missing a nut and bolt on the DBB top plate.

B19) The [redacted] (F-24) line has a nonstandard repair at bulkhead between [redacted] The repair includes a full encirclement welded split sleeve (clamshell) on P[redacted] side and a partial (patch plate style) repair on [redacted] side of the bulkhead with square corner (API STD 570 list all repair patches shall have a min. of 1"

(b) (3) (A)

[redacted]

B20) Two locations with composite repair sleeves "Clock Spring" noted on the [redacted] (F-76) pipe at [redacted]. Review per ASME PCC-2 Article 401 recommended.

(b) (3) (A)

[redacted]

B21) The concrete saddle (Saddle # 530) is cracked on the edge with large splint noted on [redacted] (F-76) line at about the 7 o'clock position.

B22) The [redacted] (F-76) pipe has a threaded NPS 2 HPV welded on top of a full encirclement welded split sleeve repair between [redacted]. The ball valve does not have a lock, and the reducing bushings are not engaged completely in the valve. (Lock valve out)

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

B23) Coating failure and some corrosion on a welded [redacted] branch on the [redacted] (F-76) line. Corrosion around weld noted.

(b) (3) (A)

B24) Pipe support with anchor bolts not embedded in the concrete noted on [redacted]

B25) Pitting Corrosion on [redacted] (JP-5 line) between [redacted] (46″ from P[redacted] at 9 o'clock. Corrosion Area is 9″ x 9″, Pit Depth is 0.050 - 0.140″, Metal thickness on unaffected area is 0.239 - 0.244″ resulting on a remaining metal thickness of 0.099″.

- Note: this does not meet API 574 structural minimum thickness (SMT). SMT for NPS 18 is 0.110″ per Table 7.
- Note: Also, does not meet ASME B31.3 Equation (3a) from Paragraph 304.1.2 09″

(b) (3) (A)

(b) (3) (A)

[redacted]

B26) There is a tack-weld fit up ("Welding Dog") tab on the [redacted] (JP-5) line between [redacted]. Approximately 63" from [redacted]. This was probably installed as a welding ground during recent hot work and never was removed. Not a standard practice. Temporary attachments are supposed to be removed and area tested with appropriate NDE.

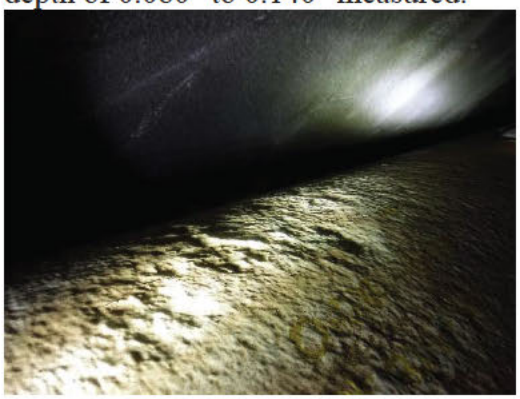
(b) (3) (A)

[redacted]

B27) Concrete saddle support (# 337) between [redacted] has several 1/8" rods between the pipe and the concrete saddle. Reason is unknown.

B28) Several active and inactive pitting and general corrosion on section of the [redacted] (JP-5) pipe, approximately 21-inches from [redacted] were noted. The pitting/corrosion area is at the 12 o'clock position. The UTT adjacent to the pit was 0.225 -0.242 inches. Remaining metal thickness of 0.130" to 0.147" is estimated here.

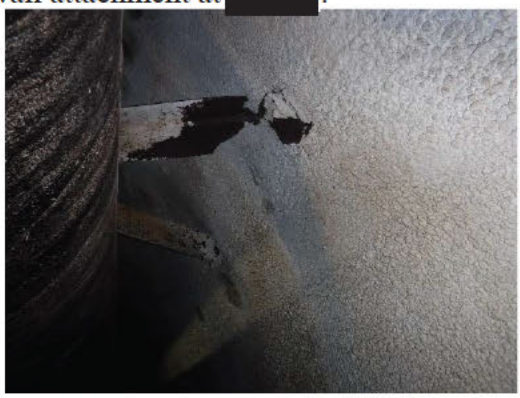
B29) Several inactive pitting and general corrosion on section of the [redacted] (F-76) pipe between [redacted] The pitting/corrosion area is at the 10 o'clock position. Pit depth of 0.080" to 0.140" measured.



B30) Pitting Corrosion on [redacted] (JP-5 line) between [redacted] (158″ from [redacted] at 6 o'clock. Corrosion Area is 10″ x 10″, Pit Depth is 0.055″ - 0.102″, Metal thickness on unaffected area is 0.218″ - 0.238″ resulting in a remaining metal thickness of 0.116″ to 0.136″. Note: very close to API 574 (0.110") and ASME 31.3 (0.109" limits).

(b) (3) (A) [redacted]) (3) (A)

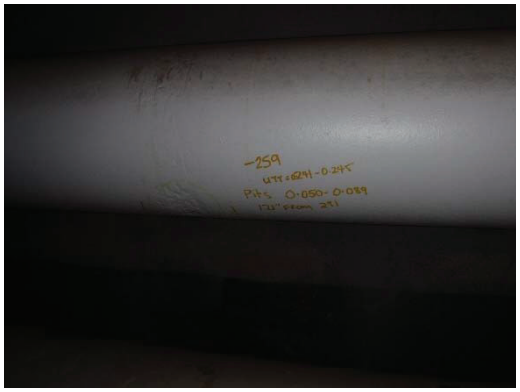
B31) Corrosion on pipe support at the tunnel wall attachment at [redacted].



B32) Inactive pitting on [redacted] (JP-5) line between [redacted] (50″ from [redacted]) at 10 o'clock. Corrosion Area is 8″ x 8″, Pit Depth is 0.050″ - 0.135″, Metal thickness on unaffected area is 0.226″ - 0.234″ resulting in a remaining metal thickness of 0.091″ to 0.099″. Note: below the min thickness limits of API 574 (0.110") and ASME 31.3 (0.109").

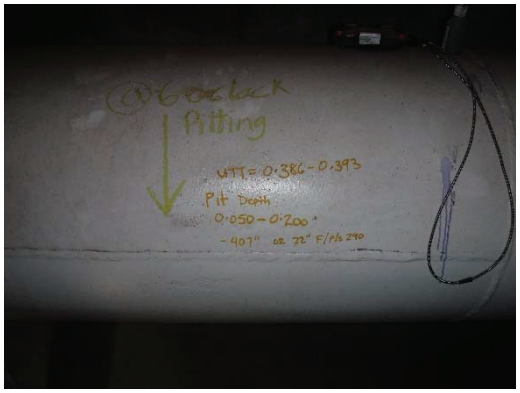
(b) (3) (A) [redacted]

B33) Inactive pitting on [redacted] (JP-5) line between [redacted] (121″ from PS 291) at 5 o'clock. Corrosion Area is 6″ x 6″, Pit Depth is 0.050″ - 0.089″, Metal thickness on unaffected area is 0.241″ - 0.234″ resulting in a remaining metal thickness of 0.152″ to 0.156″.



B34) Inactive pitting on [redacted] (F-76) line between [redacted] 1 (82″ from [redacted] at 6 o'clock. Corrosion Area is 3″ x 2″, Pit Depth is 0.114″, Metal thickness on unaffected area is 0.383″ - 0.387″ resulting on a remaining metal thickness of 0.269″ to 0.273″.

B35) Inactive pitting on [redacted] F-76) line between [redacted] (22″ from [redacted]) at 6 o'clock. Corrosion Area is 15″ x 24″, Pit Depth is 0.050″ - 0.114″, Metal thickness on unaffected area is 0.386″ - 0.393″ resulting in a remaining metal thickness of 0.186″ to 0.193″.



B36) Wood shim installed on [redacted] (f-76) pipe between Teflon pad and concrete saddle in an attempt to correct lack of support at concert saddle # 193 (Between [redacted] 0). Pipe is not fully and uniformly supported.

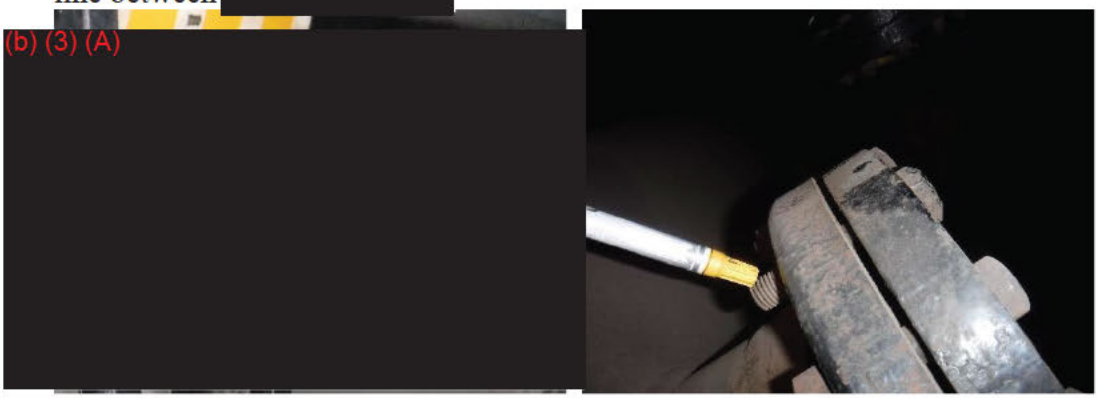
B37) Pitting Corrosion on [redacted] (JP-5) pipe between [redacted] (17″ from [redacted] at 2 o'clock. Corrosion Area is 2″ x 2″, Pit Depth is 0.113″, Metal thickness on unaffected area is 0.233″ - 0.238″ resulting in a remaining metal thickness of 0.101″ to 0.105″.

- Note: this does not meet API 574 structural minimum thickness (SMT). SMT for [redacted] is 0.110″ per Table 7.
- Note: Also, does not meet ASME B31.3 Equation (3a) from Paragraph 304.1.2

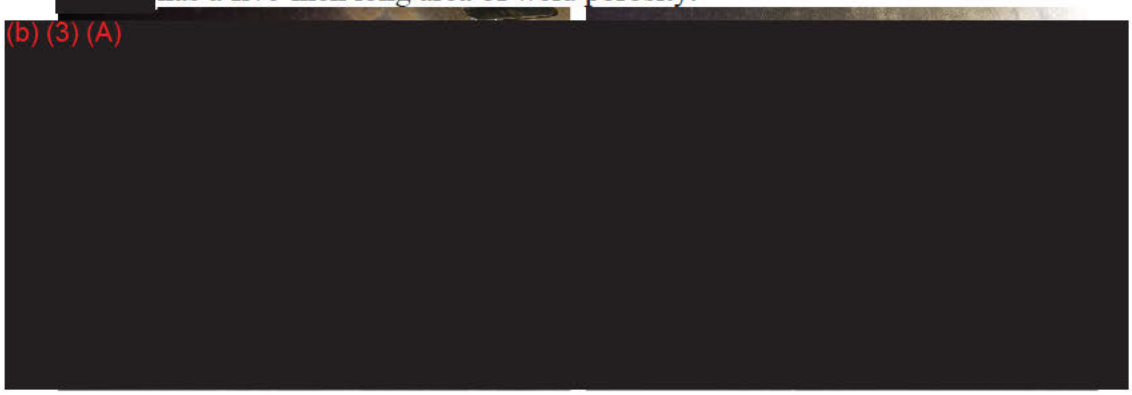
(b) (3) (A)

B38) Active pitting on [redacted] (F-76) line near [redacted] at 11 o'clock. Corrosion Area is 18″ x 24″, Pit Depth is 0.050″ - 0.120″, Metal thickness on unaffected area is 0.298″ - 0.321″ resulting in a remaining metal thickness of 0.178″ to 0.201″.

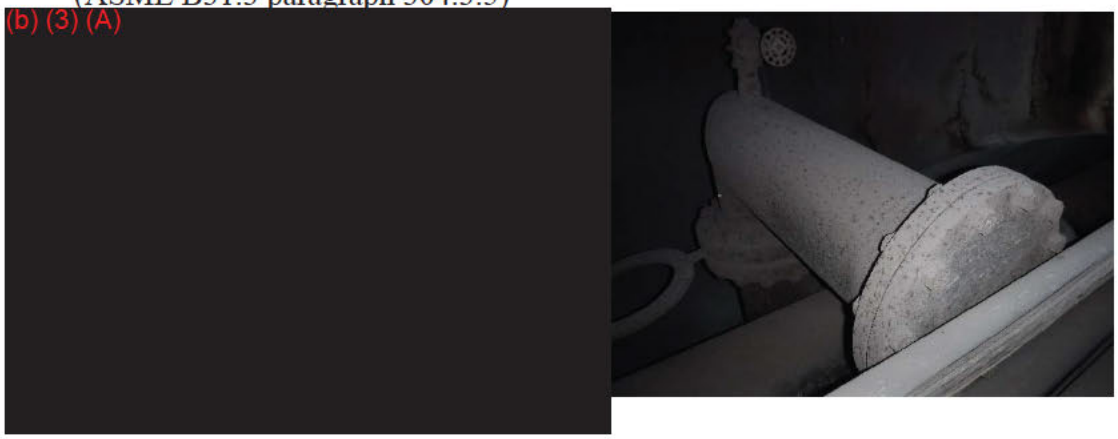
B39) One bolt missing a nut on flanged 6-inch branch fitting mounted on the [redacted] (F-76) line between [redacted]



B40) The longitudinal weld on the [redacted] (F-76) pipe between [redacted] (39" from [redacted] has a five-inch long area of weld porosity.

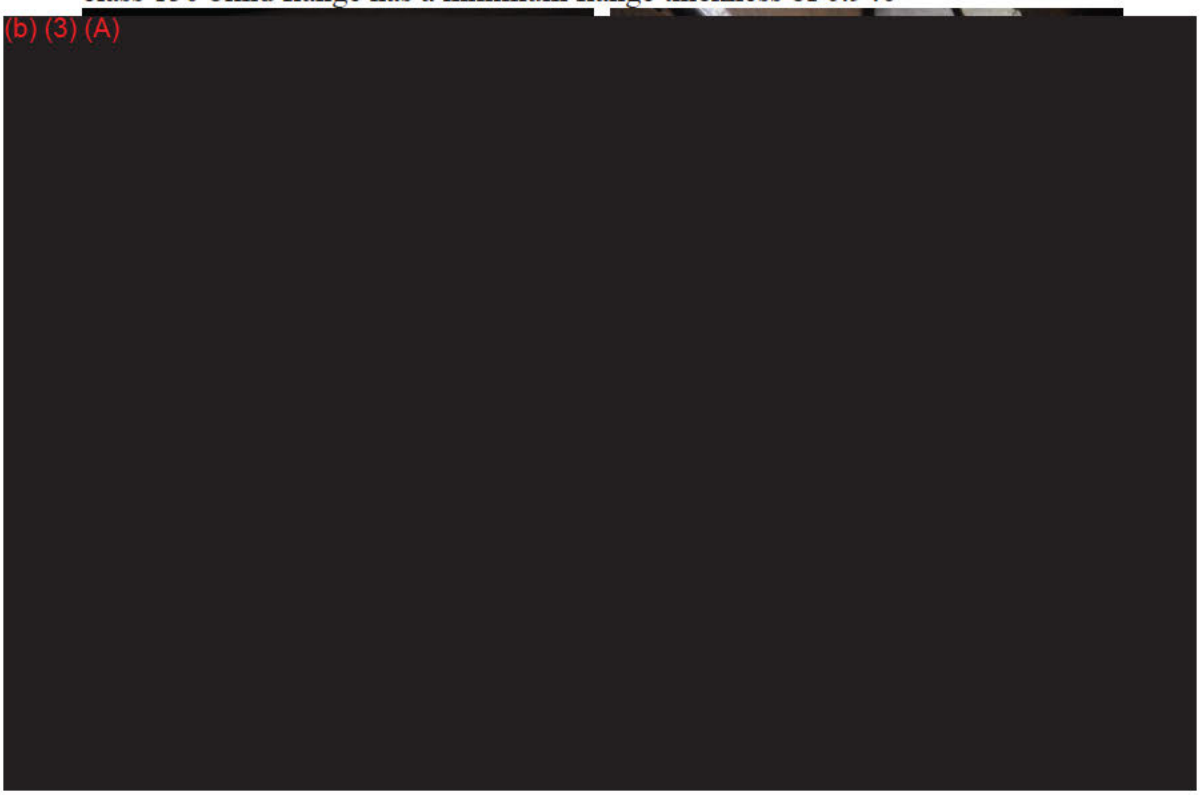


B41) There is unsupported and unreinforced [redacted] branch connection on the [redacted] (JP-5) pipe between [redacted] Line is not used, has skillet, and blind flange. (ASME B31.3 paragraph 304.3.5)



B42) Lack of thread engagement and one bolt missing a nut on flanged 6-inch branch fitting mounted on the [redacted] 2 (F-76) line between [redacted]. Note: the blind flange used also not ASME B16.5 rated/marked flange. It is a one-inch round plate with bolt holes (Plat thickness is 0.981" and appears to meet thickness required). ASME B16.5 NPS 6 class 150 blind flange has a minimum flange thickness of 0.940"

(b) (3) (A)

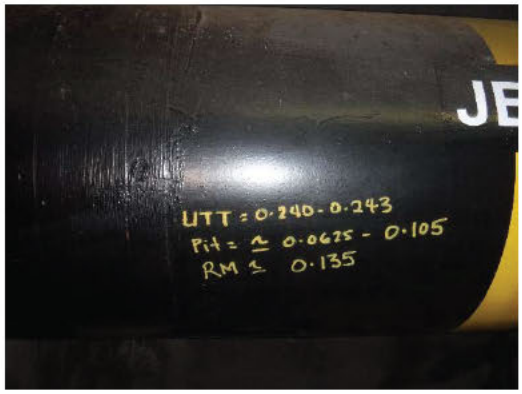


B43) The concrete saddle (Saddle # 36) is cracked on the edge with large splint noted on [redacted] (F-76) line at about the 7 o'clock position.

B44) Out-of-round/flat spot noted on the [redacted] (JP-5) between [redacted] bell-weld (12 o'clock to 3 o'clock position).

(b) (3) (A)

B45) Air-to-concrete interface corrosion and under-wrap corrosion near weld on [redacted] (JP-5) pipe between [redacted] (bulkhead penetration). Corrosion is between 2 to 6 o'clock. Pit Depth is 0.0625" to 0.105", Metal thickness on unaffected area is 0.240" - 0.243" resulting in a remaining metal thickness of 0.135" to 0.138". The interface corrosion appears to be due to drips from ceiling and failed coating system. The interface corrosion does not seem to extend in to the concrete (small section of concrete chipped to check).



B46) Coating at the harbor tunnel consisted of bitumen with asbestos warp; sections with wax tape wrap and coating with lead and another hazardous chemical.

C. UGPH Piping

C1) Two loose joint harnesses were noted on the discharge side of Pump P-201. Note: before continued operations: All restraining nuts should be snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Gaps measured between harness lug and nut were 0.082" and 0.734".
Note: additional design and/or MFG document review is needed to determine how much is too much gap on the joint harnesses, but initial understanding is that gaps should not exceed the pipe-to-pipe gap specified within the coupling. Additionally, joint harness gaps should likely not exceed the height of the deflection ring when provided (note all dresser couplings in the UGPH are not provided with deflection rings and adapters on the harness lugs).

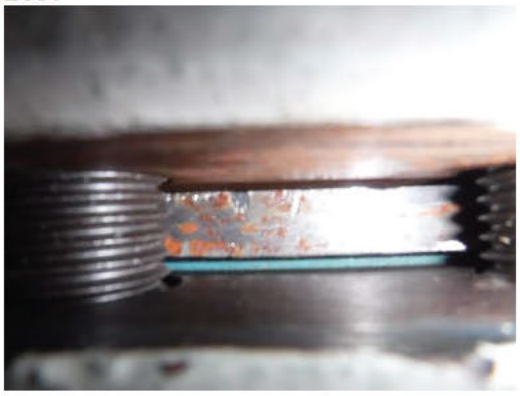
C2) Four loose joint harnesses were noted on the suction side of pump [redacted] Gaps: lower left = 0.200", lower right = 0.173", top right = 0.010", top left = 0.210" (See Notes above)

C3) Pump shaft guard post not secured to the concrete pad on pump [redacted] (pump appears to be undergoing repair).

C4) Several open conduits and sensor enclosures noted on pump [redacted] pump appears to be undergoing repair).

C5) Several loose fasteners noted on the upper half casing of Pump P-201 (pump appears to be undergoing repair).

C6) Pump P-201 had a skillet installed on the discharge side of the pump nozzle. The assembled joint only had one gasket installed. Consider using two gaskets when installing spectacle blind or skillet to protect the flange face and contact surface from damage; particularly for flanges with serrated finishes (ASME B16.5 and ASME PCC-1-2019). Similar condition noted on P-205.



C7) Some minor coating cracks was noted on the dresser coupling around the middle ring-to-follower joint area of Pump P-201 discharge line (indicating potential movement). This movement is most likely due to loosened joint harnesses and not limitation of the dresser coupling (These couplings have demonstrated satisfactory performance when MFG specification and guidance are followed). PM program that verifies dresser coupling mechanical integrity (verifying joint harness retention rod and follower bolt tightness).

C8) Hairline crack noted on Pump P-201 pump pad.
(PHOTO)

C9) Strainer drain ball valve on the inlet side of the control valve is not plugged. Consider installing a plug on the strainer drain valve and remove only during maintenance (Typical for all control valves on the discharge side of pumps at UGPH).

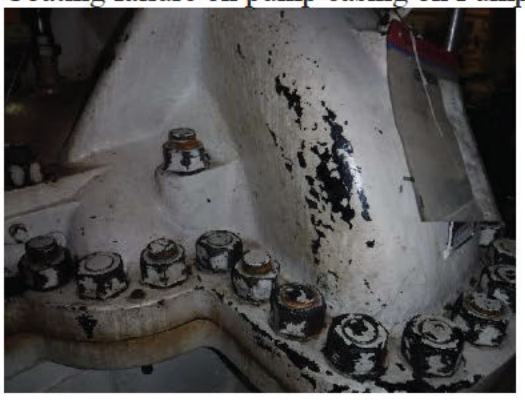
(b) (3) (A)

C10) Weeping at suction side pressure gauge associated with Pump P-201.

(b) (3) (A)

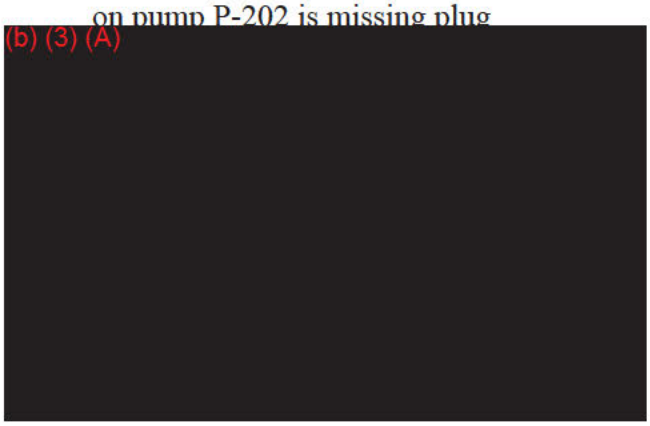
C11) Hairline crack noted on Pump P-202 pump pad. (This was noted at several pumps)

C12) Coating failure on pump casing on Pump P-202



C13) The ½-inch valve (Valve # GP26H) mounted on the suction side of the pressure gauge pipe on pump P-202 is missing plug

(b) (3) (A)



C14) Several of the ball valves on the control valve are missing valve handles. Exact reason is unknown but suspected to prevent operation of the valves (Note: operating during emergency such as a tubing break or damage will be difficult with missing valve handles. Consider a car-seal for valve line up. (Typical for majority of control valves on the discharge side of pumps at UGPH)

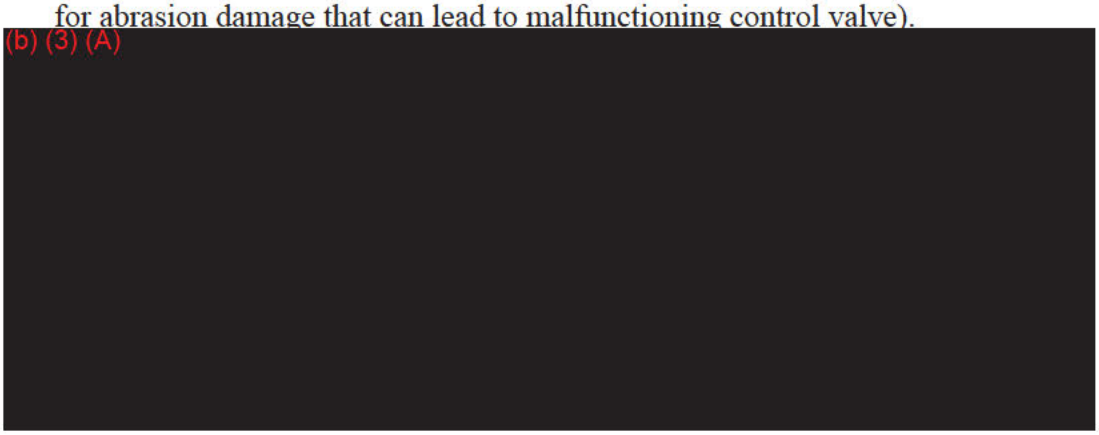
(b) (3) (A)

C15) Minor bearing oil staining on pump casing (Typical for some pumps at UGPH). Pump P-202 shown

(b) (3) (A)

C16) The control valve tubing on Pump P-202 is in contact with UGPH grating I-beam (potential for abrasion damage that can lead to malfunctioning control valve).

(b) (3) (A)

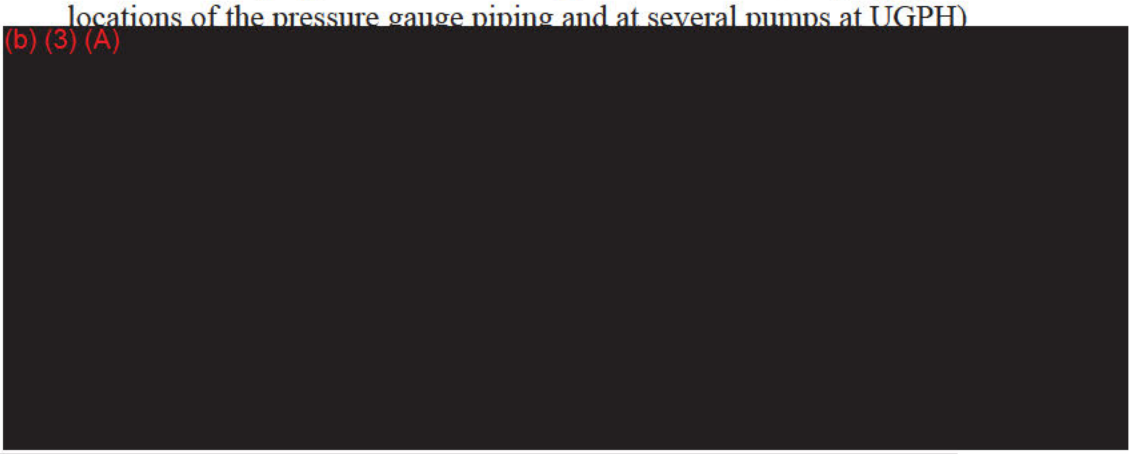


C17) Heavy discoloration and staining on control valve body on Pump P-202. Drip pan and absorbent pads were noted beneath the control valve. Similar discoloration and staining but

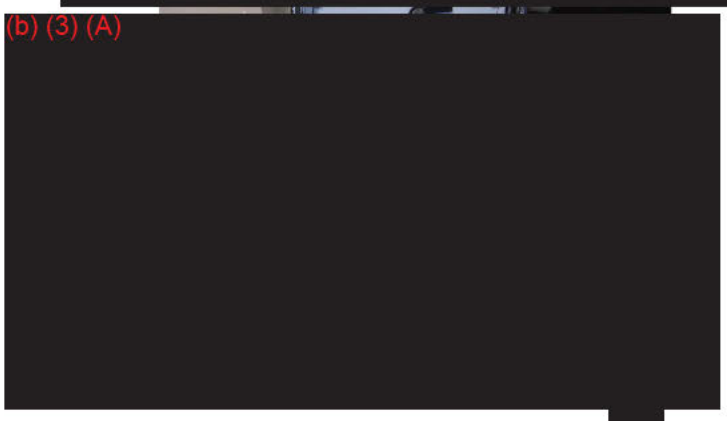
(b) (3) (A)

C18) Conduit plug used on pressure gauge pipe tee. This is not per industry standard and not known if this conduit plug has the correct tapper for use as NPT plug. (This was noted at several locations of the pressure gauge piping and at several pumps at UGPH)

(b) (3) (A)



(b) (3) (A)



C20) One slightly loose joint harness was noted on the discharge side of Pump P-203. Note: before continued operations: All restraining nuts should be snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Gaps measured between harness lug and nut was 0.030".
(PHOTO)

C21) Two loose joint harnesses were noted on the discharge side of pump P-204. Note: before continued operations: All restraining nuts should be snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Gaps measured between harness lug and nut were 0.180" and 0.845"

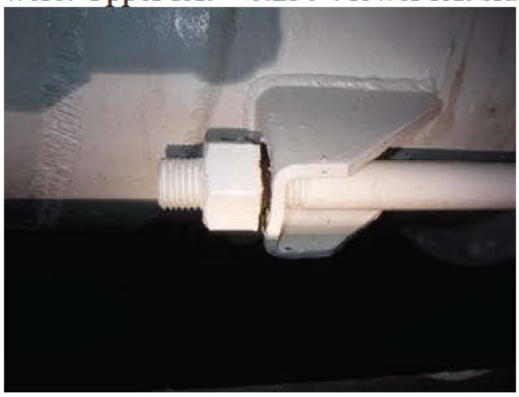
C22) The outlet side flange on the control valve on Pump P-204 is not fully engaged.

C23) Two slightly loose joint harnesses were noted on the discharge side of Pump P-205. Note: before continued operations: All restraining nuts should be snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. Gaps measured between harness lug and nut were approx. 0.030".

C24) The ball valve before the strainer on the inlet side of the control valve was in the closed position at the time of the inspection on P-205. The control valve may not function as intended when the system cannot detect differential pressure. Consider a car-seal for valve

C25) Missing nut observed on the suction side of the joint harnesses of pump P-205. Note: before continued operations: All restraining nuts should be installed and snug (not necessarily torqued down but at least fully in contact with lugs). Should also be equipped with double nut or lock nut to prevent backing-out at areas prone to vibrations. Restraining rods should be engaged to electrically bond the two sections of pipe across the dresser coupling on fuel pipes. (See next item about loose joint harness on the same dresser coupling)

C26) One loose joint harness on the suction side of the joint harnesses of Pump P-205 (this is the same dresser coupling with the missing nut). Gaps measured between harness lug and nut were: Upper left = 0.250". lower left side = 0.275". (Facing pump)



C27) Moderate weeping/staining on front bearing shaft and casing on Pump P-206. Similar

(b) (3) (A)

C28) Some inactive corrosion and bolt diameter reduction (due to the corrosion) noted on the suction side dresser coupling follower bolts on Pump P-206

(b) (3) (A)

C29) The hazardous area rated flow switch (MFG by SOR Inc) mounted on the discharge side of Pump P-206 has a housing cover that is not secured. Will not meet hazardous area rating (NFPA class I, division II, Group D). Additionally, all housings must be properly "sealed" at the conduit connection and housing cover to maintain the NEMA classification.

C30) The ½-inch discharge side pressure gauge threaded fittings have several areas of wetting/weeping around the threaded fitting on Pump P-208. Wet absorbent pads noted beneath the fittings.

C31) One slightly loose joint harness was noted on the discharge side of pump P-209. Gaps measured between harness lug and nut were approx. 0.030" (enough for the rod and bolt to move laterally).
(PHOTO)

C32) Two slightly loose joint harnesses were noted on the discharge side of Pump P-210. Gaps measured between harness lug and nut were approx. 0.030" (enough for the rod and bolt to move laterally).

C33) Dresser lugs on Pump P-210 suction side are installed backward (this was also noted on the other dresser couplings at UGPH).

(b) (3) (A)

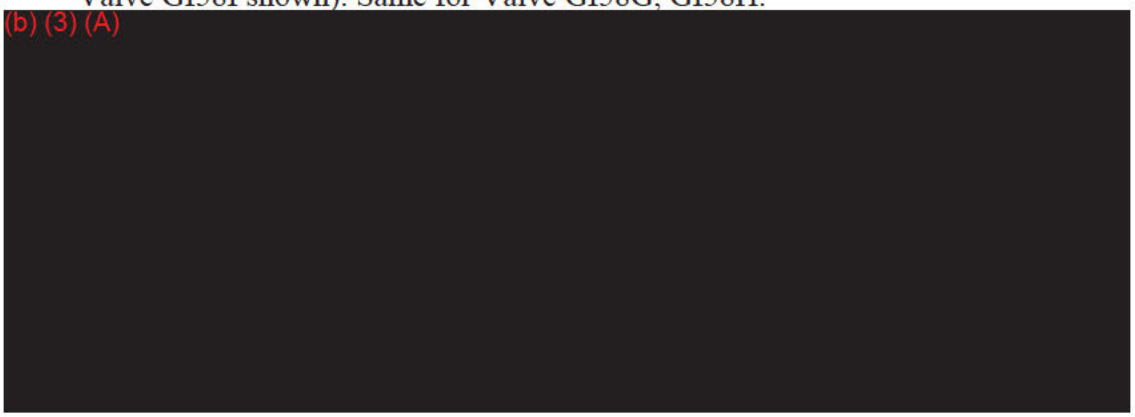
C34) There are several open conduits, exposed wires, and unsealed electrical equipment housing throughout the UGPH including what appears to be abandoned conduits on the floor. Will

(b) (3) (A)

C35) The open conduit on the UGPH floor will limit the secondary containment capability of the UGPH (no secondary containment).

C36) Several brass/bronze fittings used on the fuel system (low melting point material). Gate Valve GI58I shown). Same for Valve GI58G, GI58H.

(b) (3) (A)



C37) Several staining, weeping fittings noted in the UGPH piping below the grating (on main header piping to/from the RH and main header to/from the lower yard tunnel). This was noted on tie-ins for temperature sensors, pressure sensors, HPVs, and other small-bore auxiliary fittings.

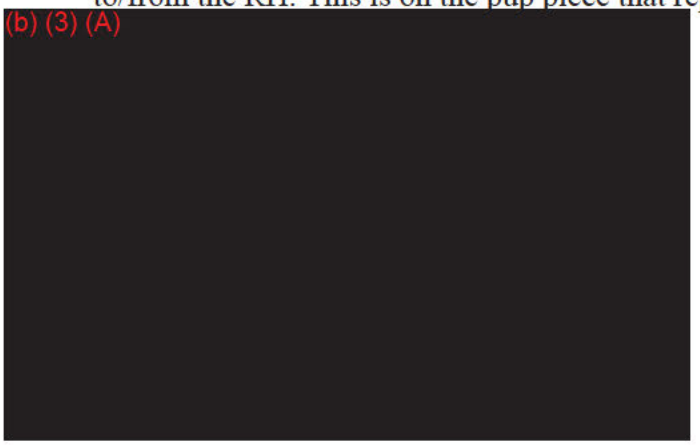
(b) (3) (A)

C38) Several threaded fittings noted in the UGPH piping below the grating (on main header piping to/from the RH and main header to/from the lower yard tunnel). Note: some of the branch tie-in welds are not per industry standard (did not use Weldolet and other branch connecting fittings that provide integral reinforcement and reduce stress at joint). This includes HPVs,

(b) (3) (A)

C39) Lack of thread engagement (QTY 12) on the bypass loop across the [redacted] ([redacted] line to/from the RH. This is on the pup piece that replaced the flow meter.

(b) (3) (A)



C40) Several transducers are attached to the pipe, and the conduit did not have seal-off fitting. There is no tag or marking on these transducers that provide the hazardous location rating or the enclosure NEMA rating. Additionally, the transducer is connected using ridged conduit

(b) (3) (A)

C41) Several of the pressure transducers have past due calibration dates. (Due Date of 10/23/18)

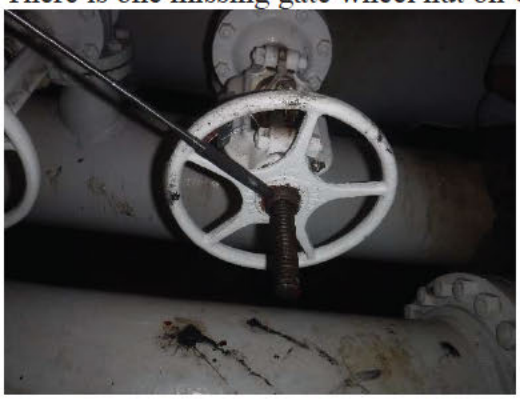
(b) (3) (A)

C42) There are staining and some drips noted on the Cameron ball valves shown. The staining /drip is from the stem injection port. Tighten the stem nut to correct or replace the upper stem seal

(b) (3) (A)

C43) Localized coating failure and corrosion (due to drips) on section of the line just before ball valve # 232E4. Pit depth = 0.050" to 0.070"

C44) There are several [redacted] branch tie-ins on the [redacted] line that are used for pressure relive devices. There is one missing gate wheel nut on Gate Valve # GR68B.



C45) There is [redacted] DBB valve on the [redacted] line (Valve # 232E2) with six studs that are not fully engaged. The stud is supposed to be engaged on the upper position of the DBB flange anywhere from 1.75 to 1.88 inches. Threaded engagement of only 0.25 to 0.75 inches where measured. Green arrow shows the available thread depth, the red arrow shows measured engagement depth of studs. (black dots marked with black Sharpie on the flange).

(b) (3) (A)

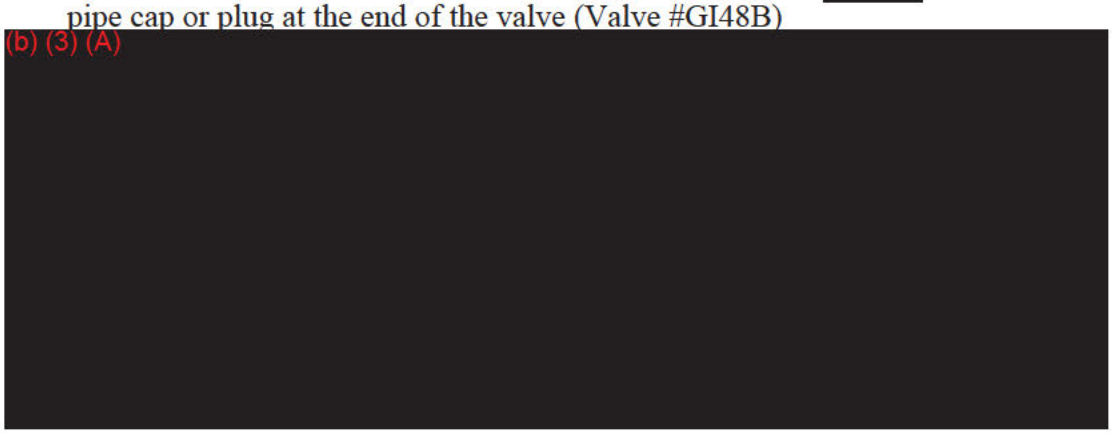
[redacted]

C46) There ¾-inch HPV on the [redacted] (F-24) line after [redacted]. This ¾-inch line is routed towards the UGPH sump nut and terminates just before the sump. The end of this line is open without a pipe plug. This is located just below the UGPH sump access staircase.

[redacted]

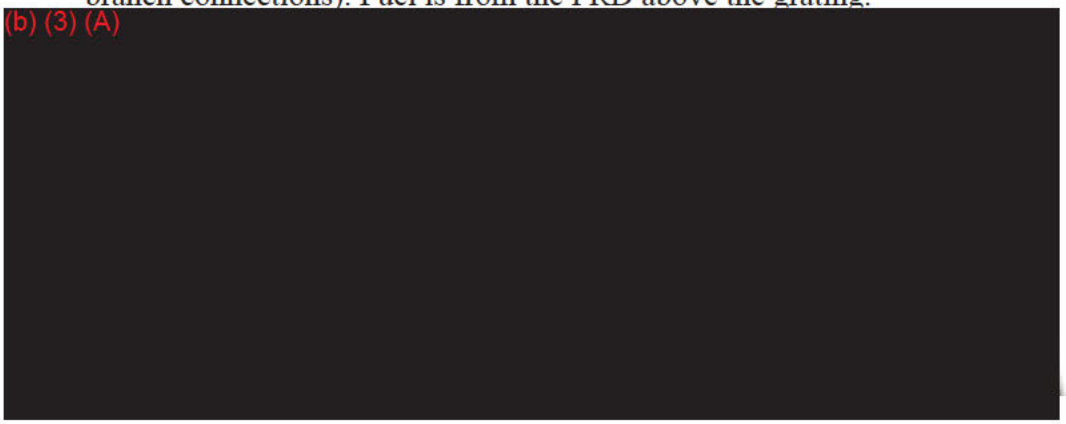
C47) There is a ¾-inch treaded valve mounted on the side of the [redacted] (F-24) line. There is no pipe cap or plug at the end of the valve (Valve #GI48B)

(b) (3) (A)



C48) Fuel soaked absorbent pads on the valves, piping, and UGPH floor (typical at several PRD branch connections). Fuel is from the PRD above the grating.

(b) (3) (A)



C49) Mechanical dent on [redacted] (F-24) tie-in line (to/from surge tank). Dent depth is 0.505" with perpendicular orientation and length of 5" located 58" from the miter weld before the surge tank-to-UGPH bulkhead penetration. This results in a dent depth of 3.2%. Note: initial assessment indicates this dent is acceptable based on latest edition of API RP 1183; *Assessment and Management of Pipeline Dents*. Plain dents regardless of shape with depths up to 10 % of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). Dent is also acceptable per API 579 section 12 Level 1 assessment (acceptable if it is ≤ 7% of the pipe diameter)

(b) (3) (A)

C50) [redacted] pipe flange to/from surge tank before the surge tank-to-UGPH bulkhead penetration

(b) (3) (A)

[redacted]

C51) Missing one nut and bolt on the 12-inch valve flange that branches off the [redacted] line from the lower yard tunnel (Valve 216ES ??) (No close-up photo, but valve/flange before green arrow. Photo facing Surge tank bulk wall)

(b) (3) (A)

[redacted]

C52) The JP-5 header manifold attached to the piping to/from the lower yard tunnel is equipped with a ¾-inch gate valve (Valve # GP98J) at the end of header. The ¾-inch valve is allowing product to weep by. NOTE: no pressure relief device (PRD) provided to the header (trapped fuel). The [redacted] and [redacted] also do not have PRDs.

(b) (3) (A)

[redacted]

[redacted]

C53) All the gate valves on the inlet and outlet side of pump are equipped with valve actuators mounted on stitch-welded adapter plate (four stitch-welds approximately 1" to 1.5" long used). Several of the welds have hairline cracks (potential for adapter plate to shear off during actuator operation). Some had one affected weld, and some had up to three of the four welds showing signa of hairline cracks. (Note: weld inspection is limited due to coating. Coating removal and NDE required to gain full assessment). This was present on [redacted]

(b) (3) (A)

(b) (3) (A)

C54) Several of the PRDs were weeping. Weeping noted on the CRL Pressure Relief Control body (manufactured by CLA VAL). Weeping noted on diaphragm between top cover and lower body. Some drips also noted on the strainer fittings, treaded stainless nipples, and tubing. No

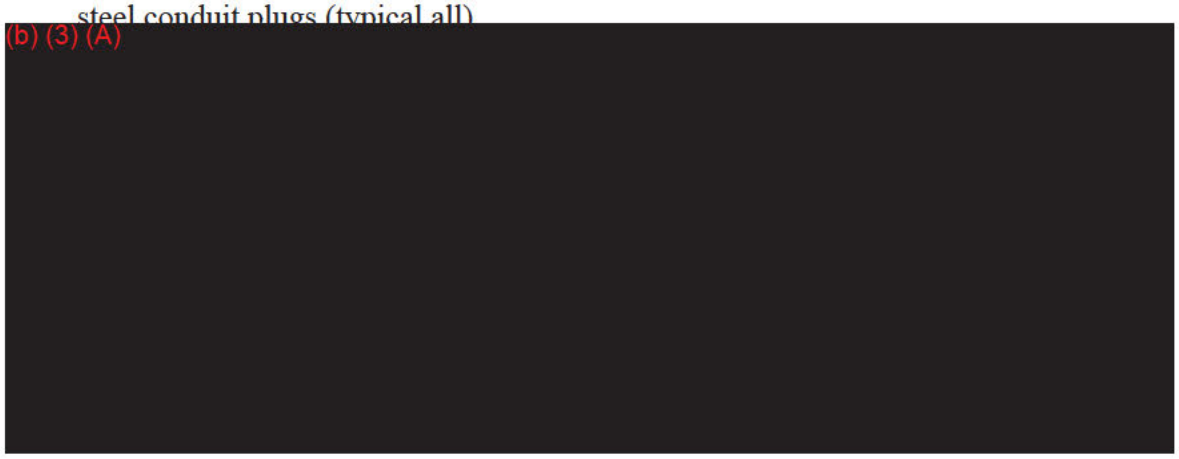
(b) (3) (A)

C55) The [redacted] gate valve used on the JP-5 line to/from harbor tunnel is weeping at gate valve [redacted]

(b) (3) (A)

C56) The PRV system for each piping in the UGPH has an Emerson Figure 533 flow control valve with Hydramotor actuator (QTY 6). The Hydramotor actuators still have the factory plastic caps on the unused conduit inlet ports. This will not meet hazardous area rating (NFPA class I, division II, Group D). Remove plastic caps and install steel conduit plugs; tighten existing steel conduit plugs (typical all)

(b) (3) (A)



D. Surge Tank Piping

D1) Several locations without Teflon or isolation material were noted throughout the surge tank piping system.

D2) Deteriorated grout noted at the bottom of the pipe support at Surge Tank 1 (just past the isolation DBB valve).

(b) (3) (A)

D3) The [redacted] sample/water drain line that ties to the [redacted] drain line has a valve that is not secured in the closed position; potential for accidental spill (note: inspection team closed the valve during the inspection. Consider a self-closing valve or a LOTO program).

(b) (3) (A)

D4) Some minor staining noted on the bottom of the flange for the [redacted] JP-5 line from Surge Tank 1; just before pipe support [redacted] (no active weeping noted)

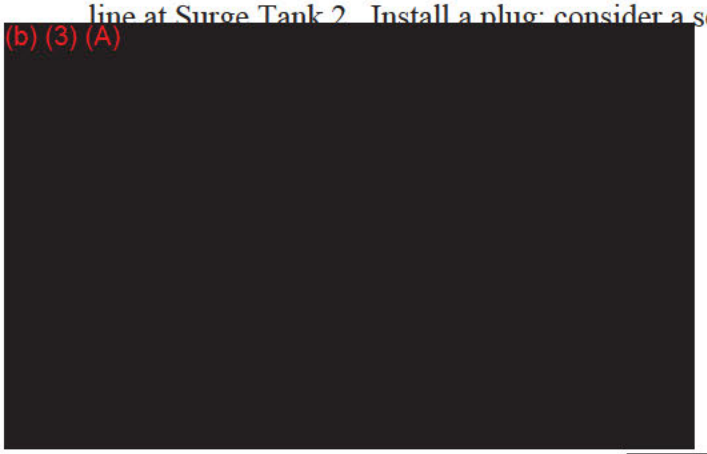
(b) (3) (A) [redacted]

D5) Some staining noted on the bottom of the flange for the [redacted] JP-5 line from Surge Tank 2; just before pipe support JP5-4 (no active weeping noted). *Note: the staining did not appear to be JP-5 (based on odor and gas meter testing) and had the viscosity of oil. InterSpec suspects this oily substance is caused by one of the two following reasons: oil used to lubricate the bolts or areas rich in polyamide or amine content in the epoxy coating that caused yellowing/blushing and/or an oily exudate. Chemical reactions that form the exudate creates a chain of reactions that can lead to a sticky, oily, or waxy film appearing on the surface of the cured epoxy coating. Amine blush testing or lab testing is suggested to fully determine the fluid type.*

D6) Some staining noted on the bottom of the flange for the [redacted] JP-5 line from Surge Tank 2; just before pipe support JP5-3 (no active weeping noted). *Note: See comment in Item 5 above about non-fuel related oily material.*

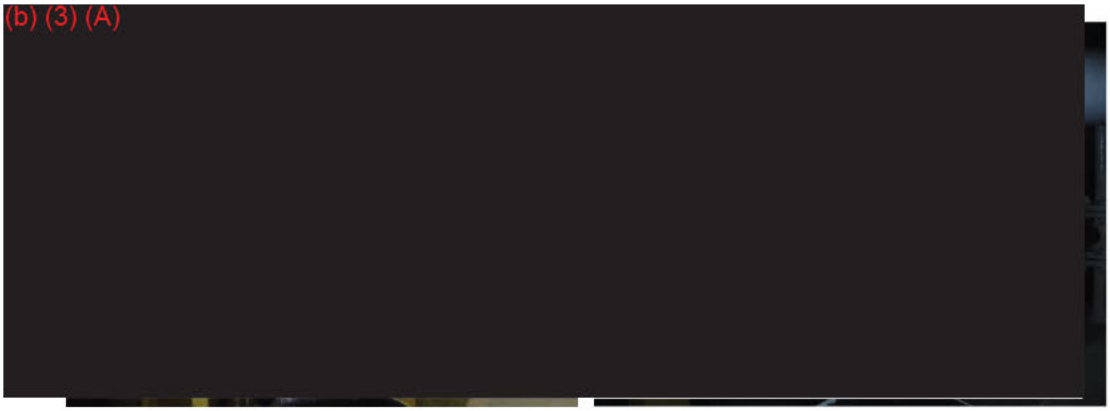
(b) (3) (A) [redacted]

D7) There is a missing plug on a 1-inch ball valve that is mounted to the 4-inch low suction line at Surge Tank 2. Install a plug; consider a self-closing valve or a LOTO program.



D8) Lack of thread engagement noted on the [redacted] low suction pipe flange from Surge Tank 3 (at the pipe branch tie-in).

D9) There is a missing plug on a 1-inch ball valve that is mounted to the 4-inch low suction line at Surge Tank 3. Install a plug; consider a self-closing valve or a LOTO program.



D10) Some minor staining noted on the bottom of the 32-inch dresser coupling on Surge Tank 4 (no active weeping noted). *Note: See comment in Item 5 above about non-fuel*

D11) The TRV system flange at Surge Tank 4 is equipped with 1/16-inch gaskets instead of 1/8-inch gaskets.

(b) (3) (A)

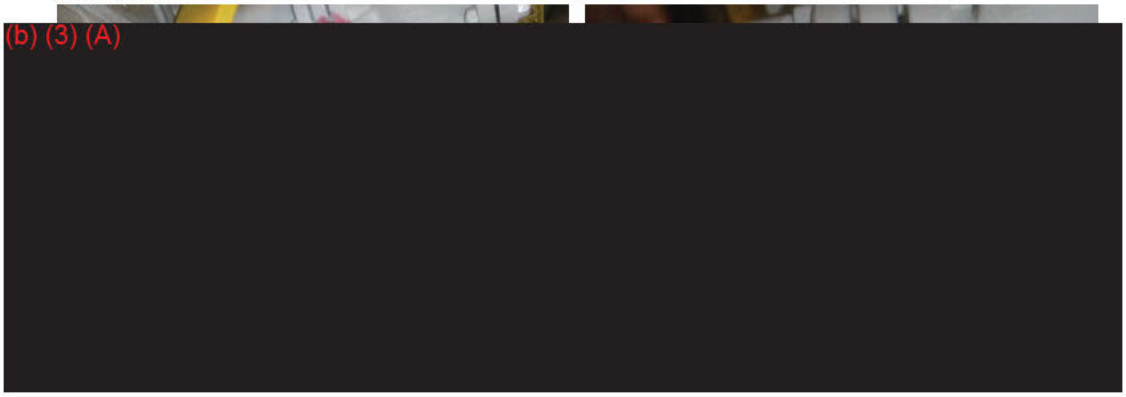
D12) Some minor staining noted on the bottom of the flange for the [redacted] F-76 line from Surge Tank 4; just before pipe support F76-8 (some staining noted on the floor but no active weeping noted). *Note: See comment in Item 5 above about non-fuel related oily*

(b) (3) (A)

D e flange for the [redacted] F-76 line from Surge Tank 4; just before pipe support F76-9 (some staining noted on the floor but no active weeping noted). *Note: See comment in Item 5 above about non-fuel related oily material.*

D14) Some staining noted on the bottom of the [redacted] low suction DBB skin valve flange from Surge Tank 4. Similar discoloration noted on the 1-inch sample line flange (likely due to drips from the 4-inch flange). Operators or others appeared to have applied Kolor Kut fuel gauging paste to detect weather the staining is fuel. Since Kolor Kut fuel gauging paste reacts to hydrocarbons; this method cannot distinguish between fuel versus other oils. *Note: See comment in Item 5 above about non-fuel related oily material.*

(b) (3) (A)



D15) There is a missing plug on a 1-inch sample ball valve that is mounted to the 4-inch low suction line at Surge Tank 4. Install a plug; consider a self-closing valve or a LOTO program.

(b) (3) (A)

E. FOR Piping [redacted]

E1) Threaded sampling pipe nipple on tank 20 FOR Line after tank skin valve. The threaded pipe nipple is for the Bottom “BTM” sampling.

E2) Missing Teflon pad (metal-to metal contact) between pipe and support on Tank 20 FOR line in the trench past tank sampling line branch.

E3) Moderate corrosion on [redacted] blind flange and fasteners on Tank 19 (abandoned branch to the sampling lines).

[redacted]

E4) Coating failure and corrosion on the I-beam type pipe supports within the trench (typical throughout the pipe run but noted to be moderate between Tank 20 and Tank 16).

E5) Displaced pipe support on piping within trench between [redacted] nd [redacted]

E6) Displaced Teflon pad pipe support within trench at [redacted]
(Photo)

E7) There is a flange installed on Tank 18 FOR line, but there is an [redacted] ball valve that is not plugged off. There is a potential for the ball valve to be bumped and cause spill.

E8) Spray foam material used to seal edge of AFFF Sump # 1. Foam material is in contact with pipe (Spray foam intent and function unknown).

E9) The top of flange just before the FOR concrete pit; Sump 7 (near Door C) is covered with concrete to include side of the flange, face of flange, and fasteners.

E10) FOR concrete pit; Sump 7 (near Door C), is not lined. Fuel contact water is dropped in this sump before it is picked up with sump pump to downstream segment of the FOR line. There is moderate sump floor-to-wall deterioration with periodic bubble formation from bottom the sump

E11) The pressure gauge on the FOR line (from Sump 7 pump) is out of calibration, and the glass is cracked.

E12) Section of the [redacted] wall mounted pipe by door C has a stained plastic wrap with C-clamp between the TEE and gate valve (indicating a leaking threaded joint)

(b) (3) (A)

[redacted]

E13) Section of the [redacted] wall mounted pipe by door C has a wood shim between pipe and support. Note: pipe is not secured to the support.

E14) Section for the FOR pipe from Sump 7 is threaded piping until it ties in to the Tank 15/16 FOR line.

(b) (3) (A)

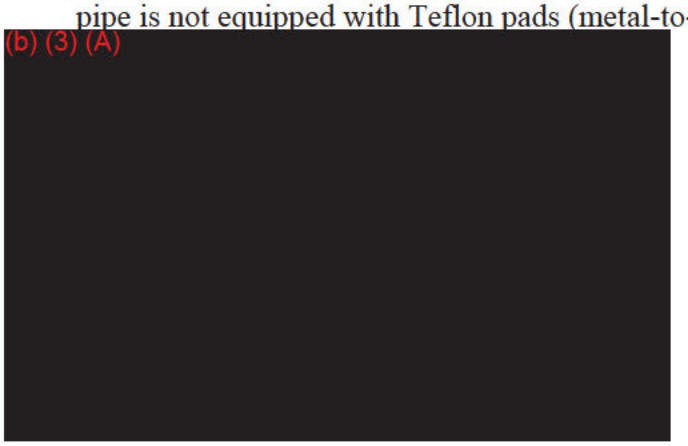
[redacted]

E15) Section of [redacted] threaded FOR piping between [redacted] and [redacted] has three segments of unsupported piping measuring 23 ft, 22 ft and 20 ft respectively. Note: industry standard is nine foot span for [redacted]

[redacted]

E16) Section of FOR piping from Sump 7 routes through the electrical room. Section of this pipe is not equipped with Teflon pads (metal-to-metal contact).

(b) (3) (A)



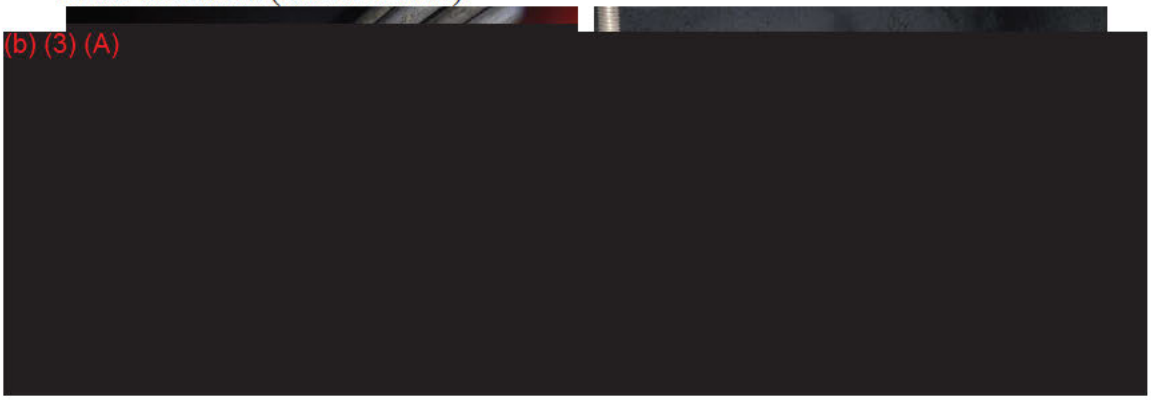
E17) The segment of the FOR piping has four brass/bronze (low melting point) valves where the line ties in to Tank 15/16 FOR trench piping. This includes the temporary line that is attached to the [redacted] header pipe.

(b) (3) (A)

E18) There are three pipe supports in the trench that are displaced near the FOR-line tie-in at Tank 15/16 (past the flange from the above photo).

E19) Tank 16 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).

(b) (3) (A)



E20) Threaded sampling pipe nipple on Tank 16 FOR Line after [redacted] tank skin valve. The threaded pipe nipple is for the Bottom "BTM" sampling (see photo in item 21).

E21) [redacted] skin valve at Tank 16 has one fastener that is not fully engaged.

(b) (3) (A)

[redacted]

E22) The FOR piping within the trench by Tank 15 has a 2 x 4 wood shim (the support is slanted and not adequately supported.

E23) There are three fasteners on gate valve past the DBB skin valve that are not fully engaged at Tank 15.

E24) Tank 15 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).

(b) (3) (A)

[redacted]

(b) (3) (A)

[redacted]

E26) FOR system at Tank 14 was isolated for ongoing repair activity by a contractor.

E27) The tank sampling system at Tank 13 was upgraded with new piping to include installing flanged joints in the past. Three [redacted] flanged joints have cracked gaskets indicating potential improper torque sequence, over torqueing, or use of lubricants that chemically

(b) (3) (A)

[redacted]

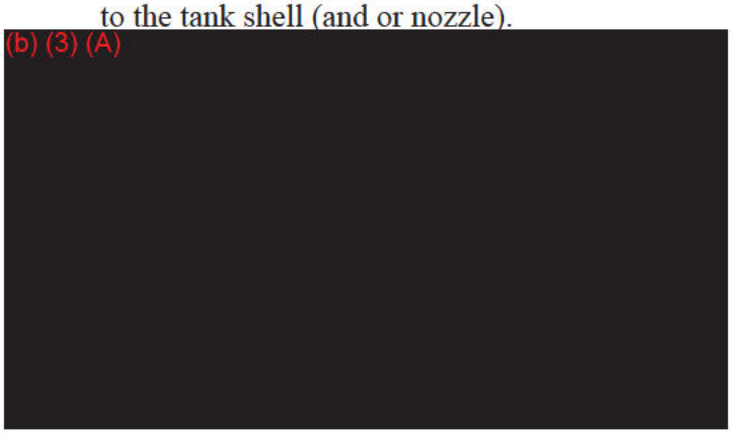
E28) The FOR piping within the trench at Tank 13 does not have correct pipe supports. Wood pipe supports noted

(b) (3) (A)

[redacted]

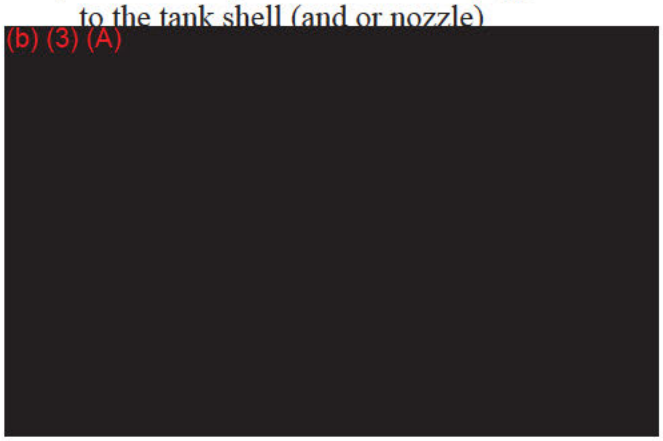
E29) Tank 12 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).

(b) (3) (A)



E30) Tank 9 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle)

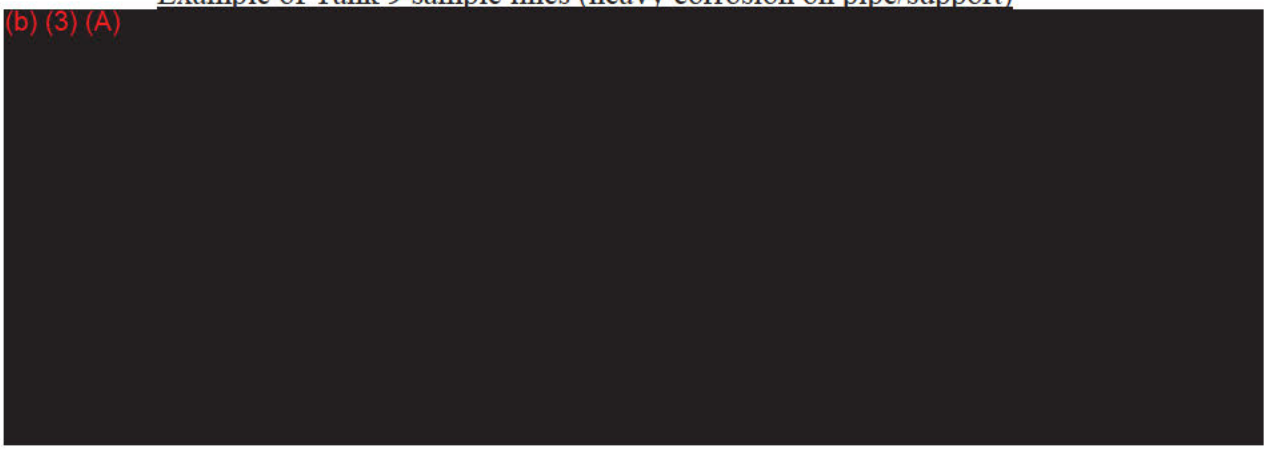
(b) (3) (A)



E31) Some coating failure and corrosion noted on the tank sampling lines throughout the facility; mostly on the treaded style sampling system that has not yet been upgraded to welded and flanged system. Tank 9 sampling system had the most aggressive corrosion on piping and supports. There are no skin valves close to the tank for Tank 9 sampling system. NOTE: additional evaluation to include coating/corrosion removal is required to fully access the affected sample pipe. A spill kit and pipe repair clamp should be readily available during corrosion removal.

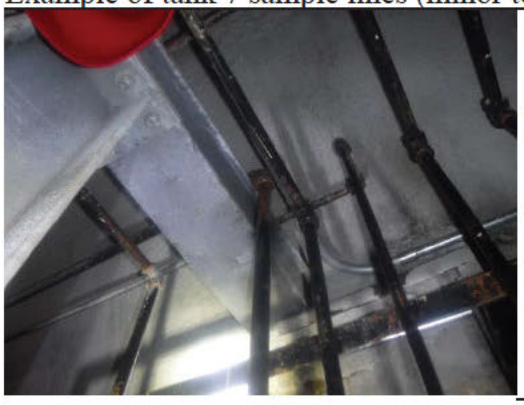
Example of Tank 9 sample lines (heavy corrosion on pipe/support)

(b) (3) (A)



[redacted]

Example of tank 7 sample lines (minor to moderate corrosion)



E32) Missing coated U-bolts and isolation Teflon on Tank 5 FOR piping. (QTY 3)

E33) Tank 4 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle). This tank has approximately [redacted] t of pipe between the tank and the first available isolation valve located at the sample manifold.

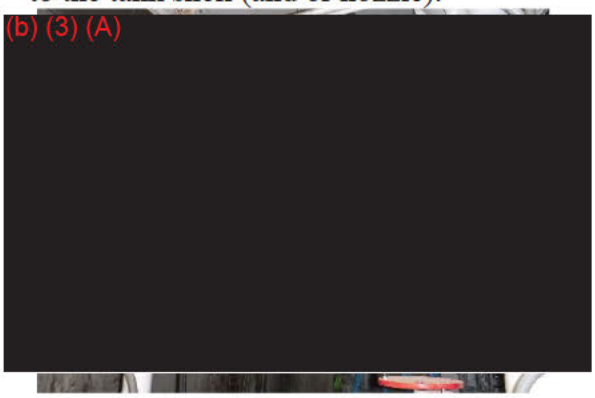
(b) (3) (A) [redacted]

E34) Section of FOR piping through the AFFF Sump pit # 4 (Just past [redacted]) is covered with plastic (reason unknown but assumed to protect FOR pipe during repair at the sump pit area).

[redacted]

E35) There is a segment of unsupported [redacted] FOR piping spanning [redacted] at Tank 3 (Note industry standard is fourteen feet span for 1.5-inch pipe).
(NO PHOTO)

E36) Tank 3 sample lines are not equipped with skin valves positioned as close as practical to the tank shell (and or nozzle).



E37) Some staining noted on Tank 4 sampling system (just below the "135 foot" sample line valve).

E38) There is a segment of unsupported [redacted] FOR piping spanning [redacted] at Tank 4 (Note: industry standard is fourteen foot span for 1.5-inch pipe). The weight of the sampling line header is also bearing on the FOR line.
[NO PHOTO]

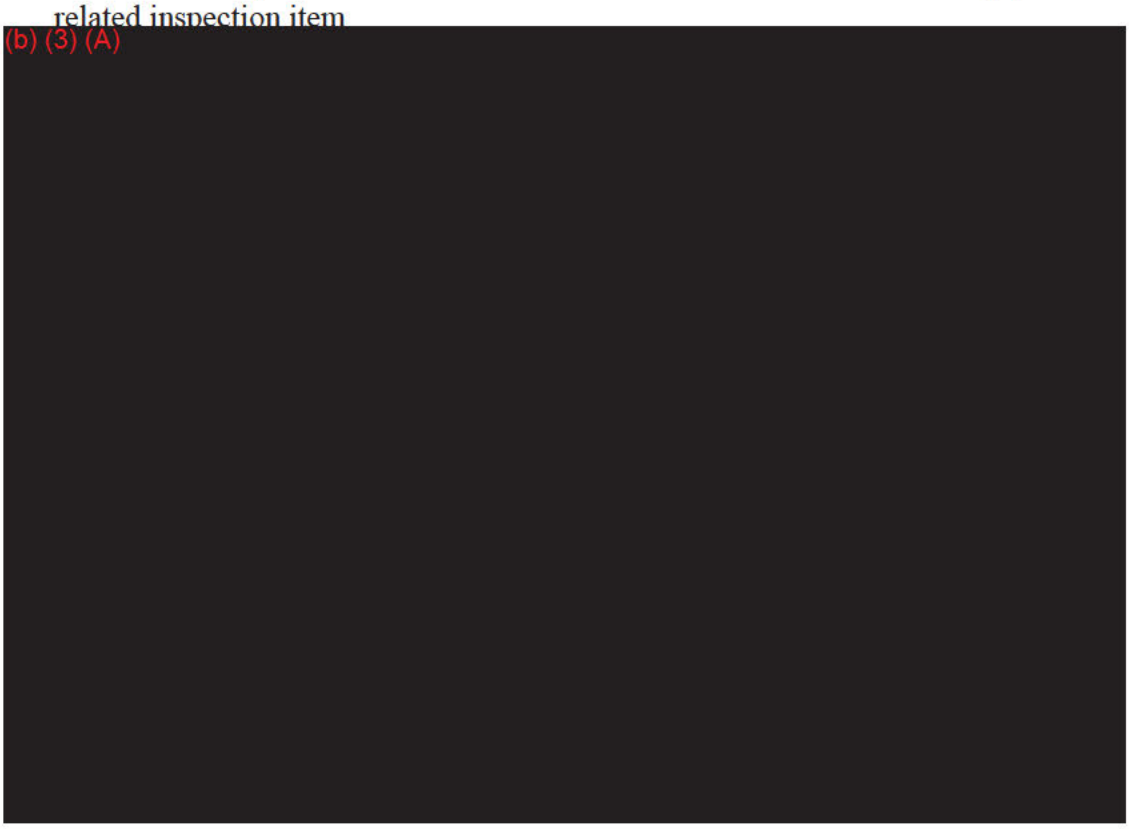
E39) Missing Teflon pad (metal-to metal contact) between pipe and support on FOR line between [redacted]

E40) Missing Teflon pad (metal-to metal contact) between pipe and support on FOR line between [redacted]
[NO PHOTO]

E41) Missing Teflon pad (metal-to metal contact) between pipe and support on FOR line between [redacted] (closer to [redacted]).
[NO PHOTO]

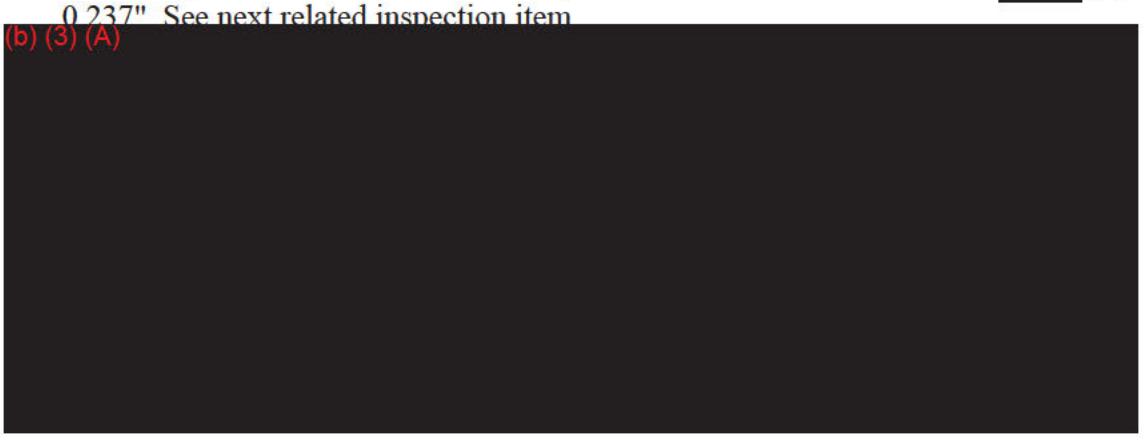
E42) There are three locations on the [redacted] pipe with repair clamps at the FOR-Sump (S-23) downstream of the isolation valve (shown with green arrow). The presence of these types of clamps indicate there were areas of compromised pipe sections at this location. A 6", 16" and 8" full circumferential, single-section stainless steel repair clamp manufactured by Romac Industries is used with a 54-inch section of the pipe. See next related inspection item

(b) (3) (A)



E43) Several low ultrasonic thickness (UT) data was recorded near the locations where repair clamps are used. A section of FOR pipe was closely checked with a UT gauge, and several locations with thickness ranging from 0.106" to 0.190" were identified indicating over 55% of metal loss was present. The nominal thickness of [redacted] pipe is 0.237". See next related inspection item

(b) (3) (A)



E44) The section of piping identified with low UT data and repair clamps is consider a dead-leg with stagnant area that normally has little or no significant flow. This section requires a low point drain (LPD) or periodic flushing to prevent microbial-influenced corrosion (MIC).

E45) The [redacted] sump/pump bypass valve flange is missing a nut.

E46) The [redacted] DBB on the sump pump discharge line before the strainer is missing a body cavity relief valve handle. The valve is also not plugged when not used.

E47) The [redacted] valve above the FOR isolation valve has a lose flange with several missing fasteners and a Camlock without a cap (potential spill point).

E48) Missing coated U-bolts and isolation Teflon on FOR isolation valves supports.

E49) Segment of tunnel piping from the [redacted] isolation valve to the ADIT 3 door is constructed with mechanical coupling (Style 77 Victaulic joint). Some discoloration corrosion cell and staining were noted at some joints (locations will be identified).
Note: [redacted] starting at Tank 311 [redacted] and ending at the [redacted] isolation valves (F-[redacted] were labeled to aide in identifying and locating findings reported. The letter "F" is tacked to the pipe supports ([redacted] numbers to distinguish the FOR [redacted] from the facility designated pipe supports.

E50) [redacted] is damaged likely due to impact with displaced pipe support and U-bolt.

E51) Several locations with lose U-bolts, displaced Teflon pads, missing Teflon pads or loose hangers were noted. Some of the locations are summarized below with a full list to be provided in the report.

F-PS #	Condition
F-	Loose U-bolts
F-	Displaced Teflon pad
F-P	Missing pipe clamp bolt
F-PS	.....

E52) Areas of total coating failure and heavy corrosion were identified on sections of the FOR line. Some of the locations are summarized in the table (note: some coating repair activity was noted during the inspection on some specific locations):

F-PS #	Condition
[redacted]	coating failure and heavy corrosion
	total coating failure with some corrosion scale
	total coating failure with some corrosion scale
	total coating failure with some corrosion scale
	total coating failure with some corrosion scale
	total coating failure with some corrosion scale
	total coating failure with some corrosion scale
F-PS	.....

E53) There is a 2-inch LPD and ¾-inch HPV near [redacted] The LPD is missing a camlock cap, and there are two bolts that are not fully engaged on the 2-inch LPD flange.

E54) There is a 2-inch LPD and ¾-inch HPV near [redacted] The LPD is missing a camlock cap, and there are two bolts that are not fully engaged on the 2-inch LPD flange.

E55) A LPD with missing plug and a ball valve that is not locked-out was noted on the FOR line near [redacted] (note: facility personnel corrected this finding).

E56) A LPD with missing plug and a ball valve that is not locked-out was noted on the FOR line beneath ADIT 3 staircase (note: facility personnel corrected this finding).

E57) There is moderate coating failure and some corrosion noted on the [redacted] FOR penetration sleeve just below the ADIT 3 staircase (water infiltration at penetration) Some corrosion was not at the [redacted] pipe by the Link-Seal.

E58) Several external pitting areas were noted on the FOR section of pipe outside ADDIT 3. The thickness data indicates approximately 0.020″ to 0.035″ internal corrosion on the segment of pipe with several external pitting ranging from 0.010″ to 0.190″. This section of FOR pipe is [redacted] Schedule 40 with original thickness of 0.280″. Pitting near [redacted] has depth ranging between 0.100″ to 0.140″ and local metal thickness of 0.252″ Remaining metal thickness: (0.252″ - 0.140″ = 0.112″). This is equivalent of approx. 60% loss from original thickness or 56% localized loss. Segment of the piping near F-[redacted] has pit depth of 0.190″ with the local metal thickness of 0.248″ resulting in remaining metal thickness of (0.248″ - 0.190″) 0.058″. This is equivalent of approx. 79 % loss from original thickness or 77 % localized loss. There are areas that are not accessible without pipe jacking with moderate corrosion and a suspected weeping/wetting noted at [redacted] This segment of piping from ADIT 3 riser to tank 311 is not fit for continued service and requires replacement. Length of pipe from the FOR riser to tank 311 DBB valve (outside of the secondary containment) is 151-feet.

E59) There are moderate coating failure and corrosion on the FOR riser flange just outside of ADIT 3 door. Note: there is a threaded [redacted] fittings with a pressure gauge mounted on the flange.

E60) Excessive vegetation around pipe (section of FOR pipe to Tank 311).

E61) The wooden staircase is partially resting on the pipe at one side of the landing.

E62) The body cavity relief valve of the [redacted] receipt DBB valve (outside of the secondary containment of Tank 311) is discharging to the isolated side (should discharge towards the tank side).

E63) The [redacted] DBB valve (outside of the secondary containment of Tank 311) has one loose fastener. Note: Tank 311 has cathodic protection and fasteners with insulating flange kit (IFK) is required.

E64) The [redacted] DBB valve (outside of the secondary containment of Tank 311) does not have a complete IFK. The gasket used does not appear to be insulating type and has one missing insulating washer. Additional test required to determine if IFK is functioning properly. Note: it may be practical to install ICCP on Tank 311 and remove the IFK to extend CP to the section of buried piping at ADIT 3 (review of the 2021 CP Report indicated the section of buried piping had ineffective magnesium anode).

E65) The TRV bypass lines (QTY 2) at Tank 311 does not have a complete IFK. Only has insulating washer on the lower flange. The gasket used also does not appear to be insulating type.

E66) The body cavity relief valve of the [redacted] issue DBB valve (outside of the secondary containment of Tank 311) is discharging to the isolated/caped side (should discharge towards the tank side).

APPENDIX 'E' - CALCULATIONS

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	[redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.233	t		
Depth of Corroded Area (inches)	0.113	d		*Step 3*
Length of Corroded Area (inches)	2	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{0.954}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 1.263

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **33592.585** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{10622.318}\ \text{psi}$$

$SF\ x\ S_O =$ **15933.476** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{869.675}\ \text{psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspectior		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.226	t		
Depth of Corroded Area (inches)	0.135	d		*Step 3*
Length of Corroded Area (inches)	8	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{15.733}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 3.168

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **22568.958** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t}$$

$S_O =$ **10951.327** psi

$SF\ x\ S_O =$ **16924.779** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D}$$

566.732 psi *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.234	t		
Depth of Corroded Area (inches)	0.089	d		*Step 3*
Length of Corroded Area (inches)	6	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{8.547}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 2.473

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **29971.061** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{10576.923}\ \text{psi}$$

$SF\ x\ S_O =$ **16346.154** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{779.248}\ \text{psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.218	t		
Depth of Corroded Area (inches)	0.102	d		*Step 3*
Length of Corroded Area (inches)	10	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{25.484}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 3.847

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **25861.928** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{11353.211}\ \text{psi}$$

$SF\ x\ S_O =$ **17545.872** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{626.433}\ \text{psi} \quad \textit{Step 7}$$

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.239	t		
Depth of Corroded Area (inches)	0.140	d		*Step 3*
Length of Corroded Area (inches)	9	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{18.828}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 3.409

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **22637.289** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{10355.649}\ \text{psi}$$

$SF\ x\ S_O =$ **16004.184** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{601.146}\ \text{psi} \quad \textit{Step 7}$$

Flaw is Acceptable *Step 8*

[redacted]

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ENGINEERING + CONSULTING

Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.240	t		
Depth of Corroded Area (inches)	0.105	d		*Step 3*
Length of Corroded Area (inches)	6	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{8.333}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 2.448

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **28513.543** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{10312.500}\ \text{psi}$$

$SF\ x\ S_O =$ **15937.500** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{760.361}\ \text{psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	18	D		*Step 1*
Nominal Wall Thickness (inches)	0.225	t		
Depth of Corroded Area (inches)	0.095	d		*Step 3*
Length of Corroded Area (inches)	3	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{2.222}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 1.542

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **32170.106** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t}$$

$S_O =$ **11000.000** psi

$SF\ x\ S_O =$ **17000.000** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D}$$

804.253 psi *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L.
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	32	D		*Step 1*
Nominal Wall Thickness (inches)	0.430	t		
Depth of Corroded Area (inches)	0.196	d		*Step 3*
Length of Corroded Area (inches)	8	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{4.651}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$$M = \quad \mathbf{1.961}$$

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right) \qquad S_F = \mathbf{29390.154} \text{ psi}$$ *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF = \mathbf{1.5}$

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{10232.558} \text{ psi}$$

$SF\ x\ S_O$ = **15813.953** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{789.860} \text{ psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L.
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	32	D		*Step 1*
Nominal Wall Thickness (inches)	0.358	t		
Depth of Corroded Area (inches)	0.14	d		*Step 3*
Length of Corroded Area (inches)	24	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{50.279}$$

$$M = 0.032z + 3.3$$

$$M = \quad 4.909$$

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **27569.335** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \quad \mathbf{12290.503}\ \text{psi}$$

$SF\ x\ S_O =$ **18994.413** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{616.864}\ \text{psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L.
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	32	D		*Step 1*
Nominal Wall Thickness (inches)	0.386	t		
Depth of Corroded Area (inches)	0.114	d		*Step 3*
Length of Corroded Area (inches)	24	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{46.632}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$M =$ 4.788

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$$

$S_F =$ **30430.677** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{11398.964}\ \text{psi}$$

$SF\ x\ S_O =$ **17616.580** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{734.140}\ \text{psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

[redacted]

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L.
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	32	D		*Step 1*
Nominal Wall Thickness (inches)	0.387	t		
Depth of Corroded Area (inches)	0.114	d		*Step 3*
Length of Corroded Area (inches)	3	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$$z = \frac{L^2}{Dt} \qquad z = \mathbf{0.727}$$

$$M = \sqrt{(1 + 0.6275z - 0.003375z^2)}$$

$$M = \quad 1.206$$

$$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right) \qquad S_F = \mathbf{36422.548} \text{ psi}$$ *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

SF = **1.5**

Hoop Stress, So

$$S_O = \frac{P_O D}{2t} \qquad S_O = \mathbf{11369.509} \text{ psi}$$

$SF\ x\ S_O$ = **17571.059** psi

Estimated Failure Pressure

$$P_F = \frac{2S_F t}{D} \qquad \mathbf{880.970} \text{ psi}$$ *Step 7*

Flaw is Acceptable *Step 8*

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Project No:	22-022	Sheet: 1	of 1
Project Name:	Fuel Transfer System Inspection		
Subject:	(b) (3) (A) [redacted]		
Author:	CSB	Date:	8/22/2022
Reviewer:	JWK	Date:	8/22/2022

ASME B31G Level 1 Analysis

Step 1. Determine pipe diameter and nominal wall thickness from appropriate records or direct measurement of the pipe.
Step 2. Clean the corroded pipe surface to bare metal (N/A for the calculation)
Step 3. Measure the max depth of the corroded area, d, and longitudinal extent of the corroded area, L.
Step 4. Determine applicable pipe material properties from appropriate records.
Step 5. Calculate the estimated failure stress, S_F.
Step 6. Define an acceptable safety factor, SF.
Step 7. Compare S_F to SF X S_O.
Step 8. The flaw is acceptable where S_F is equal to or greater than SF X S_O, or where P_F is equal to or greater than SF X P_O.

Pipe Diameter(inches)	32	D		*Step 1*
Nominal Wall Thickness (inches)	0.298	t		
Depth of Corroded Area (inches)	0.12	d		*Step 3*
Length of Corroded Area (inches)	24	L		
Bulging stress magnification factor		M	Calculated below	
Maximum Operating Pressure (psi)	275	MOP	(also P_O)	
Specified Minimum Tensile Strength	60000	SMTS	(ASME B31 3 Table A-1)	
Specified Minimum Yield Strength	35000	SMYS	(ASME B31 3 Table A-1)	*Step 4*
Elastic modulus of steel	29500000	E	(ASME B31 3 Table C-6)	
Flow stress	38500	S_{FLOW}	(1.1*SMYS)	

$z = \frac{L^2}{Dt}$ $z =$ **60.403**

$M = 0.032z + 3.3$

$M =$ 5.233

$S_F = S_{FLOW}\left(\frac{1 - 0.85(\frac{d}{t})}{1 - 0.85(\frac{d}{t})/M}\right)$ $S_F =$ **27094.385** psi *Step 5*

Safety Factor, $SF = \frac{hydrostatic\ test\ pressure\ (425\ psi)}{MOP}$ *Step 6*

$SF =$ **1.5**

Hoop Stress, So

$S_O = \frac{P_O D}{2t}$ $S_O =$ **14765.101** psi

$SF\ x\ S_O =$ **22818.792** psi

Estimated Failure Pressure

$P_F = \frac{2S_F t}{D}$ **504.633** psi *Step 7*

Flaw is Acceptable *Step 8*

[redacted]

APPENDIX 'F' – PIPE SUPPORT ASSESSMENT

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Outside [redacted] 3	[redacted] (b) (3) (A)	Good, new, labeled by others.	Other	None.
			Outside [redacted] 3		Good, new, no teflon pad, pipe not in contact w/ saddle, labeled by others.	Long	Provide teflon pad, adjust support or shim to properly support pipe.
			Outside [redacted] 3		Good, new, photo for example, on exit line, unlabeled.	Other	None.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Missing U-bolt, metal to metal contact, labeled by others.	Long	Provide teflon pad and coated U-bolt.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
	Table E2		Outside [redacted] 3		Good, metal to metal contact, labeled by others. API 570: Heavy corrosion at saddle-to-pipe crevice (no isolation Teflon pad).	Long	API 570: Reapir support. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			[redacted] 3		Actively dripping, medium-high corrosion, metal to metal contact, corroded at pipe support interface, photo taken for how wall support should look, labeled by others.	Urgent	Replace support.
			[redacted] 3		Highly corroded and deformed, no contact w/ pipe, labeled by ABA.	Urgent	Replace support.
			[redacted] 3		Corroded, in contact w/ pipe, labeled by ABA.	Urgent	Replace support.
			[redacted] 3		Corroded, intact, metal to metal contact, only top anchor to wall present, lower part of bracket not in contact w/ wall.	Urgent	Replace support.
			[redacted] 3		Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
			[redacted] 3		Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
	Table E2		[redacted] 3		Very minor corrosion, overall good, metal to metal contact. API 570: Missing pipe clamp (no isolation Teflon pad).	Long	Provide teflon pad. API 570: Secure pipe clamp. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			[redacted] 3		Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
			3		Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
			3		Additional corrosion at AB (anchor bolt) to concrete at lower bolts.	Long	Provide teflon pad.
			3		Additional corrosion at upper and lower bolts to concrete.	Long	Provide teflon pad.
			[redacted] 3		Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
			[redacted] 3		Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
			[redacted] 3		Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
			[redacted] 3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
			3		Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
	Table E2		[redacted] 3		Metal to metal contact, otherwise good. API 570: Missing pipe strap at the support (no isolation Teflon pad).	Long	Provide teflon pad. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		[redacted] 3		Not supporting pipe, no anchorage to wall at top, metal to metal contact. API 570: Support anchor dislodged from tunnel wall.	Urgent	Replace support.
			[redacted] 3		Has teflon pad, but not well supported, C-clamp to hold guide on.	Long	Provide teflon pad.
			3		Has teflon pad, but not well supported, C-clamp to hold guide on.	Long	Provide teflon pad.
			[redacted] 3		No teflon pad, not clearly supporting pipe.	Long	Provide teflon pad, adjust support or shim to properly support pipe.
			[redacted] 3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			[redacted] 3		No teflon pad, not supporting pipe.	Long	Provide teflon pad, adjust support or shim to properly support pipe.

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] 3	[redacted] (b) (3) (A)	Clamp not attached, teflon pad w/ contact. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			[redacted] 3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		New, some minor cracking, overall good conditioon.	Other	None.
	Table E2		[redacted] 3		Overall good. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
			[redacted] 3		Overall good.	Other	None.
	Table E2		[redacted] 3		No guide, support broken so pipe is at end of arm. API 570: Missing pipe clamp bolt (no isolation Teflon pad).	Urgent	Replace support.
			[redacted] 3		Bottom of bracket deformed from impact.	Urgent	Replace support.
			3		Overall good.	Other	None.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
			[redacted] 3		Overall good.	Other	None.
			[redacted] 3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			[redacted] 3		No teflon, no contact.	Long	Modify support to properly support pipe and provide teflon pad.

Table 15 - FOR Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] 3	[redacted] (b) (3) (A)	No teflon, no contact. API 570: Missing pipe clamp bolt (no isolation Teflon pad).	Long	Modify support to properly support pipe and provide teflon pad. API 570: Install bolts clamp. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
			[redacted] 3		Overall good.	Other	None.
			3		Overall good, photo shows dank area on support is dirty, not corrosion.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Teflon pad in place, no sleeve on U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		No contact w/ pipe.	Urgent	Replace support or modify support to properly support pipe.
			[redacted] 3		Teflon pad in place, no sleeve on U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		No contact w/ pipe.	Urgent	Replace support or modify support to properly support pipe.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.

Table 15 - FOR Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] 3	[redacted] (b) (3) (A)	Teflon pad has been displaced, no sleeve on U-bolt, very minor spots of corrosion (flea bites). API 570: Displaced bottom Teflon pad.	Long	Replace teflon pad, replace with coated U-bolt. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		[redacted] 3		Teflon pad in place, no sleeve on U-bolt. API 570: Loose U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		Teflon pad displaced, no sleeve on U-bolt.	Long	Replace teflon pad, Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, eflourescence spatla but no damage.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, corrosion at U-bolt to FOR pipe, aux pipe to top bar of support.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		No sleeve on U-bolt, corrosion on outside of front support where sanitary sewer lines bolt to support.	Long	Replace U-bolt and add sleeve.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, corrosion at U-bolt to pipe interface.	Long	Replace U-bolt and add sleeve, clean and paint pipe.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.

Table 15 - FOR Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		No sleeve on U-bolt, repair area, corrosion at U-bolt to cross brace, repair paint on teflon pad.	Long	Replace with coated U-bolt.
			[redacted] 3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, paint at repair.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
	Table E2		[redacted] 3		Front support flange bent from apparent impact, U-bolt displaced on pipe, not U-shaped. API 570: Loose U-bolt.	Urgent	Replace support.
			[redacted] 3		No sleeve on U-bolt, not attached to wall.	Long	Replace with coated U-bolt, reattach to wall.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
	E51 Table E2		Between door and sump		Support completely deformed, removed from baseplate. API 570: Damaged pipe support (impacted by a moving vehicle).	Urgent	Replace support.
			Between door and sump		Overall good.	Other	None.
			Between door and sump		Overall good.	Other	None.

Table 15 - FOR Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E2		Between door and sump	(b) (3) (A)	Paint damaged, corroded, grout under baseplate, chipped and missing chunks. API 570: Missing Teflon spacer/pad between pipe and support.	Long	Clean and repaint, replace grout under baseplates API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			In sump		2/3 U-bolts missing sleeve, very minor corrosion, 1/3 teflon pad missing.	Long	Add teflon pad and sleeve to U-bolt.
			In sump		All three missing teflon pad, lower line not touching support.	Long	Add teflon pad.
	E2 E4 E5 E6 E13 E15 E16 E18 E22 E28 E36 E39 E40 E41 E42 Table E2		FOR Trench		Not positively attached to ground (typical), not well seated on ground (typical), teflon pad not completely under pipe (typical), Total number lightly corroded: 59 Total number moderately corroded: 28 Total number severely corroded: 10 Total number missing teflon pad: 5	Long	Replace teflon pads where required, replace severely corroded supports, remove and replace all wood supports.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted]			Harbor Tunnel	[redacted]	Saddle overhangs block, condition overall ok.	Other	None.
			Harbor Tunnel		Plate and saddle overhang block, condition overall ok.	Other	None.
			Harbor Tunnel		Plate and saddle overhang block, condition overall ok, minor chipping at concrete edges.	Other	None.
			Harbor Tunnel		Some plate corrosion, saddle not uniformly in contact w/ plate.	Other	None.
			Harbor Tunnel		Area broken out for steel pipe support base.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Saddle overhangs support on back side wall (by 2in or so), front bottom of concrete chipped out for pipe support (metal) base, see photo PSC-5.	Other	None.
			Harbor Tunnel		Moderately corroded.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipping at top of sleeper, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Honeycombing, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipping at saddle under pipe, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None
	Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Pipe is not in contact with saddle # 24 (floating pipe).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipped at front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Corroded at baseplate.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	B46 Table E2		Harbor Tunnel	(b) (3) (A)	Pop out at backside w/ exposed and corroded rebar. API 570: Deteriorated saddle with rebar exposed (saddle # 36).	Long	Chip out broken concrete, clean rebar and recast concrete. API 570: Repair concrete saddle.
			Harbor Tunnel		Rebar corrosion.	Other	None.
			Harbor Tunnel		Poorly consolidated but solid at back bottom, both sides.	Long	Monitor for deterioration.
			Harbor Tunnel		Poorly consolidated but solid at back bottom, both sides.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle, baseplate not seated flush (typical).	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Concrete has been chipped out on tank side around flange for F-24, JPS lines, F-24 line has broken concrete out (but not fallen) on opposite side.	Urgent	Replace concrete.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at top front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at top, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel	A	Overall good, except F-24 line has been broken out on tanks side, no flange visible.	Urgent	Replace concrete.
			Harbor Tunnel		Minor pitting and chipping at front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel	A	Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted]			Harbor Tunnel	[redacted]	Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel	A d	Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Plate not fully seated on concrete.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Pitted concrete at front.	Other	None.
			Harbor Tunnel		Saddle on plate on large concrete block.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel	A d	Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
	Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Concrete pipe saddle # 110 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Foam filled.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at bottom, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, some deterioration at bottom of sleeper but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deterioration at bottom but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deterioration at bottom but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, some deterioration at bottom of sleeper but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom w/ deterioration.	Other	None.
			Harbor Tunnel		Efflorescence at bottom w/ deterioration.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel	A	Overall good.	Other	None.
			Harbor Tunnel		Deterioration at base, poorly consolidated at back bottom but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipped at saddle under pipe.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom at back but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflourenscence at back, but solid.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted]			Harbor Tunnel	[redacted]	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Deterioration at back.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at back, but solid. API 570: Wood shim at saddle #167 (between steel wear plate and saddle).	Other	API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at back, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at bottom. API 570: Concrete pipe saddle # 178 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		More deteriorated, but still fairly solid, surface crumbling.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Cannot see anchorage, all others ok.	Other	None.
	B37 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Wood shim installed on [redacted] pipe between Teflon pad and concrete saddle in an attempt to correct lack of support at concert saddle # 193 (Between [redacted] 289 – [redacted] 290). Pipe is not fully and uniformly supported.	Long	API 570: Remove wood. Repair the concrete saddle support or provide a replacement steel support adjacent to this pipe support. Alternatively, the existing pipe support can be evenly shimmed with steel and Teflon pad to uniformly support the pipe.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Saddle corrosion.	Long	Monitor for deterioration.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Saddle corrosion.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deteriorated at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle. API 570: Wood shim at saddle #231 (unknown reason, but no corrosion noted).	Long	API 570: Removed wood and install Teflon shim.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		More corrosion at saddle.	Long	Monitor for deterioration.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		More corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle, debris between saddle and pipe.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle, debris between saddle and pipe.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Corrosion on saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Large breakout at front.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
	Table E2		Harbor Tunnel		Efflorescence at bottom, corrosion at saddle. API 570: Concrete pipe saddle # 256 is not engaged with pipe (floating pipe).	Long	Monitor for deterioration. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Steel corrosion and concrete breakout at back [redacted] 1 side, exposed steel.	Long	Chip out broken concrete, clean rebar and recast concrete.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Excessive efflorescence.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Continuous cast block at wall begins.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at back. API 570: Wood shim at saddle #231 (unknown reason, but no corrosion noted).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Poorly consolidated at back.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
	B28 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Concrete saddle support (# 337) between [redacted] (b) and 432 has several 1/8" rods between the pipe and the concrete saddle. Reason is unknown.	Long	API 570: Remove the 1/8" rods between the concrete support saddle and pipe. Conduct visual inspection of the interface. Consider a Teflon shim between saddle and pipe.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor breakout at flange of JP-5 line at [redacted] 1 side.	Long	Replace concrete.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, some overhang of saddle over plate.	Other	None.
			Harbor Tunnel		Back to sleeper w/ cast in saddle type.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base, corrosion at saddle, ok w/ teflon pad.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Extremely poor consolidatation at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Very poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Efflorescence and cracking but couldn't knock any concrete off, clearly infiltration, likely rebar corrosion.	Long	Chip out broken concrete, clean rebar and recast concrete.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, poorly consolidated, dried puddle at back base.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Wet base, standing water from PSC 457.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
	Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Concrete pipe saddle # 481 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base, cracking at back, but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Wet on ceiling, efflorescence, concrete rough around all pipe penetrations.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		In standing water, deterioration at base.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
	B38 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: NPS 32 (F-76) pipe has a concrete pipe saddle #501 (Between [redacted] 594 – [redacted] 595) not engaged with pipe (floating pipe). There is loose concrete aggregate between pipe and saddle. Borescope inspection in the cavity did not indicate corrosion/erosion at this area.	Long	API 570: Remove the loose concrete aggregate between pipe and saddle and shim with Teflon pad. Repair the saddle as needed. Monitor at next inspection.
	Table E2		Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), saddle supported on wood block and angles. API 570: Wood shim at saddle #502 (between steel wear plate and saddle).	Long	Replace saddle support. API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), severely corroded saddle and plate on angles, base in standing water.	Long	Replace saddle and saddle support.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates (moderate) in standing water.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates (moderate) in standing water.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ).	Long	Replace saddle.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Minor consolidation issues.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
	B22 Table E2		Harbor Tunnel		Efflorescence at base. API 570: The concrete saddle (Saddle # 530) is cracked on the edge with large splint noted on NPS 32 (F-76) line at about the 7 o'clock position.	Long	API 570: Repair the concrete saddle support. Consider installing a Teflon pad between the saddle and pipe.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at base but solid. API 570: Corrosion on steel plate on saddle # 548 (there is steel plate between pipe and concrete saddle).	Long	API 570: Repair as needed/ monitor.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Overall good.	Other	None.
			Harbor Tunnel		Saddle on plate on CIP type, saddle not welded flush to pipe.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid

Table 16 - Concrete Sleepers - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Saddle type ok.	Other	None.
			Harbor Tunnel		Saddle type ok.	Other	None.
			Harbor Tunnel		Saddle type ok, beyond PSC 596(c) pipes move horizontally and have individual supports.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Baseplate corroded, not anchored, minor corrosion at angle to wall connection, corrosion at saddle on backside. API 570: No wear plate or Teflon pad between pipe and pipe support (F-24).	Long	Anchor column to slab. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		Harbor Tunnel		Severe baseplate corrosion, severe corrosion at (1) brace to wall. API 570: No wear plate or Teflon pad between pipe and pipe support [redacted]	Long	Repair brace to wall, anchor column to slab. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			Harbor Tunnel		Corrosion at baseplate and bottom of column, no grout pad/pier, column baseplate bears on slab, mild corrosion over entire support, severe corrosion at JP-5 bracket to wall (x1) at [redacted] 1 side, moderate corrosion at F-24 bracket to wall (x1) at [redacted] 1 side, bolts to wall not uniformly flush tight to wall.	Long	Clean corrosion and repaint, replace anchorage to wall.
			Harbor Tunnel		Corrosion at baseplate and bottom of column, top bolt not seated well at [redacted] 2 side, no grout pad.	Long	Clean corrosion and repaint, replace anchorage to wall.
			Harbor Tunnel		Baseplate corroded but ok, small grout pad surrounding top, braces covered w/ effluent from wall.	Long	Clean corrosion and repaint, maintain in good condition.
	B14 Table E2		Harbor Tunnel		Severely corroded baseplate and bottom of column, loss of steel in column, delamination of baseplate, no grout pad, F-24 connected to wall severely corroded. API 570: Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points.	Urgent	Replace support.
	Table E2		Harbor Tunnel		Anchor bolts corroded, bottom of column moderately corroded, flange deformed, anchor bolts to wall moderately corroded. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair.
	Table E2		Harbor Tunnel		Severe delamination at baseplate , anchor bolts and bottom of column, no grout, anchor bolts not straight. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support.
			Harbor Tunnel		Bottom of column moderately corroded, anchor bolts and baseplate covered w/ concrete.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Minor corrosion at column bottom, anchor bolts (nuts) corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		JP-5 braces to wall connection hidden, corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderately-minor base of column corrosion, baseplate corrosion, anchor bolts corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderately-minor column corrosion, [redacted] anchors to wall not well seated, severe baseplate and anchor bolts corrosion.	Long	Replace support.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, moderate JP-5 to wall corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, baseplate corrosion, moderate JP-5 to wall corrosion.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, mild corrosion at paint damage, moderate at F-24 anchor bolts to wall at [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, moderate at [redacted] anchor bolts to wall, both sides.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolt corrosion, moderate [redacted] anchor bolts to wall, [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, severe anchor bolts corrosion, moderate at JP-5 anchor bolt to wall, deterioration of top flange, very severe at F-24 anchor bolts to wall, both sides.	Long	Replace support.
			Harbor Tunnel		Moderate column corrosion, severe anchor bolt corrosion, moderate anchor to wall, both lines [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, mild at all bolts on wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor and baseplate corrosion, mild at baseplate in grout.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate-severe column corrosion, moderate anchor bolt and baseplate corrosion, mild all anchor bolts to wall, excep[redacted] on[redacted] 1 side (moderate).	Long	Replace support.
			Harbor Tunnel		Mild-moderate column corrosion, moderate baseplate and anchor bolt corrosion, mild anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion, mild anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt corrosion, welded connection to wall at JP-5 at[redacted] 2 side, no nut F-24 at[redacted] 1.	Long	Anchor to wall at all locations.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion[redacted] [redacted] 2 not tight.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate-severe column corrosion, moderate anchor bolt and baseplate corrosion, ok anchor bolts to wall.	Long	Replace support.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion, ok anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, moderate-severe anchor bolt and baseplate corrosion.	Long	Replace support.
			Harbor Tunnel		Mild-moderate column corrosion, mild-moderate anchor bolt and baseplate corrosion, moderate[redacted] sides.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, moderate F-24 anchor bolt at[redacted] 1.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild-moderate column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Mild-moderate column corrosion, moderate anchor bolt and baseplate corrosion, moderate [redacted] at [redacted] 2, anchor bolt not visible a [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, moderate both [redacted], mild JP-5.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, deformed flange, severe anchor bolt corrosion, moderate anchor bolt at JP-5, moderate anchor bolt at [redacted] top flange at JP-5 deterioration and corrosion.	Long	Replace support.
			Harbor Tunnel		New "T" and baseplate installed at severe column corrosion, mild corrosion to T, moderate to baseplate, mild corrosion to achor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-46	Harbor Tunnel		No saddles or bearing pads, baseplate and anchor bolts corroded, grout pad chipped, minor corrosion paint damage on support. API 570: No wear plate or Teflon pad between pipe and pipe support [redacted] No wear plate or Teflon pad between pipe and pipe support (JP-5). No wear plate or Teflon pad between pipe and pipe support [redacted]	Long	Install bearing pads, clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	B17 Table E2		Harbor Tunnel		Moderate corrosion at column, moderate at baseplate, anchor bolts not visible, moderate at JP-5 anchor bolts (x1), moderate a [redacted] x1). API 570: Anchor type welded saddle was cut of the pipe (likely for previous repairs/mods). The existing weld attachment is only tack welded at two location (weaker).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Engineering assessment may be required to determine if this saddle support is sufficiently anchored.
			Harbor Tunnel		Moderate-severe at column, moderate-severe at anchor bolts and baseplate, mild at anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, mild at anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, grout pad damaged, mild at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, moderate at (1) anchor bolt to wall, mild at (3) anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at anchor bolts to wall, moderate at baseplate anchor bolts and baseplate, severe corrosion at column.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, sever corrosion at column and anchor bolts to wall, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition, replace lower column and grout pad.
			Harbor Tunnel		Mild corrosion at any number of locations, may have efflorescence coating it, grout pad damage.	Long	Clean corrosion and repaint, repair grout pad, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt not tight.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt at baseplate not tight, anchor bolt a[redacted] nut.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wood shim at baseplate.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, chip at grout pad.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations,[redacted] no nut.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wood shim at baseplate.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, baseplate broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent x2.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-44	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, corrosion on JP-5 braces, corrosion at [redacted]	Long	Replace support.
	B14 Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations. API 570: Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points. Moderate corrosion on horizontal support attachment to wall (QTY 4).	Urgent	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, active dripping.	Urgent	Replace support, support on minimum 6" raised concrete pier.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken w/ wood shim.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, water flowing starts.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-29 HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)		HT-36	Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39 HT-41	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-38	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water, Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken w/ wood shim, water flowing ends. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, no grout pad. API 570: Minor to moderate corrosion on the base plate due to standing water, anchor bolts on the base of plate are not secured down to the floor.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken w/ wood shim, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water. No wear plate or Teflon pad between pipe and pipe support (JP-5).	Long	Replace support, support on minimum 6" raised concrete pier. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflourrescense coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	B16 Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Majority of the piping support in the harbor tunnel has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the NPS 16 (F-24) and NPS 18 (JP-5) lines. Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating on the pipe and support. Provide a Teflon shim at location of metal-to-metal contact points.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	B25 Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken, anchor bolt bent w/ wood shim. API 570: Pipe support with anchor bolts not embedded in the concrete.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad. API 570: Secure the anchor bolts to the base plate of the pipe support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E2		Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations, no grout pad, connection to wall not visible. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, connection of the wall not visible.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
	Table E2	HT-33	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchors not visible. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent. API 570: Anchor bolts on the base of plate are not secured down to the floor	Long	Clean corrosion and repaint, maintain in good condition. API 570: Defer to next inspection (has grouting).
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
		HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, complete deterioration through bottom front flange of both columns, extreme deterioration of anchor bolts over back flange of both columns.	Urgent	Replace support.
	Table E2	HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, severe corrosion over entire support complete less of support at bottom of both columns and both flanges, delamination (severe) at baseplate, angles to wall severely deteriorated. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad cracked.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchor not visible, flanges at angle column not attached to baseplate, severe delamination at baseplate. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Urgent	Replace support.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, same style as others, wall shield, wall anchor bolt not visible.	Other	None.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at baseplate and column flanges, appears unattached and detached when sounded.	Urgent	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E2		Harbor Tunnel	(b) (3) (A)	Extreme corrosion w/ no or very little material at any number of locations, extreme delamination at baseplate, columns not attached due to extreme deterioration, JP-5 bracket to the wall deteriorated and detached. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad chipped.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations. API 570: No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, all anchor bolts not visible.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken, loss of bearing.	Urgent	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken. API 570: No wear plate or Teflon provided after repairs (F-24) (floating pipe).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, JP-5 at wall.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: No wear plate or Teflon provided after repairs (JP-5).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-28	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Mild corrosion at any number of places, may have effloresence from wall coating it.	Other	None.
		HT-28	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, no nut on [redacted] to wall.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)		HT-30	Harbor Tunnel	(b) (3) (A)	Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: No wear plate or Teflon provided after repairs [redacted] (floating pipe).	Long	API 570: Shim and moniter at next inspection.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
	Table E2	HT-26 HT-28	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column flanges completely deteriorated at slab, baseplate is dust, JP-5 attachments to wall completed corroded - not attached at (1) side. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, corroded baseplate, no grout.	Other	None.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Clean of corrosion and maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, corroded baseplate, no grout.	Long	Clean of corrosion and maintain in good condition.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at bottom of column and significant loss of column flange section at baseplate interface.	Urgent	Replace support.
	B32 Table E2	HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column moderately corroded, JP-5 anchor to wall complete section loss. API 570: Corrosion on pipe support at the tunnel wall attachment.	Urgent	Replace Support.
		HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, moderate column corrosion, complete loss of section at JP-5 and [redacted] anchor to wall on [redacted] 1 side.	Urgent	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repair [redacted]	Long	Clean of corrosion and maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repairs [redacted] No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, impacted and deformed column flanges.	Urgent	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: No wear plate or Teflon provided after repairs (JP-5).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have effflorescence from wall coating it, no grout.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, F-24 anchor bolt to wall corroded.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-23	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformation.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: The original tack welded wear plate between pipe and support is short. The bell-bell weld is resting on directly on pipe support member.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-19	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, deformed flange column, grout pad broken.	Long	Replace support.
		SGH p242	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		SGH p242	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have effflorescence from wall coating it.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		H-11	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, no saddles, no pads.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Small wood shim between wear plate and Steel support member (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-8	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5 brace to wall corroded.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it [redacted] brace at wall corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, stacked washers anchor bolt to wall at F-24 line on [redacted] 5 side to fit anchor bolt to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, JP-5 supported on frame on [redacted] attachment to wall, ceiling support threaded rod for frame extension for additional lines (sprinkler lines), abandoned (?) ceiling and pipe supported support (unnumbered) between [redacted] and [redacted] 144, abandoned frame is level 3, threaded rod is badly deteriorated, [redacted] style begins. API 570: No wear plate or Teflon at the intermediate [redacted] next to [redacted] Intermediate [redacted] between F-76 and [redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, replace ceiling supported threaded rods, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-5	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Intermediate [redacted] between [redacted] and [redacted] is welded directly to pipe.	Long	Replace support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	B16 Table E2		Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations. API 570: Majority of the piping support in the harbor tunnel has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the [redacted] (JP-5) lines.	Long	Replace support .
	Table E2	HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Intermediate [redacted] betwee [redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Monitor at next inspection.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon at [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	Table E2	HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Intermediate [redacted] between [redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, JP-5 on stacked plates.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Pipe is not in contact with support [redacted] (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5 [redacted] brace to wall at [redacted] 3 side corroded, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5 [redacted] brace to wall corroded.	Long	Replace support.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: Anchor bolts on the base of plate are not secured down to the floor.	Long	API 570: Secure anchor bolts.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, column flange deformed, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it, extremely long anchor bolt.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, F-24 line on built up WF, JP-5 on cradle.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, F-24 line on built up WF, JP-5 on cradle.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, F-24 line on built up WF, JP-5 on cradle, both lines on saddles.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, WF supported on angles at walls, high zinc paint, bottom flange deformation at several areas.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		efflorescence at pipe penetrations on tunnel side, moderate cracking in gunnite parge coat.	Long	Clean and repair.
			RHTF		Moderate pitting and paint flaking, moderate deformation of lower flange at (1) location.	Other	None.
			RHTF		Moderate corrosion at column connection to beam, light corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Moderate corrosion at column connection to beam, light corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
	A15		RHTF		Mild corrosion in small pockets along beam and column.	Long	Provide sufficient spacing between pipe and Unistrut.
	A15		RHTF		Mild corrosion in small pockets along beam and column, more corrosion than [redacted] 96, still mild angle paint is deteriorated.	Long	Clean corrosion and repaint, maintain in good condition, Provide sufficient spacing between pipe and Unistrut.
			RHTF		Mild corrosion in small pockets along beam and column, minor bottom flange deformation between supports.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Mild corrosion in small pockets along beam and column, no flange deformation.	Other	None.
			Tank 1 Lateral		Good condition.	Other	None.
			Tank 1 Lateral		Good condition.	Other	None.
			Tank 2 Lateral		Plate deformed at diesel fuel line.	Other	None.
			Tank 2 Lateral		Good.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A11 Table E2		RHTF	[redacted] (b) (3) (A)	Moderate corrosion along beam and beam brace, grout pad/protection damaged at column. API 570: Pipe is not fully bearing on support (partial support) [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11	LAT-52	RHTF		Missing cross brace arm to [redacted] very mild spot corrosion. API 570: Long segment of the [redacted] pipe is unsupported. The pipe is also not adequately supported betwee [redacted] with only partial support on one side.	Long	Add cross brace arm. API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Very mild spot corrosion. API 570: Long segment of the [redacted] pipe is unsupported. The pipe is also not adequately supported betwee [redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Very mild spot corrosion. API 570: Long segment of the [redacted] pipe is unsupported. The pipe is also not adequately supported betwee [redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Minor corrosion in small areas. API 570: Unistrut in contact with pipe a [redacted] causing coating failure/corrosion. Pipe is not fully bearing on support (partia [redacted]	Long	API 570: Repair pipe and shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Minor corrosion in small areas. API 570: Long segment of the [redacted] is unsupported. The pipe is also not adequately supported betwee [redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Minor corrosion in small areas, deformation at lower angle brace to [redacted] API 570: Unistrut in contact with pipe at PS86 causing coating failure/corrosion. Long segment of the [redacted] pipe is unsupported. The pipe is also not adequately supported between [redacted] with only partial support on one side.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair pipe and add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Long segment of the [redacted] pipe is unsupported. One location has 57' 11" of unsupported pipe between [redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe) [redacted].	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	A11 Table E2		RHTF	(b) (3) (A)	Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe) [redacted].	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		API 570: Pipe is not bearing on support (floating pipe)[redacted]	Long	API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Cracking and chipping at grout pad. API 570: Pipe is not bearing on support (floating pipe)[redacted]	Long	Repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe)[redacted].	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2	LAT-51	RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad, missing cross brace arm to[redacted] 79. API 570: Moderate corrosion on the steel saddl[redacted] Long segment of the[redacted] pipe is unsupported. One location has 57' 11'' of unsupported pipe between[redacted]	Long	Add cross bracing, clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Replace steel saddle. Shim the pipe or pipe support as needed to support the pipe uniformly.
			Tank 3 Lateral		None.	Other	None.
	Table E2		Tank 3 Lateral		API 570: Pipe is not bearing on support (floating pipe) NPS 20. Pipe is not bearing on support (floating pipe[redacted]	Long	API 570: Adjust support (raise the plate).
			Tank 4 Lateral		None.	Other	None.
			Tank 4 Lateral		Corrosion at pipe support down to cross beam.	Long	Clean corrosion, maintain in good condition.
		LAT-28	RHTF		Moderate corrosion all over, top flange deformed at wall end, column flange deformed at free end, grout pad damaged, baseplate damaged.	Long	Replace column, anchorage, and grout pad, clean corrosion and repaint, maintain in good condition.
	A19 Table E2		RHTF		Moderate corrosion, minor grout pad cracking and chipping. API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe.	Long	Clean corrosion and repaint, maintain in good condition, API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	A19 Table E2		RHTF	(b) (3) (A)	API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe.	Long	API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	Table E2	LAT-48	RHTF		Grout pad chipped. API 570: Pipe is not bearing on support, missing saddle (floating pipe) [redacted]	Long	API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A8 Table E2	LAT-47	RHTF		API 570: Wood shim b/w saddle and pipe support member/dislodged [redacted]	Long	API 570: Shim.
	Table E2		RHTF		API 570: Pipe is not bearing on support (floating pipe) [redacted].	Long	API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
		LAT-46	RHTF		Paint chipping, moderate corrosion more severe at wall, pipe support corroded.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	LAT-46	RHTF		Paint chipping, moderate corrosion more severe at wall, pipe support corroded. API 570: There are moderate coating failure and some corrosion on the horizontal pipe support I-beam.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating.
	A19 Table E2	LAT-45 LAT-46	RHTF		Corroded at wall, low angle brace between [redacted] deformed API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe. Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition, repair angle brace at deformed area. API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	Table E2		RHTF		X bracing removed between [redacted] for new ventilation door (door 3) installation. API 570: Pipe is not bearing on support (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A19 Table E2		RHTF		Moderate corrosion, splice under pipe, mildly deformed bottom flange at wall. API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe. Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	Table E2		Tank 5 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted] API 570: No Teflon between pipe and support (Tank 5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		Tank 5 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted] API 570: Loose nut on adjustable plate/some deflection on plate [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Secure the nut on the[redacted] plate.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Tank 5 Lateral	(b) (3) (A)	Corrosion/efflorescence deformation at support plate at diese[redacted]	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 6 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted]	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 6 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted] cracked grout exposed baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		RHTF		Flange deformation at wall anchor moderate corrosion at wall. API 570: Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair pipe and add shim.
			RHTF		Column flange deformation.	Other	None.
			RHTF		Minor corrosion at wall.	Other	None.
			RHTF		Overall good.	Other	None.
			RHTF		Bulkhead anchor in good condition.	Other	None.
			RHTF		Moderate corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Column flange deformation, top angle brace to[redacted] not attached fully.	Long	Clean corrosion and repaint, maintain in good condition, attach angle brace fully.
			RHTF		Overall good.	Other	None.
	Table E2		RHTF		Moderate corrosion under middle line, column flange deformed. API 570: Contact type abrasion and corrosion at pipe support/pipe (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			RHTF		Lower angle brace deformed.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Tank 7 Lateral		Plate supporting pipe at T7A bent under weight. API 570: Small deflection on pipe support after dresser coupling (Tank 7).	Long	API 570: Adjust support (raise the plate).
			Tank 7 Lateral		Overall good.	Other	None.
			Tank 8 Lateral		Overall good.	Other	None.
			Tank 8 Lateral		Overall good.	Other	None.
			RHTF		Corrosion at baseplate, grout cracked and chipped, beam flange bent.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad.
			RHTF		Overall good.	Other	None.
			RHTF		Moderate corrosion at wall, minor deformation to bottom flange.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Column flange deformation at several locations on braced column.	Long	Clean corrosion and repaint, maintain in good condition.
		LAT-26 LAT-28	RHTF		Beam flange deformation, corrosion at beam-wall interface.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2	LAT-26	RHTF	[redacted] (b) (3) (A)	Corrosion at saddle of wall closest to pipe, corrosion at beam-wall interface. API 570: Coating failure and corrosion at saddle support (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
		LAT-26 LAT-43	RHTF		Corrosion at base of center column at repair.	Long	Clean corrosion and repaint, maintain in good condition
		LAT-26	RHTF		Baseplate grout chipped.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad.
			RHTF		Baseplate corrosion at wall baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
	A25 Table E2		Tank 9 Lateral		API 570: NPS 20 pipe is not in contact with the pipe (floating pipe).	Long	Adjust the elevation of the pipe support plate to provide sufficient load bearing contact between pipe and support plate.
			Tank 9 Lateral		None.	Other	None.
			Tank 10 Lateral		Corrosion on top beam and top of column (effloures cense).	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 10 Lateral		None.	Other	None.
	A7 A10 Table E1 Table E2	LAT-41 LAT-42	RHTF		Severe corrosion and significant loss of support at train-side column (photo), minor corrosion at center column baseplate, grout pad edges destroyed at center column baseplate (photo), severe corrosion and loss of material at beam near wall (photo) API 570: Metal to metal contact. No Teflon shims/insulation strip. Rail-ties wedged between pipe and saddle [redacted] Corrosion on base of pipe support and I-beam.	Urgent	Replace support Note: This support is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	A7 Table E1 Table E2	LAT-38 LAT-40	RHTF		Severe corrosion and significant loss of support at bottom of column,minor flange deformation at free end, corrosion at JP-5 saddle, corrosion and loss of angle at lower angle support, no saddle at [redacted] API 570: Metal to metal contact. No Teflon shims/insulation strip. Missing steel saddle (floating pipe) [redacted] Corrosion on base of pipe support and I-beam.	Urgent	Replace support Note: This support is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	A9 Table E2		RHTF		Corrosion at beam support at [redacted] minor areas of corrosion elsewhere. API 570: Long segment of the [redacted] pipe is unsupported. One location has 47' of unsupported pipe between [redacted] with the saddle support missing at [redacted] 46.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Install saddle supports at [redacted] and shim as needed to support pipe on the saddles. Secure the saddles to the pipe support.
	A9 Table E2	LAT-39	RHTF		Cracking and chipping at grout pad. API 570: Long segment of the [redacted]) pipe is unsupported. One location has 47' of unsupported pipe between [redacted] with the saddle support missing at [redacted]	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Install saddle supports at [redacted] 46 and shim as needed to support pipe on the saddles. Secure the saddles to the pipe support.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A9 A24 Table E1 Table E2	LAT-26	RHTF	[redacted] (b) (3) (A)	Minor corrosion at paint loss areas, no saddle to [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip. The [redacted] pipe is not fully supported. The pipe is partially in contact with the pipe support (JP-5). Missing steel saddle (floating pipe) [redacted].	Long	Clean corrosion and repaint, maintain in good condition, add saddle. API 570: Shim [redacted] pipe support so as to provide positive contact between pipe and saddle support. Consider Teflon shim between pipe and saddle. Shim JP-5 pipe and monitor at next inspection. Install saddle o [redacted] line.
	A24 Table E1 Table E2	LAT-26	RHTF		Minor corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip. The [redacted] pipe is not fully supported. The pipe is partially in contact with the pipe support (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim [redacted] pipe support so as to provide positive contact between pipe and saddle support. Consider Teflon shim between pipe and saddle. Shim JP-5 pipe and monitor at next inspection.
	Table E1 Table E2	LAT-26	RHTF		No saddle to [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.Missing steel saddle (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition, add saddle. API 570: Install saddle. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E1	LAT-26	RHTF		Overall good. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-26 LAT-36	RHTF		Cross bracing deformed. API 570: Metal to metal contact. No Teflon shims/insulation strip. Moderate corrosion on the steel saddle [redacted]	Long	Repair bracing. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations. Replace steel saddle.
	Table E1	LAT-26 LAT-36	RHTF		Loss of grout and corrosion at baseplate, cross bracing deformed. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Repair bracing, clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26 LAT-35	RHTF		Bottom flange corrosion at downspout. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			RHTF	An	Overall good.	Other	None.
	Table E1	LAT-28 LAT-35	RHTF		Flange deformation at (2) locations, connection at "wall" not visible. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			Tank 11 Lateral		Minor chipping at baseplate and grout.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Tank 11 Lateral	(b) (3) (A)	None.	Other	None.
			Tank 12 Lateral		Minor chipping at baseplate and grout.	Other	None.
			Tank 12 Lateral		None.	Other	None.
	Table E1	LAT-26	RHTF		Minor corrosion at paint damage, moderate flange corrosion at downspout, top flange delamination at beam, moderate baseplate corrosion at train track column w/ minor grout damage. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Flange deformation at [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Minor damage at grout pad. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Minor grout pad damage at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Grout pad damage and flange corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Corrosion at paint chipping. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Column flange deformation at train track flange, grout pad damage and minor baseplate corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Beam flange corrosion at downspout. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, repair beam at flange delamination, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E1	LAT-26	RHTF	(b) (3) (A)	Grout pad damage and loss of support. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 14 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 14 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
	Table E1	LAT-26	RHTF		Baseplate corrosion at wall column (moderate), moderate-severe column flange corrosion at train track column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-26	RHTF		Moderate flange deformation at train track column, column flange damage at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip. Pipe is not bearing on support (floating pipe) (F-76).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	Table E1	LAT-26 LAT-30	RHTF		Flange deformation at wall column, baseplate grout damage and corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
		LAT-31	RHTF		Overall good.	Other	None.
	Table E1	LAT-26 LAT-30	RHTF		Overall good. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			RHTF		Overall good.	Other	None.
	Table E1	LAT-28	RHTF		Column flange deformation at train track column, minor grout chipping at wall column baseplate. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			RHTF		Overall good.	Other	None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-26	RHTF	[redacted] (b) (3) (A)	Beam flange corrosion at downspout, baseplate corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26 LAT-27	RHTF		Corrosion (moderate) at wall baseplate, grout chips, minor flange deformation at beam, severe delamination and corrosion at wall beam. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, replace damaged beam at wall column and wall connection, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-25 LAT-26	RHTF		Corrosion (moderate) at wall baseplate, grout chips, minor flange deformation at beam, severe delamination and corrosion at wall beam. API 570: Metal to metal contact. No Teflon shims/insulation strip. Moderate corrosion on the steel saddle[redacted]	Long	Clean corrosion and repaint, replace damaged beam at wall column and wall connection, maintain in good condition. API 570: Replace steel saddle. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E2	LAT-23	RHTF		Beam flange deformation, beam corrosion at JP-5 and[redacted] lines, baseplate grout cracked and chipped. API 570: Moderate corrosion on the steel saddle[redacted]	Long	Replace severely corroded beam area, clean corrosion and repaint, maintain in good condition. API 570: Replace steel saddle.
			Tank 15 Lateral		Corrosion at[redacted] line.	Long	Clean corrosion, maintain in good condition.
			Tank 15 Lateral		None.	Other	None.
	Table E2		Tank 16 Lateral		Baseplate grout damage. API 570: Small deflection on pipe support after dresser coupling (Tank 16).	Long	API 570: Adjust support (raise the plate).
			Tank 16 Lateral		None.	Other	None.
	Table E1	LAT-19 LAT-20 LAT-23	RHTF		Flange deformation at beam, baseplate corrosion and grout damage at[redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-20 LAT-21	RHTF		Grout damage and corrosion at baseplate, minor column flange deformation, cross bracing cut. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-19 LAT-20	RHTF		Minor flange deformation, significant corrosion at column base and loss of column, flange steel. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Replace Support; alternatively, cut out area of deformation and corrosion and replace in kind

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-18	RHTF	[redacted] (b) (3) (A)	Beam flange corrosion (moderate) at pipe support area on top of beam. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-17 LAT-18	RHTF		Severe corrosion and loss of steel at wall connection. API 570: Not in contact with saddle.	Long	Replace connection to wall, clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.
	Table E1		RHTF		Could not access to perform assessment. API 570: There is no saddle support and the pipe is not resting on the I-beam.	Long	API 570: Add shims to support to gain contact.
	Table E1		RHTF		Could not access to perform assessment. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	None. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			RHTF		Overall good.	Other	None.
	Table E1		RHTF		No saddle to JP-5 line, cracked and chipped grout at wall column. API 570: There is no saddle support and the pipe is not resting on the I-beam.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shims to support to gain contact.
	Table E1	LAT-13 LAT-14	RHTF		Minor corrosion at paint damage, has saddle, wall column grout cracked and chipped. API 570: The pipe is partially in contact with the pipe support.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.
	Table E1	LAT-11 LAT-12	RHTF		Beam flange deformation, wall baseplate corroded, grout chipped and missing. API 570: Not in contact with saddle.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.
			Tank 17 Lateral		Corrosion at column bottoms, loss of steel, corrosion at unknown member, flange cutout at tackwelded member, no visible saddle at JP-5.	Long	Clean corrosion and repaint, maintain in good condition, add saddle.
			Tank 17 Lateral		Corrosion at base of column, no saddle.	Long	Clean corrosion, maintain in good condition, add saddle.
			Tank 17 Lateral		Overall good.	Other	None.
			Tank 18 Lateral		Beam moderately corroded at ends and beam top flange, no saddle for JP-5 line, crack and exposed rebar at unknown gunnite support.	Long	Clean corrosion and repaint, maintain in good condition, repair beam connection each end.
		LAT-10	Tank 18 Lateral		Corrosion at beam to wall, severe corrosion at column baseplate, flange loss and corrosion at JP-5.	Long	Clean corrosion and repaint, maintain in good condition, repair connections beam to wall.
	Table E1		RHTF		Corrosion at beam flanges, loss of flange metal, grout at walkway column chipped away. API 570: The pipe is partially in contact with the pipe support.	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Add shims to support to gain contact.
	Table E1		RHTF		Overall good. API 570: Shimmed with Teflon pads.	Other	None. API 570: None.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E1	LAT-5	RHTF	(b) (3) (A)	Grout at wall column broken and displaced, beam at wall corroded (beyond column). API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, repair connections beam to wall. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-5	RHTF		Painted flange damage at red pipe, moderate corrosion at wall column, grout cracked and missing. API 570: Missing one nut at concrete footing. Broken grouting.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Replace missing nut and re-grout.
	Table E1	LAT-5 LAT-8 LAT-55	RHTF		Saddle damaged only (1) side, grout removed from elevator column baseplate, space between wall column baseplate and grout pad. API 570: Metal to metal contact. No Teflon shims/insulation strip. Pulled anchor stud at concrete footing. Broken grouting.	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Install support with insulation or half-round Teflon strip. Re-secure anchor stud and re-grout. Note: The repair to replace deformed anchor bolt at this support is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	Table E1	LAT-5 LAT-6 LAT-7	RHTF		No Saddle. API 570: Pipe is resting on I-beam with Teflon shims/insulation strip and wood.	Long	Add saddle. API 570: Remove wood shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations. Note: The repair to replace grout and anchor bolt at this support is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
		LAT-5	RHTF		Overall good.	Other	None.
	Table E1	LAT-5	RHTF		Overall good. API 570: Pipe is resting on I-beam with no saddle or Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1		RHTF		Minor areas of corrosion at paint damage, column at Tank 19 side corroded w/ exposed baseplate. API 570: Not in contact with saddle with minor gaps.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1		RHTF		Minor areas of corrosion at paint damage, column at Tank 19 side corroded w/ exposed baseplate. API 570: Saddle is displaced from support beam with 1 5" Unistrut support placed underneath.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Remove Unistrut and reposition saddle.
			Tank 19 Lateral		No saddle, grout damage and corrosion at tunnel-side column, corrosion at unknown member-column interface.	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 19 Lateral		No saddle, top flange damage at pipe corrosion at beam to wall (beyond column) and at tunnel side top.	Long	Clean corrosion and repaint, maintain in good condition, replace beam-wall connection.

Table 17 - Frame Pipe Supports - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Tank 20 Lateral	(b) (3) (A)	No saddle.	Long	Add saddle.
			Tank 20 Lateral		Severely deteriorated.	Other	None.
		LAT-1 LAT-2	Tank 20 Lateral		Corrosion at wall-beam interface beyond column, severe corrosion and loss of flange at baseplate corrosion on beam.	Long	Replace column and beam to wall connection, clean corrosion and repaint with high zinc paint, maintain in good condition.

Table 18 - Underground Pumphouse Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			UGPH	[redacted] (b) (3) (A)	Grout pad cracked and exposing baseplate.	Long	Repair grout pad and maintain in good condition.
			UGPH		No grout layer.	Long	Repair grout pad and maintain in good condition.
			UGPH		Grout chipped, baseplate displaced (no anchorage except for grout surround).	Long	Repair grout pad and maintain in good condition.
			UGPH		Chipped concrete pier.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Grout chipped.	Long	Repair grout pad and maintain in good condition.
			UGPH		Pier minor chipping, minor corrosion at baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Grout pad chipped and missing.	Long	Repair grout pad and maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Minor corrosion at base of column.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Unpainted, no grout base, corrosion at baseplate and bottom half of X.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Covered in oil.	Other	None.
			UGPH		Grout cracked apart, baseplate displaced.	Long	Repair grout pad and maintain in good condition.
			UGPH		Painted, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Grout broken out at front.	Long	Repair grout pad and maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Painted top, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Painted top, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Minor cracking to grout base.	Long	Repair grout pad and maintain in good condition.
			UGPH		Pier doesn't span trench, covered in oil.	Other	None.
			UGPH		Loss of support under baseplate at sleeper between [redacted] shimmed w/ wood scrap.	Long	Modify support to adequately support pipe without need for shim.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Cut for flange, corrosion at saddle.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Minor pier cracking.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 18 - Underground Pumphouse Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			UGPH	[redacted] (b) (3) (A)	Overhangs the trench.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good

Table 18 - Underground Pumphouse Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			UGPH	[redacted] (b) (3) (A)	Overall good.	Other	None.
			UGPH		Minor corrosion at all bearing plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Missing (1) anchor bolt and nut.	Long	Install anchor bolt and nut.
			UGPH		Chipping at pier under baseplate.	Other	None.
			UGPH		Chipping at pier under baseplate, shared pier w/ grating column.	Other	None.
			UGPH		Chipping at pier.	Other	None.
			UGPH		Corrosion at plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Top channel bottom flange cut for pipe clearance.	Other	None.
			UGPH		Top channel bottom flange cut for pipe clearance.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Shared pier w/ [redacted], no anchor bolt.	Long	Install anchor bolt and nut.
			UGPH		Corrosion at plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Interior column flange cut for F24 flange each side.	Other	None.
			UGPH		Moderate corrosion at baseplate .	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Pier chipping at baseplate.	Other	None.
			UGPH		Baseplate corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Moderate corrosion at plate under saddle.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Separate pier under each baseplate, pier straddles trench.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		No grout pad.	Long	Repair grout pad and maintain in good condition.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 18 - Underground Pumphouse Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			UGPH	(b) (3) (A)	Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 19 - Surge Tank Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Surge Tank	[redacted] (b) (3) (A)	No teflon pads visible, concrete at junction between [redacted] API 570: No wear plate or Teflon provided after repairs [redacted]	Long	Provide teflon pad. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Could not access for condition assessment.	Other	None.
			Surge Tank		[redacted] part of concrete is broken through and chipped under saddle.	Long	Repair concrete and maintain in good condtion.
			Surge Tank		[redacted] part of concrete is chipped.	Other	None.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		[redacted] part of concrete is cracked but overall good.	Other	None.
			Surge Tank		[redacted] part of concrete is cracked but overall good.	Other	None.
			Surge Tank		Grout loss under baseplates, not all nuts are tightened, not all anchors are plumb.	Long	Replace grout pad and maintain in good condtion.
			Surge Tank		Concrete over baseplate cracked, baseplate not displaced.	Long	Repair concrete and maintain in good condtion.
			Surge Tank		Sleeper broken in half at edge of saddle baseplate and displaced, loss of support under baseplate.	Long	Repair concrete, replace grout pad, and maintain in good condtion.
			Surge Tank		Sleeper broken in half at edge of saddle baseplate and displaced, loss of support under baseplate.	Long	Repair concrete, replace grout pad, and maintain in good condtion.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Minor loss of grout under baseplate.	Long	Replace grout pad and maintain in good condtion.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Corroded baseplates but overall good.	Long	Clean corrosion and repaint, maintain in good condition.
	D2		Surge Tank		Loss of grout and support anchors exposed, anchor bolts knocked crocked.	Long	Replace grout pad and anchor bolts and maintain in good condtion.
[redacted]			Surge Tank		Overall good.	Other	None.

APPENDIX 'G' – SORTED TABLES – FINDINGS AND RECOMMENDATIONS (BY URGENCY)

Table 7 (Sorted) - F-24 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)			RHTF	T (b) (3) (A)	Tank sample piping downstream of the isolation valves are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
	A1		RHTF	(	Brass/bronze valve (low melting point) attached to the blind flange of the [redacted]. Rating of valve is unknown.	Urgent	Replace valve with a Class 150 ball valve. Long-term consideration should be given into replacing threaded pipe and fittings with welded pipe.
	A4		RHTF		The DBB valves are equipped with a drain valve in lieu of a plug. The end of the valves is not secured with a pipe plug. - Tank 2 – - Tank 3 – - Tank 4 – - Tank 6 – - Tank 15 - Tank 16 (b) (3) (A)	Urgent	Provide threaded plug on ball valve drain.
	A12		RHTF		Threaded 2[redacted] carbon steel low point drain valve is located on [redacted] pipeline. Valve classification is unknown.	Urgent	Replace valve with a Class 150 ball valve. Long term consideration should be given to replacing the threaded valve and piping with welded pipe and flanged ball valve.
	A14		RHTF		Two loose joint harness fasteners were noted on the Dresser coupling on the [redacted] pipeline.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
	A16		RHTF		3[redacted] welded and flanged branch connection on top of the [redacted] pipeline. Six of the flange fasteners are not fully engaged.	Urgent	Replace hardware to ensure fasteners are fully engaged (nuts are fully engaged with threaded bolts).
	B7		Harbor Tunnel		There are two high point vents on the [redacted] pipeline between the UGPH concrete bulkhead and [redacted] the vicinity of Valve 0151) that are constructed of threaded valves, nipples, and piping. Staining and weeping were noted around the threaded fittings. Valve classifications are unknown.	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Replace valves with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the high point vent piping and valves with welded pipe with flanged connections.
	B7 B8		Harbor Tunnel		There are two low point drains on the [redacted] pipeline between the UGPH concrete bulkhead and [redacted] that are constructed of threaded valves, nipples, and piping. Notable corrosion was observed on the LPD just before the bulkhead to the UGPH. Valve classifications are unknown.	Urgent	Replace low point drains with Class 150 carbon steel ball valves, replace corroded piping, and recoat affected areas. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.

Table 7 (Sorted) - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	B9		Harbor Tunnel	(b) (3) (A)	The 16[redacted] DBB valve was manufactured with four studs on the top and four studs on the bottom of the valve flanges where clearance to install a hexagonal bolt behind the flange is not possible. The threaded studs are not fully engaged at these locations. Engagement between 0.250 and 0.550 inches was observed with the valve flange.	Urgent	Replace fasteners that are not fully engaged per manufacturers recommendations.
	B18		Harbor Tunnel		Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. Locations include: - 1[redacted] threaded plug on top of pipe [redacted] - 1[redacted] threaded plugon t[redacted] - Two 2[redacted] high point ve[redacted] - 1.5[redacted] high point vent (- 2[redacted] high point vent [redacted] - 2[redacted] high point vent [redacted] - 1.5[redacted] high point vent (- 1.5[redacted] high point vent (- 1.5[redacted] threaded plug o - 1.5[redacted] low point drain (- 1.5[redacted] high point vent ((b) (3) (A)	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the high point vent between[redacted] 267 and[redacted] 268. Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.
	C18		UPGH		Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.

Table 7 (Sorted) - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	C37		UGPH	[redacted] (b) (3) (A)	Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings. The following locations should addressed: - PIT-301 and adjacent Temperature Sensor - Valve GI58B - Valve GI18H - Valve GI38B - Valve GI38C - Valve GI48B - Valve GI48C - Valve GI48D	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
	C41		UGPH		It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices in the UGPH.
	C46		UGPH		There is a 3/4[redacted] high point vent located on the [redacted] pipeline downstream of [redacted]. The 3/4[redacted] piping terminates just before the UGPH sump and is lacking a threaded pipe plug.	Urgent	Provide threaded pipe plug to prevent accidental discharge of product from high point vent. Consideration should be given to modify the high point vent piping, so it terminates near the high point vent.
	C47		UGPH		There is a 3/4[redacted] threaded valve mounted on the side of the [redacted] pipeline. There is no pipe cap or plug at the end of the valve. Note: It is not clear as to the purpose of this connection. Valve classification is unknown.	Urgent	Provide plug or cap to prevent accidental discharge of product. Replace valve with Class 150 ball valve. Long term consideration should be given to removing this connection if it serves no purpose.
	C48 C54		UGPH		There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves. Perform routine pressure testing/calibration of pressure relieving devices.
	C51		UGPH		Valve flange for the 12[redacted] gate valves is missing a fastener.	Urgent	Install new fastener on valve flange.
	LRUT Results CML#[redacted] B17		Harbor Tunnel		An area of inactive pitting (approximately 0.050 inches deep) with some large area scaling was identified. An additional two areas of possible corrosion of similar magnitude of pitting are suspect under the pipe wrap at this location.	Urgent	Remove the pipe wrap and inspect these areas on the pipeline.
	A5		RHTF		Coating failure and corrosion on [redacted] piping at support.	Long	Remove surface corrosion and recoat affected area. Consider replacing support with a saddle that is welded to the structural support and providing a Teflon pad between pipe and saddle.

Table 7 (Sorted) - F-24 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A6		RHTF	[redacted] (b) (3) (A)	[redacted] pipeline has a thick coating system preventing inspection of the pipe exterior. A dent was observed at the 7 o'clock position nea[redacted] which could not be analyzed due to coating system.	Long	Remove thick coating system, inspect exterior of pipe, and recoat.
	A9		RHTF		[redacted] pipeline is not adequately supported, approximately 47[redacted] between [redacted], with a saddle missing at [redacted] 46.	Long	Install saddle support a[redacted] to properly support the pipeline.
	A10		RHTF		[redacted] pipeline has a metal shim between pipe and saddle support.	Long	Remove support and shim, realign support saddle/base to properly support the pipe, and provide Teflon pad between saddle support and pipeline.
	A8	LAT-47	RHTF		[redacted] pipeline is not adequately supported. Saddle is not engaged, wood shim is used, and saddle is not secured to I-beam support.	Long	Replace pipe support at this location with a suitable saddle of sufficient height to properly support the pipe and secure support to the I-beam structure. Provide Teflon pad between saddle support and pipeline.
	A11		RHTF		[redacted] pipeline is unsupported between supports, approximately 58[redacted]	Long	Shim the pipe or pipe supports to uniformly support the pipe.
	A11		RHTF		[redacted] pipeline is unsupported between supports. Support is partial engagement on one side of the pipeline.	Long	Shim the pipe or pipe supports to uniformly support the pipe.
	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
	A15		RHTF		Metal-to-metal contact between the[redacted] pipeline and Unistrut support has caused coating failure and surface corrosion.	Long	Modify Unistrut support to eliminate metal-to-metal contact and spot repair coating system at the affected area.
	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition.	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.
	B10 Table H	HT-1 HT-9 HT-16 HT-17 HT-23 HT-24 HT-37 HT-40	Harbor Tunnel		Several areas of coating failure with minor to moderate corrosion was observed on the[redacted] pipeline. See Table H in API 570 report for exact locations.	Long	Clean, prep and recoat affected areas.

Table 7 (Sorted) - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B1		Harbor Tunnel	[redacted] (b) (3) (A)	Moderate coating failure and moderate corrosion on pipe, flanges, fasteners, and components on the [redacted] pipeline due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.
	B15 Table F	HT-4 HT-18	Harbor Tunnel		Several dents were present on the [redacted] pipeline within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
	B50		Harbor Tunnel		There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.
			UGPH		The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Long	Provide threaded plugs to prevent accidental discharge of fuel product.
	C14		UPGH		The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Long	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
	C15		UPGH		Minor bearing oil staining was noted on pump casings.	Long	Perform routine cleaning and removal of bearing oil staining from pump casings.
	C26		UGPH		Moderate weeping/staining on front bearing shaft and casing of pump.	Long	Perform routine cleaning and removal of oil staining from pump casings.
	C31		UGPH		One loose joint harness fastener was noted on the Dresser coupling on the discharge side of Pump [redacted] 209.	Long	Tighten fasteners per manufacturers or designer of record specifications.
	C32		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of Pump [redacted] 210.	Long	Tighten fasteners per manufacturers or designer of record specifications.
	C33		UGPH		Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
	C38		UGPH		Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections).	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.
	C40		UGPH		Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Long	Provide appropriate seal fittings and flexible conduit connections at transducers.

Table 7 (Sorted) - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	C42		UGPH	[redacted] (b) (3) (A)	There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Long	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
	C49		UGPH		Mechanical dent was found on the [redacted] pipeline tie-in line to/from the surge tank. Dent depth is 0.505 inches with perpendicular orientation and length of 5 inches located 58 inches from the miter weld before the surge tank-to-UGPH bulkhead penetration. This results in a dent depth of 3 2%. Assessment indicates this dent is acceptable based on latest edition of API RP 1183; Assessment and Management of Pipeline Dents. Plain dents regardless of shape with depths up to 10 % of the pipe diameter, without coincident features such as metal loss, welds, or cracks have been shown in testing to have the same failure pressure as plain line pipe (Section 1). Dent is also acceptable per API 579 section 12 Level 1 assessment (acceptable if it is ≤ 7% of the pipe diameter).	Long	Monitor at next API 570 Inspection.
	C52		UGPH	F	It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.
	C53		UGPH	G	All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Long	Remove coating and perform further weld inspection.
	C56		UGPH	Fl	The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
	D1		UGPH		Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
	D3		UGPH		The 1[redacted] ball valve associated with the sample/water drain line that ties into the 4[redacted] low suction line was observed as open and not secured. This could create a potential for a fuel spill. Valve was closed during our inspection.	Long	Consider a self-closing/spring loaded ball valve to prevent the valve from being inadvertently left open which could cause an accidental fuel spill.

Table 7 (Sorted) - F-24 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)		PM-19 PM-20 PM-21 PM-22	RHTF	(b) (3) (A)	Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	B20		Harbor Tunnel		A non-standard repair at the bulkhead betwee - was noted. The repair includes a full encirclement welded split sleeve (clamshell) on 652 side and a partial patch plate style repair or side of the bulkhead with square corners.	Other	This repair is scheduled for completion.

Table 8 (Sorted) - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	B14 Table E2		Harbor Tunnel	(b) (3) (A)	Severely corroded base plate and bottom of column, loss of steel in column, delamination of base plate, no grout pad [redacted] connected to wall severely corroded.	Urgent	Replace support.
	B14 Table E2		Harbor Tunnel		Severe corrosion and loss of support at baseplate and lower column connection.	Urgent	Replace support, support on minimum 6" raised concrete pier.
			Harbor Tunnel		Extreme corrosion with no or very little material at any number of locations, active dripping.	Urgent	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-33	Harbor Tunnel		Corrosion to loss of support, wall anchors not visible.	Urgent	Replace support.
		HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, complete deterioration through bottom front flange of both columns, extreme deterioration of anchor bolts over back flange of both columns.	Urgent	Replace support.
	Table E2	HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, severe corrosion over entire support complete less of support at bottom of both columns and both flanges, delamination (severe) at baseplate, angles to wall severely deteriorated. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchor not visible, flanges at angle column not attached to baseplate, severe delamination at baseplate. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at baseplate and column flanges, appears unattached and detached when sounded.	Urgent	Replace support.
	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme delamination at baseplate, columns not attached due to extreme deterioration, JP-5 bracket to the wall deteriorated and detached. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.

Table 8 (Sorted) - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken, loss of bearing.	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, JP-5 at wall.	Urgent	Replace support.
	Table E2	HT-26 HT-28	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column flanges completely deteriorated at slab, baseplate is dust, JP-5 attachments to wall completed corroded - not attached at (1) side. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at bottom of column and significant loss of column flange section at baseplate interface.	Urgent	Replace support.
	B32 Table E2	HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column moderately corroded, JP-5 anchor to wall complete section loss. API 570: Corrosion on pipe support at the tunnel wall attachment.	Urgent	Replace support.
		HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, moderate column corrosion, complete loss of section at JP-5 and [redacted] anchor to wall on [redacted] 1 side	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, impacted and deformed column flanges.	Urgent	Replace support.
	A7 A10 Table E1 Table E2	LAT-41 LAT-42	RHTF		Severe corrosion and loss of support at train-side column (photo), minor corrosion at center column baseplate, grout pad edges destroyed at center column baseplate (photo), severe corrosion and loss of material at beam near wall (photo) API 570: Metal to metal contact. No Teflon shims/insulation strip. Rail-ties wedged between pipe and saddle (F-24). Corrosion on base of pipe support and I-beam.	Urgent	Replace support. This repair is scheduled for completion.

Table 8 (Sorted) - F-24/JP-5 Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted]	A7 Table E1 Table E2	LAT-38 LAT-40	RHTF	[redacted]	Severe corrosion and loss of support at bottom of column, minor flange deformation at free end, corrosion at JP-5 saddle, corrosion and loss of angle at lower angle support, no saddle at [redacted] API 570: Metal to metal contact. No Teflon shims/insulation strip. Missing steel saddle (floating pipe) [redacted] Corrosion on base of pipe support and I-beam.	Urgent	Replace support. This repair is scheduled for completion.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)			RHTF	T 1 (b) (3) (A)	Tank sample piping downstream of the isolation valve are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
	A3		RHTF		HPV on Tank 16 jet fuel piping downstream of th isolation valve is missing a threaded plug. Some fuel was noted inside the valve body.	Urgent	Provide threaded plug on high point vent.
	A4		RHTF		The DBB valves are equipped with a drain valve in lieu of a plug. The end of the valves is not secured with a pipe plug. - Tank 7 – DBBs - Tank 8 – h DBB - Tank 9 – DBB - Tank 10 – DBB	Urgent	Provide threaded plug on ball valve drain.
	A17		RHTF		High point vent with threaded fittings and a brass (low melting point) valve on top of the 18 JP-5 pipeline. Valve classification is also unknown.	Urgent	Replace high point vent valve with Class 150 ball valve. Long term consideration should be given to replacing high point vent assembly with welded pipe and valve with flanged connections. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	LRUT Results CML# B26		Harbor Tunnel		One indication was observed approximately -460 inches from setup on the JP-5 pipeline.	Urgent	Remove pipe wrap and inspect the pipeline at these locations.
	B5 B6		Harbor Tunnel		There are two low point drains on the 18 JP-5 pipeline between the UGPH concrete bulkhead and that are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Moderate corrosion was observed on low point drain piping adjacent to Notable corrosion was observed on LPD pipe adjacent to isolation valve #0156. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace low point drains with Class 150 carbon steel ball valves. Recoat affected areas to prevent further corrosion. Replace corroded piping with new. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B18		Harbor Tunnel	[redacted] (b) (3) (A)	Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. - 1[redacted] high point vent[redacted]) - Two 2[redacted] high point vents[redacted] (weeping) - 2[redacted] high point vent[redacted]) - 0.5[redacted] threaded plug on top of pipe - 0.5[redacted] threaded plug on top of pipe - 1[redacted] threaded plug on top[redacted] (weeping) - 2[redacted] high point vent[redacted] - 2[redacted] high point vent[redacted] - Two 1.5[redacted] threaded plugs on top - Two 1[redacted] high point vent[redacted] - 2[redacted] high point ven[redacted]	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the two high point vents between[redacted] and the threaded plug between[redacted]. Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.
	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Urgent	Provide threaded plugs to prevent accidental discharge of fuel product.
	C14		UPGH		The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Urgent	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
	C18		UPGH		Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.
	C37		UGPH	Various	Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings.	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
	C40		UGPH	Various	Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Urgent	Provide appropriate seal fittings and flexible conduit connections at transducers.
	C41		UGPH	Various	It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	C42		UGPH	[redacted] (b) (3) (A)	There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Urgent	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
	C48 C54		UGPH		There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves.
	C55		UPGH		4[redacted] gate valve is weeping at bonnet.	Urgent	Service valve to prevent future weeps. If valve cannot be serviced, consider for replacement.
	D7		UGPH		The 1[redacted] ball valve that is mounted on the 4[redacted] low suction line at Surge Tank 2 is missing a plug.	Urgent	Install a plug to prevent accidental fuel release.
	F13		RHTF		There is a threaded nipple (high point vent) near Tanks 11 and 12 installed with a 3/4[redacted] ball valve. Note: There is staining/wetting on the lower threaded fitting. Location is between [redacted]	Urgent	Product staining was noted at threaded connections. Urgent repair should be to disassemble threaded joints, clean, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing high point vent assembly with welded pipe and valve with flanged connections. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	F21	PM-23	RHTF		The 18[redacted] dresser coupling joint harness has four lugs that are welded backwards on the upstream side of the coupling.	Urgent	Correct positioning of the lugs in accordance with manufacturer's recommendation. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	B52		Harbor Tunnel		A dent was observed at the bell joint. Due to location of anomaly's proximity to a weld this will not pass API 579 Section 12 Level 1 assessment. Measured depth of anomoly was 0.320 inches.	Urgent	Perform follow-on NDE examination of the weld at this location to validate if weld is acceptable for continued service.
	A20		RHTF		The 2[redacted] high point vent piping on the 18[redacted] JP-5 pipeline is threaded and extends down below the pipe. Pipe extends into personnel movement space below and is at risk for possible damage from impact.	Long	Replumb high point vent piping such that it does not extend into personnel movement space and is constructed of welded pipe and flanged components. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A2		RHTF	[redacted] (b) (3) (A)	Minor staining, indicative of a minor fuel weep, on the upstream body threaded plug associated with [redacted] DBB tank isolation valve.	Long	Tighten threaded plug and monitor as needed until it is repaired. Remove plug from the valve body and retape and reinstall to prevent future weeps. NOTE: Removal of plug cannot be performed without taking the tank out of service.
	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the [redacted] JP-5 pipeline.	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.
	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the [redacted] JP-5 pipeline.	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.
	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the [redacted] JP-5 pipeline.	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports. Note: This segment of piping (8ft pup) is currently being replaced as part of the FY21 Emergent Pipeline Repair Project.
	A19		RHTF		Coating failure and corrosion between pipe and pipe support on the [redacted] JP-5 pipeline.	Long	Remove pipe support, clean, and recoat affected area, and reinstall pipe support. Secure saddle support to support beam and provide Teflon pad between support and pipe to eliminate metal-to-metal contact. NOTE: This may require replacement of the affected pipe supports.
	A18	LAT-50	RHTF		Coating failure and corrosion due to mineral deposits on the [redacted] JP-5 pipeline. No significant pitting was observed.	Long	Clean and recoat affected area of the pipeline.
	B44		Harbor Tunnel		The [redacted] branch connection on the [redacted] JP-5 pipeline is unsupported and unreinforced. Branch line does not appear to be in use and blinded with a skillet and flange.	Long	Remove unused branch connection.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B40		Harbor Tunnel	[redacted] (b) (3) (A)	Pitting corrosion on [redacted] JP-5 pipeline at the 2 o'clock position. Corrosion areas is 2[redacted] by 2[redacted] with a pit depth measurement of 0.113 inches. Remaining metal thickness of 0.120 to 0.125 inches. Metal thickness of unaffected area is 0.233 to 0 238 inches. Approximate wall loss of 48.5%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B33		Harbor Tunnel		Inactive pitting on the [redacted] JP-5 pipeline at the 10 o'clock position. Corrosion area is 8[redacted] by 8[redacted] with pit depth measurements of 0.050 to 0.135 inches. Remaining metal thickness of 0.091 to 0.099 inches. Metal thickness of unaffected area is 0.226 to 0 234 inches. Approximate wall loss of 59.7%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B34		Harbor Tunnel		Inactive pitting on the [redacted] JP-5 pipeline at the 5 o'clock position. Corrosion area is 6[redacted] by 6[redacted] with pit depth measurements of 0.050 to 0.089 inches. Remaining metal thickness of 0.152 to 0.156 inches. Metal thickness of unaffected areas is 0.234 to 0.241 inches. Approximate wall loss of 38%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B31		Harbor Tunnel		Pitting corrosion was observed at the 6 o'clock position on the [redacted] JP-5 pipeline. Corrosion areas is 10[redacted] by 10[redacted] with pit depth measurements of 0.055 to 0.102 inches. Remaining metal thickness of 0.116 to 0.136 inches. Metal thickness of unaffected areas is 0 218 to 0.238 inches. Approximate wall loss of 46.8%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B26		Harbor Tunnel		Heavy pitting was observed on the piping at the 9 o'clock position on the [redacted] -5 pipeline. Corrosion area is 9[redacted] by 9[redacted] with pit depth measurements of 0.050 to 0.140 inches. Metal thickness of unaffected area is 0.239 to 0 244 inches. Approximate wall loss of 58.6%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B49		Harbor Tunnel		Heavy pitting was observed on the piping at the 2-6 o'clock positions on the [redacted] h JP-5 pipeline at the interface where the piping penetrates the concrete bulkhead. Pit depth measurements of 0.0625 to 0.105 inches. Metal thickness of the unaffected area is 0.240 to 0.243 inches. Remaining metal thickness of 0.135 to 0.138 inches. Approximate wall loss of 43 8% wall loss.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup. Note, this will require removal of the pipeline within the concrete bulkhead.
	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition.	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.

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(b) (3) (A)	B10 Table H	HT-1 HT-16 HT-17 HT-23 HT-24 HT-41 HT-48 HT-50 HT-51	Harbor Tunnel	(b) (3) (A)	Several areas of coating failure with minor to moderate corrosion was observed on the [redacted] JP-5 pipeline. See Table H in API 570 report for exact locations.	Long	Clean, prep and recoat affected areas.
	B1	HT-52	Harbor Tunnel		Moderate coating failure and moderate corrosion on pipe, flanges, fasteners, and components on the [redacted] JP-5 pipeline due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.
	B12		Harbor Tunnel		Non-standard flange construction a[redacted] branch connection on th[redacted] JP-5 pipeline. Blind flange was constructed with 12-[redacted] weldneck flange with a flat plate welded to flange for blind.	Long	Replace non-standard blind with a 12[redacted] blind flange per ASME B16.5.
	B13		Harbor Tunnel		Moderate oil staining noted on the [redacted] DBB valve gear box.	Long	Clean up gear box and ensure covers are secured to prevent future oil leaks. Verify sufficient lubricant is still present and if needed service actuator gear box.
	B27		Harbor Tunnel		Tack weld fit up tab is located on th[redacted] JP-5 pipeline at the 12 o'clock position.	Long	Remove temporary attachment on the pipeline and perform NDE.
	B29		Harbor Tunnel		Several active and inactive pitting locations and general corrosion was noted on the [redacted] JP-5 pipeline at the 12 o'clock position. Location is approximately 21-inches from [redacted] Pit depth measurement of 0.095 inches. Remaining wall thickness of 0.130" to 0.147" is estimated at this location. Metal thickness of unaffected areas is 0.225 inches. Approximate wall loss of 42.2%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	B15 Table F	HT-4 HT-18	Harbor Tunnel		Several dents were present on the [redacted] JP-5 pipeline within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
	B50		Harbor Tunnel	Various	There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.

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Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			UGPH	[redacted] (b) (3) (A)	The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance.	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
	C26		UGPH		Moderate weeping/staining on front bearing shaft and casing of pump.	Long	Perform routine cleaning and removal of oil staining from pump casings.
	C28		UGPH		Inactive corrosion and bolt diameter reduction was noted on the follower bolts associated with the suction side dresser coupling.	Long	Replace dresser coupling follower bolts. Monitor for damage until repair is complete.
	C29		UGPH		Housing on flow switch mounted on discharge side of pump is not secured and loose. Current configuration does not meet hazardous area rating.	Long	Secure housing and properly seal all conduit connections.
	C30		UGPH		1/2[redacted] piping and pressure gauge assembly was observed to be weeping on the discharge side of[redacted] 208.	Long	Disassemble piping and gauge, retape threaded connections, and reassemble to prevent future weeps.
	C33		UGPH		Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
	C38		UGPH		Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections). - PIT-284 and adjacent Temperature Sensor - Valve GI15D - Valve GI35E - Valve GI25B - Valve GI25C	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.
	C52		UGPH		The JP-5 header manifold has a 3/4[redacted] gate valve (Valve GP98J) at the end of the header. The 3/4[redacted] valve is allowing product to weep by and drip into a catchment basin. It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.
	C53		UGPH		All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Long	Remove coating and perform further weld inspection.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	C56		UGPH	(b) (3) (A)	The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
	D1		UGPH		Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
	D4 D5 D6		UGPH		Some minor staining was noted on the bottom of the flanges for th JP-5 pipeline near Surge Tank 1 and Surge Tank 2. No active weeping was noted. Liquid does not appear to be fuel as there was no presence of odor.	Long	Clean flange and monitor for future weeps. Repair as needed.
	F4		RHTF		Facility piping at the tank piping laterals tees have nonstandard rated flanged fittings and non-standard weld tie-ins. Noted at Tank 11/12, 13/14, 15/16.	Long	Replace fittings with ASME B16.5 fittings and flanges at these locations.
	F6	LAT-12 LAT-14	RHTF		A section of 18 JP-5 pipeline is not adequately supported at resulting in an unsupported pipe span of 44 between The maximum suggested pipe support spacing for pipe is 28	Long	Install saddle supports between the pipe and I-beam at Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
	F7		RHTF		A section of is not adequately supported a resulting in an unsupported pipe span of 30 betwee and concrete penetration at Door C. The maximum suggested pipe support spacing for JP-5 pipeline is 28	Long	Install saddle supports between the pipe and I-beam a Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
	F9		RHTF		There is moderate coating failure and associated corrosion on the valve and associated hardware. Corrosion on fasteners, flanges, valve body, and relief pipe nipples was noted.	Long	Replace the coating on the DBB valve and associated hardware.
	F10		RHTF		The body cavity relief nipple is in contact with the galvanized conduit. Potential for further corrosion due to dissimilar metal contact is present.	Long	Reroute conduit or DBB relief piping to eliminate metal-to-metal contact/interference.
	F11		RHTF		There is heavy corrosion on the flanges promoting crevice corrosion on the fasteners.	Long	Replace fasteners.
	F12		RHTF		There is heavy corrosion on the conduit and fittings associated with	Long	Replace corroded conduit and associated fittings on

Table 9 (Sorted) - JP-5 Findings and Recommendations							
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(b) (3) (A)	F15		RHTF	(b) (3) (A)	Facility piping girth (circumferential) welds include several non-typical bell and spigot style fillet welds. Some welds are direct bell-bell buttweld attachments. These welds appear to be part of the original construction. There has been ongoing replacement effort of these welds with several identified and replaced since the 2015 API 570 inspection. There are currently ten (10) welds with a bell and spigot/ bell-bell weld configuration in the segment inspected.	Long	Replace these joints to bring the piping into current standards. Note: Bell joints are being replaced between [redacted] and [redacted] as part of the FY21 Emergent Pipeline Repair Project.
	F16		RHTF		A weld undercut was identified on the [redacted] JP-5 pipeline (located approximately 100 inches pas[redacted] at the 4 o'clock position. The measured depth was 1/32[redacted] This is acceptable for normal and Category M fluid service.	Long	Recoat affected area where the coating was removed for weld measurement.
	F20		RHTF		There is an [redacted] dresser coupling joint and associated joint harness at[redacted] just past the concrete penetration. Visual inspection did not reveal any deficiencies at this location. A slight tilt was noted and documented. Approximately a 0 9-degree tilt over a 36" span was recorded.	Long	Monitor at next API 570 inspection. Note: This is programmed for removal as part of the FY21 Emergent Pipeline Repair Project.
	F22	PM-25	RHTF		There was corrosion identified under insulation at the Tank 10 dresser coupling. Location is at the 8 o'clock to 10 o'clock position.	Long	Clean, prep, and recoat affected areas. Reinstall insulation after coating work is complete. Add[redacted] inspection to the next API 570 inspection for all dresser couplings.
	F23		RHTF		Internal portions of the piping at Tanks 18 and 20 were visual inspected to get a condition assessment. The piping is in satisfactory condition with minor pitting. Minor pitting was noted at the bottom of the pipe (likely due to standing water). Pitting depth of 0.030" to 0.050" was noted.	Long	Exercise the tank valves periodically to move product and prevent standing water at low points of the piping system.
	F24		RHTF		Minor pipe pitting was identified on Tank 18 laterally below a bubbled coating. Piping is 16[redacted] schedule 40. Pitting depth of 0.030" to 0.070" was noted.	Long	Clean, prep, and recoat affected area.
	F26	PM-10	RHTF		There is no hold down u-bolts or slide-guide to prevent lateral pipe movement at the end of the header pipe run (at[redacted]	Long	Add guided slide support with hold down lugs at[redacted] Note: This repair is currently programmed as a predictive repair as part of the FY21 Emergent Pipeline Repair Project.
	F27		RHTF		There is coating damage at the pipe repair sleeve located approximately 2.5[redacted] from[redacted]	Long	Clean, prep, and recoat affected areas.

Table 9 (Sorted) - JP-5 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)		PM-19 PM-20 PM-21 PM-22	RHTF	(b) (3) (A)	Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	B47		Harbor Tunnel		Out-of-round (flat spot) noted on the [redacted] JP-5 pipeline at the bell-weld between the 12 o'clock and 3 o'clock position.	Other	No action needed to perform defuel operations. Evaluate at the next API 570 inspection.
	C15		UPGH		Minor bearing oil staining was noted on pump casings.	Other	Perform routine cleaning and removal of bearing oil staining from pump casings.
	F1		RHTF		Dresser coupling joints and associated joint harness at Tanks 18, 19, and 20 are damaged due to the May 6th event.	Other	The lateral piping associated with Tanks 18, 19, and 20 are currently under repair as part of the FY21 Emergent Pipeline Repair Project.
	F5		RHTF		Heavy corrosion with pitting was located at the rolled 45-degree elbows. Corrosion is due to active drips from the tunnel ceiling mineral deposits. Nominal thickness was likely 0 375". The general metal thickness at this area is now 0.300" with a pit depth of 0.100" resulting in a remaining thickness of 0.200".	Other	This segment of piping is currently under repair as part of the FY21 Emergent Pipeline Repair Project. No further action is recommended.
	F14 Table F		RHTF		A dent has been identified with a depth of 0.950[redacted] and needs to be repaired prior to returning the JP5 pipeline above valve MOV-0163 back to service. An additional 10 dents were located from [redacted] to Tank 20. Refer to Table F in the API 570 report in Apendix C for exact dent locations of the other 10 dents.	Other	This segment of piping has been repaired by pup replacment as part of the FY21 Emergent Pipeline Repair Project. Recommendation for the other ten dents is to monitor at the next API 570 inspection.

Table 10 (Sorted) - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A22		RHTF	[redacted] (b) (3) (A)	Dresser coupling on the [redacted] lateral piping to Tank 14 is missing the deflection ring. A small gap was noted between the washer and harness lug.	Urgent	Install appropriate deflection rings and tighten fasteners per manufacturers or designer of record specifications.
			RHTF		Tank sample piping downstream of the isolation valve are open to the atmosphere. If the isolation valves were to be bumped or inadvertently forced open, this could lead to an accidental fuel spill.	Urgent	Provide threaded caps on tank sample piping downstream of isolation valves. NOTE: This deficiency has been corrected for the tanks that have been previously cleaned, inspected, and repaired.
	A21		RHTF		The high point vent on the [redacted] pipeline is constructed with a non-standard threaded bronze/brass (low melting point) valve. Valve is located between riser tee to lateral piping and blind flange at the end of the pipe run. Valve classification is unknown.	Urgent	Replace high point vent valve with a Class 150 flanged carbon steel ball valve and welded pipe.
	A33	PM-23 PM-24	RHTF		Dresser coupling on the [redacted] pipeline was observed with backwards lugs. There are no deflection rings or adapters on the harness lugs.	Urgent	Correct positioning of the lugs and provide deflection rings and adapters on the harness lugs. Tighten hardware on rods per manufacturer or designer of record specifications.
	A26		RHTF		Several fasteners on flanges between lateral tee and 32[redacted] F-76 pipeline have moderate corrosion.	Urgent	Replace corroded fasteners and remove corrosion from spectacle blind. Recoat affected area.
	A27		RHTF		Two fasteners are not fully engaged on the blind flange associated with the branch piping on [redacted] pipeline.	Urgent	Tighten fasteners or replace fasteners with longer bolts to ensure nuts are fully engaged.
	A32		RHTF		Dresser coupling on the 32[redacted] F-76 pipeline was observed with rod restraint that did not appear to be fully engaged/tightened. There are no deflection rings or adapters on the harness lugs. The lugs are installed backwards. Dresser coupling is located on main pipeline within the RHTF.	Urgent	Correct positioning of the lugs and provide deflection rings and adapters on the harness lugs. Tighten hardware on rods per manufacturer or designer of record specifications.
	B2		Harbor Tunnel		The two high point vents on the [redacted] pipeline adjacent to valve 0151 and the UGPH bulkhead are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace high point vent valves with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the high point vent piping and valves with welded pipe with flanged connections.
	B3 B4 B5		Harbor Tunnel		There are three low point drains on the [redacted] pipeline between the UGPH concrete bulkhead and [redacted] 690 that are constructed of threaded valves, nipples, and piping. There is evidence of fuel staining and weeping noted around the threaded fittings. Valve classification is unknown.	Urgent	Remove, retape, and reassemble threaded connections. Replace low point drains with Class 150 carbon steel ball valves. Long term consideration should be given to replacing the low point drain piping and valves with welded pipe with flanged connections.
	B19		Harbor Tunnel		DBB isolation valve on the [redacted] pipeline is missing a nut and bolt on the top plate.	Urgent	Install new nut and bolt on the top plate of the valve.

Table 10 (Sorted) - F-76 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B23		Harbor Tunnel	[redacted] (b) (3) (A)	2[redacted] threaded HPV is located on the [redacted] F-76 pipeline. The ball valve does not have a lock and the reducing bushing is not fully engaged in the threaded connection. Valve classification is unknown.	Urgent	Lock 2[redacted] ball valve out. Remove the reducing bushing and install a 2-[redacted] pipe plug. Replace valve with a Class 150 carbon steel ball valve. Long term consideration should be given to replacing the threaded piping and valve with welded pipe and flanged connections.
	B43		Harbor Tunnel		Longitudinal weld on the [redacted] F-76 pipeline has a 5[redacted] long area of weld porosity.	Urgent	Conduct additional NDE to evaluate the extent of the porosity in this weld.
	B42		Harbor Tunnel		One bolt is missing a nut on the flanged 6[redacted] branch fitting mounted on the [redacted] F-76 pipeline.	Urgent	Replace fastener that has a missing nut.
	B45		Harbor Tunnel		The flanged 6[redacted] branch connection on the [redacted] F-76 pipeline lacks proper thread engagement on a fastener and is missing a nut on another bolt. The blind flange installed does not appear to be ASME B16.5 rated.	Urgent	Install new fasteners to ensure proper thread engagement, install new nut, and install new ASME B16.5 blind.
	B18		Harbor Tunnel		Several HPVs and LPDs throughout the harbor tunnel. These are composed of threaded valves, piping, and components. Minor staining was noted on some of these fittings. Also, the valve classifications in several locations are unknown. - 1[redacted] threaded plug on top [redacted] - 1[redacted] threaded plug on bottom [redacted] - 2[redacted] high point vent [redacted]) - 2[redacted] high point vent [redacted] - 2[redacted] high point vent [redacted] - 2[redacted] high point vent [redacted]) (weeping)	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps at the 2[redacted] high point vent located between [redacted] Replace all associated valves with Class 150 ball valves. Long term consideration should be given to replacing threaded connections with welded and flanged connections.
	C1 C2 C7		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 201. Four loose joint harness fasteners were noted on the Dresser coupling on the suction side of pump [redacted] 201. Some minor coating cracks were noted on the discharge dresser coupling around the middle ring-to-follower joint area indicating potential movement.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
	C9		UGPH		The ball valve on the strainer drains associated with the pump discharge control valves are not plugged.	Urgent	Provide threaded plugs to prevent accidental discharge of fuel product.
	C10		UPGH		A small fuel weep was observed on the suction side pressure gauge assembly at the threaded connection associated with Pump [redacted] 201.	Urgent	Remove gauge, retape threaded connection, and reassemble to prevent future weeps.
	C13		UGPH		1/2[redacted] ball valve (Valve GP26H) is missing a plug.	Urgent	Provide threaded plug to prevent accidental discharge of fuel product.

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[redacted] (b) (3) (A)	C14		UPGH	[redacted] (b) (3) (A)	The small isolation ball valves on the pump discharge control valve tubing are missing operating handles. This will prevent isolation in the event of an emergency such as a tubing break or damage to isolate the fuel leak.	Urgent	Provide operating handles on ball valves and consider a car-seal to lock valves in desired position.
	C17		UGPH		Heavy discoloration and staining observed on the pump discharge control valve. Similar discoloration was noted on [redacted] 203, [redacted] 204, [redacted] 205.	Urgent	Clean, disassemble, and replace valve cover gasketing to prevent future weeps and drips.
	C18		UPGH		Conduit plug is being used to plug tee fitting on pressure gauge assemblies.	Urgent	Install appropriate threaded pipe plugs on tee fittings.
	C19		UPGH		A small fuel weep was observed on the suction side pressure gauge assembly at the threaded connection associated with Pump [redacted] 203.	Urgent	Remove gauge, retape threaded connection and reassemble to prevent future weeps.
	C20		UGPH		One loose joint harness fastener was noted on the Dresser coupling on the discharge side of pump [redacted] 203.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
	C21		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 204.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
	C22		UGPH		The fasteners on the pump discharge control valve are not fully engaged.	Urgent	Tighten fasteners or replace fasteners with longer bolts to ensure nuts are fully engaged.
	C23		UGPH		Two loose joint harness fasteners were noted on the Dresser coupling on the discharge side of pump [redacted] 205.	Urgent	Tighten fasteners per manufacturers or designer of record specifications.
	C24		UGPH		The isolation ball valve on the pump discharge control valve tubing was in the closed position at the time of inspection. The control valve function may be limited when the piloting is isolated and not subject to system pressures.	Urgent	Verify correct position of isolation valve on the control tubing and consider providing a lock or car-seal to prevent accidental misalignment of the valve position.
	C25 C27		UGPH		The suction side Dresser coupling is missing a nut on the restraining rod. Also, there was one loose joint harness fastener present.	Urgent	Provide nut and tighten fasteners per manufacturers or design of record specifications.
	C34		UGPH		There are several open conduits, junction boxes, and unsealed electrical fittings throughout the UGPH that will not meet hazardous area ratings.	Urgent	Seal all electrical fittings per NFPA requirements to meet hazardous area classifications.
	C36		UGPH		There are several bronze/brass valves installed on the small ancillary piping systems within the UGPH. A few examples are Gate Valve GI58I, GI58G, and GI58H. Valve classification is unknown.	Urgent	Replace low melting point valves with Class 150 carbon steel ball valves.

Table 10 (Sorted) - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	C37		UGPH	[redacted] (b) (3) (A)	Fuel staining and weeping was noted on the pipe tie-ins associated with the temperature sensors, pressure sensors, high point vents, and low point drains. Weeping is present at threaded connections associated with these fittings. - PIT-0285 and adjacent Temperature Sensor - Valve GI36C - Valve GI26G - Valve GI16E	Urgent	Disassemble threaded connections, retape, and reassemble to prevent future weeps. Long term consideration should be given to replacing threaded connections with welded connections where possible.
	C39		UGPH		Lack of thread engagement was observed on 12 fasteners on the bypass loop flanges associated with the [redacted] pipeline.	Urgent	Install proper flange bolts and hardware to insure proper thread engagement at all flanged connections.
	C40		UGPH		Several transducers are attached to the piping and the conduits do not have seal off fittings. Additionally, the conduits are ridged which could break under pipe movement.	Urgent	Provide appropriate seal fittings and flexible conduit connections at transducers.
	C41		UGPH		It was noted that several of the pressure transducers are past due for calibration. (Calibration due date of 10/23/18)	Urgent	Perform calibration of all temperature and pressure devices.
	C42		UGPH		There is staining and some minor drips noted on the Cameron ball valves throughout the UGPH. Drips appear to be coming from the stem injection port.	Urgent	Clean valve body, service stem nut/upper stem seal to prevent future weeps/drips.
	C44		UGPH		Gate valve GR68B is missing wheel nut on valve stem.	Urgent	Install new wheel nut.
	C45		UGPH		The 18[redacted] DBB valve on the [redacted] has six fasteners/studs that are not fully engaged.	Urgent	Remove existing hardware and reinstall studs to ensure proper thread engagement with valve body flange.
	C48 C54		UGPH		There was noticeable fuel drips and weeps coming from pressure relieving devices on the valve above the grating. (Cla Val relief devices)	Urgent	Service pressure relieving devices to prevent future weeps. If valves are not serviceable, consideration should be given to replacement of these valves.
	C53		UGPH		All the gate valves on the suction and discharge side of the pumps are equipped with motorized valve actuators. It was observed that the motorized valve actuators are mounted on a stich welded adapter plate. Several of the stitch welds have hairline cracks present and could cause the adapter plate to shear off during actuator operation.	Urgent	Remove coating and perform further weld inspection.
	D8		UGPH		Lack of thread engagement on nuts and bolts associated with the 4[redacted] low suction pipe flange for Surge Tank 3 at the pipe branch tie-in connection.	Urgent	Tighten fasteners or install new flange bolting hardware to ensure proper thread engagement is achieved at the flanged joint.
	D9 D15		UGPH		The 1[redacted] ball valves that are mounted on the 4[redacted] low suction line at Surge Tanks 3 and 4 are missing plugs. A brass/bronze valve was noted at Surge Tank 3 location. Valve classification is unknown.	Urgent	Install a plug to prevent accidental fuel release. Replace bronze/brass valve with Class 150 carbon steel ball valve.
	D14		UGPH		Some minor staining was noted on the bottom of the 4[redacted] low suction DBB valve flange at Surge Tank 4.	Urgent	Clean flanges and monitor for future weeps.

Table 10 (Sorted) - F-76 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	LRUT Results CML# B8		Harbor Tunnel	(b) (3) (A)	LRUT Results - An indication (corrosion spot) was observed approximately 7 inches past the concrete bulkhead, towards the tank gallery, underneath the pipe wrap.	Urgent	Remove pipe wrap and inspect the pipeline at this location.
	LRUT Results CML# B21		Harbor Tunnel		LRUT Results - One confirmed indication was detected at approximately -402 to -411 inches from setup on the pipeline. There was also an indication identified at the pipeline to concrete saddle support, PSC-195 on the pipeline that will require additional investigation.	Urgent	Perform further investigation of the indications at both locations. Note: This will require the pipe to be lifted off the concrete support or the pipe support removed and replaced to allow further inspection.
	LRUT Results CML# B26		Harbor Tunnel		Two indications noted approximately -976 inches and -963 inches from setup on the pipeline.	Urgent	Remove pipe wrap and inspect the pipeline at these locations.
		PM-19 PM-20 PM-21 PM-22	RHTF		Dresser Couplings are installed in tank piping laterals.	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	A13		RHTF		Non-standard flanges and non-standard weld tie-ins at the cross-tunnel pipeline tees.	Long	Consider upgrading to ASME B16.5 rated flanges and fittings with buttwelded arrangements at cross-tunnel pipeline connections.
	A23		RHTF		Area of inactive corrosion observed on pipeline between supports, approximately 108 inches from 40. Pit depth = 0.196"-0.200" and UTT of 0.430" on unaffected areas resulting in remaining thickness of 0 219" to 0.250". Approximate wall loss of 46.5%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
	A24		RHTF		pipeline is not fully supported at pipe support.	Long	Modify pipe support to adequately support pipe. Install Teflon pad between saddle support and pipeline to eliminate metal-to-metal contact.
	A24		RHTF		pipeline is not fully supported at pipe support.	Long	Modify pipe support to adequately support pipe. Install Teflon pad between saddle support and pipeline to eliminate metal-to-metal contact.
	A25		RHTF		Second pipe support from Tank 9 is not supporting the lateral tank piping. Approximately 39 of unsupported pipe from the lateral tee to the tank.	Long	Modify pipe support to adequately support pipe.
	A29		RHTF		Branch connection on 32 F-76 pipeline has a 1 threaded fitting and valve. Fuel staining was evident on pipeline but no active weeping noted.	Long	Clean the staining from the flange joint, branch pipe, and header pipe. Monitor the location for future weeps. Replace threaded fittings and valves with welded pipe and Class 150 flanged ball valve.
	A28		RHTF		Coating failure and corrosion due to mineral deposits on pipeline. No significant pitting or thickness loss noted.	Long	Clean and recoat affected area of the pipeline.
	A30		RHTF		Staining noted on pipeline lateral tie-in between tanks. No active weeping was noted. Oily substance does not appear to be F-76 fuel.	Long	Thoroughly clean tie-in connections and flanges to remove oily substance. Monitor location for potential weeps and drips.

Table 10 (Sorted) - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	A31		RHTF	(b) (3) (A)	Wood support extending from pipeline to tunnel ceiling. Use and function of the support is unknown and not associated with pipeline support or restraint. The wood beams do not appear to be bearing any load on the pipe based on gaps between wood and top of steel saddle as well as gaps at bolting hardware.	Long	Further investigation of the use and purpose of the wood support. Perform alternative design to remove support from pipeline and for the intended function.
	B48 Table H		Harbor Tunnel		The pipeline is covered by a protective wrap throughout the Harbor Tunnel. Protective wrap is failing in numerous locations and prohibits external inspection of the piping condition.	Long	Remove protective pipe wrap and perform visual inspection of these sections of pipe for external corrosion.
	B10 Table H	HT-1 HT-7 HT-16 HT-17 HT-34 HT-35 HT-42 HT-43 HT-45 HT-47 HT-48 HT-49	Harbor Tunnel		Several areas of coating failure with minor to moderate corrosion was observed on the pipeline. See Table H in API 570 report for exact locations.	Long	Clean, prep, and recoat affected areas.
	B1		Harbor Tunnel		Moderate coating failure and with moderate corrosion on pipe, flanges, fasteners, and components on the pipeline due to mineral deposits and water infiltrating through tunnel ceiling.	Long	Seal the tunnel or provide ceiling trays to prevent further deposits on the pipeline. Clean, prep, and recoat affected area.
	B11		Harbor Tunnel		Four arc strikes/weld lines between the 7 o'clock and 10 o'clock positions were identified on the pipeline. Each arc strike is approximately 3 inches long and are located adjacent to the pipeline miter circumferential weld. Gouge depths range from 0.03125 to 0.09375 inches.	Long	Remove coating and conduct close visual inspection along with liquid penetrant testing or magnetic particle testing of the arc strikes and weld lines.
	B51		Harbor Tunnel		There appears to be a pipe alignment tab weld that was not ground flush.	Long	Grind weld attachment flush and conduct further NDE.
	B30		Harbor Tunnel		Inactive pitting and general corrosion were observed on the pipeline was observed between 314 and 315 at the 10 o'clock position. Corrosion area is approximately 24 inches by 16 inches with the deepest pit corrosion area covering 9 inches by 9 inches with pit depths range from 0.080 to 0.140 inches. Remaining wall thickness of 0.218 to 0.221 inches is estimated at this location. Metal thickness of unaffected area is 0 358 to 0.361 inches. Approximate wall loss of 39.1%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.

Table 10 (Sorted) - F-76 Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	B28		Harbor Tunnel	(b) (3) (A)	Concrete saddle support (number 337) has several 1/8 rods between the pipe and concrete saddle.	Long	Remove 1/8 rods between pipe and concrete saddle, inspect interface, and provide Teflon pad between pipe and support.
	B21		Harbor Tunnel		"Clock Spring" repair sleeve on the pipeline.	Long	Review previous documentation to determine reason for repairs. Consideration should be given into removing the clock spring repairs and replacing the section of piping with new. Note: Replacement of the clock springs was previously mentioned as a long-term repair in EEI's 2016 "Inspection and Repair of Redhill Pipelines Report" but does not appear to be performed as part of the 2019 fuel system repairs.
	B21		Harbor Tunnel		"Clock Spring" repair sleeve on the pipeline.	Long	Review previous documentation to determine reason for repairs. Consideration should be given into removing the clock spring repairs and replacing the section of piping with new. Note: Replacement of the clock springs was previously mentioned as a long-term repair in EEI's 2016 "Inspection and Repair of Redhill Pipelines Report" but does not appear to be performed as part of the 2019 fuel system repairs.
	B38		Harbor Tunnel		Concrete pipe support, PSC-501, is not engaged with pipe and the pipe is floating. Loose concrete aggregate was noted between support and pipe.	Long	Remove the loose concrete aggregate between the pipe and the support and shim with Teflon pad.
	B22		Harbor Tunnel		The concrete saddle type support is cracked.	Long	Repair concrete saddle support.
	B24		Harbor Tunnel		Coating failure and corrosion on the welded 8 branch on the pipeline	Long	Clean, prep, and recoat affected area.
	B37		Harbor Tunnel		Wood shim installed between pipeline and concrete saddle support number 193.	Long	Remove wood shim and provide steel plate shim and Teflon pad.
	B35		Harbor Tunnel		Inactive pitting on the pipeline at the 6 o'clock position. Corrosion area is 3 by 2 with a pit depth measurement of 0.114 inches. Remaining metal thickness of 0.269 to 0.273 inches. Metal thickness of unaffected areas is 0.383 to 0.387 inches. Approximate wall loss of 29.8%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
	B36		Harbor Tunnel		Inactive pitting on the pipeline at the 6 o'clock position. Corrosion area is 15 by 24 with pit depth measurements of 0.050 to 0.114 inches. Remaining metal thickness of 0.186 to 0.193 inches. Metal thickness of unaffected areas is 0.386 to 0.393 inches. Approximate wall loss of 29.5%	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.
	B41		Harbor Tunnel		Pitting on the pipeline at the 11 o'clock position. Corrosion area is 18 by 24 with pit depth measurements of 0.050 to 0.120 inches. Remaining metal thickness of 0.178 to 0.201 inches. Metal thickness of unaffected areas is 0.298 to 0.321 inches. Approximate wall loss of 40.3%.	Long	FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4 pup.

Table 10 (Sorted) - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B15 Table F	HT-4 HT-18 HT-21 HT-24	Harbor Tunnel	(b) (3) (A)	Several dents were present on the [redacted] pipeline within the harbor tunnel. See Table F in API 570 report for exact locations.	Long	The assessment indicates dents are within acceptable limits per API 579 Section 12 Level 1 assessment. Monitor dent locations at next API 570 inspection.
	B50		Harbor Tunnel		There are several plates that are tack welded to the pipeline. These plates do not appear to serve a purpose.	Long	Remove tack welded plates/attachments, grind down, and perform additional NDE at these areas.
			UGPH		The gate valves within the piping systems inside the underground pumphouse are weeping and require continuous maintenance.	Long	Remove the gate valves and install ball valves. It is recommended to program this valve replacement after defueling of RHTF is complete.
	C3		UGPH		Pump shaft guard post not secured to concrete pad.	Long	Secure shaft guard post.
	C4		UGPH		Several open conduits and sensor enclosures were noted on [redacted] 201 as this pump appears to be undergoing maintenance and/or repair.	Long	Secure all conduits and sensor enclosures prior to returning pump to service.
	C5		UGPH		Several loose fasteners noted on the upper half casing of [redacted] 201 as this pump appears to be undergoing maintenance and/or repair.	Long	Secure all fasteners to the casing prior to returning the pump back to service.
	C12		UGPH		Coating failure on pump casing associated with Pump [redacted] 202	Long	Clean, prep, and recoat affected areas.
	C15		UPGH		Minor bearing oil staining was noted on pump casings.	Long	Perform routine cleaning and removal of bearing oil staining from pump casings.
	C16		UGPH		The control valve tubing on the pump discharge control valve is in contact with the grating/I-beam.	Long	Modify control valve tubing or grating to prevent metal-to-metal contact.
	C33		UGPH		Dresser coupling lugs on pump suction side are installed backwards.	Long	Repair dresser coupling lugs to be installed correctly.
	C35		UGPH		There are several locations throughout the UGPH where abandoned/open conduit penetrates the UGPH floor, potentially negating the secondary containment.	Long	Cap, seal, or remove all abandoned conduits within the UGPH.
	C38		UGPH		Several threaded fittings were noted throughout the UGPH piping below the grating on the main header piping. Some of the branch connections welds are not per industry standard (did not use Weldolet or other approved branch connections).	Long	Replace threaded fitting and pipe with welded connection and replace branch connections with industry approved connections.
	C43		UGPH		Localized coating failure and corrosion observed on [redacted] pipeline at Valve 232E4. Small pitting was observed with pit depths ranging from 0.05 to 0.07 inches.	Long	Clean, prep, and recoat affected areas.
	C50		UGPH		The flange connection on the [redacted] pipeline at the bulkhead penetration does not appear to be an ASME rated flange.	Long	Replace flanged connection with ASME B16 5 rated flange.
	C52		UGPH		It was also noted that there are no pressure relief devices installed on the header piping.	Long	Provide pressure relief devices to prevent an over pressurization of the header piping.

Table 10 (Sorted) - F-76 Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	C56		UGPH	[redacted] (b) (3) (A)	The pressure relief system has an Emerson Figure 533 flow control valve with hydramotor actuator. The hydramotor actuator still has the factory plastic caps installed in the unused conduit inlet ports.	Long	Remove plastic caps and provide threaded steel conduit plugs.
	D1		UGPH		Several locations where the Teflon pad is missing between pipe and pipe support, creating metal-to-metal contact.	Long	Provide Teflon isolation pads to eliminate metal-to-metal contact between support and pipe.
	D10		UGPH		Some minor staining was noted on the bottom of the [redacted] Dresser coupling on Surge Tank 4. No active weeping was observed. Liquid does not appear to be fuel.	Long	Clean flange and monitor for future weeps.
	D11		UGPH		The thermal relief flange at Surge Tank 4 appears to be equipped with a 1/16[redacted] gaskets instead of 1/8[redacted] gaskets.	Long	Disassemble the connection and provide dimensionally correct gaskets.
	D12 D13		UGPH		Some minor staining was noted on the bottom of the flanges for the 32[redacted] F-76 pipeline just before support F76-8 and F76-9. No active weeping was observed. Liquid does not appear to be fuel.	Long	Clean flanges and monitor for future weeps.
	C8		UGPH		Hairline crack was noted in pump pad associated with Pump[redacted] 201. Hairline crack does not appear to be of significant concern.	Other	Monitor hairline cracks in pump pad/foundations.
	C6		UGPH		Skillet is installed on the discharge pump nozzle on[redacted] 201 and[redacted] 205. The assembled joints have only one gasket installed.	Other	Consider installing another gasket to protect flange faces from contact surface damage.
	C11		UGPH		Hairline crack was noted in pump pad associated with Pump[redacted] 202. Hairline crack does not appear to be of significant concern.	Other	Monitor hairline cracks in pump pad/foundations.

Table 11 (Sorted) - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Concrete has been chipped out and removed on tank side around flange for the JP-5 lines; concrete around line has broken out (but not fallen) on opposite side.	Urgent	Remove and replace concrete at anchor bulkhead.
			Harbor Tunnel		Concrete a has been broken out on tanks side, no flange visible.	Urgent	Remove and replace concrete at anchor bulkhead.

Table 12 (Sorted) - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	E27		RHTF	[redacted] (b) (3) (A)	The tank sampling system at Tank 13 has three 1[redacted] flanged joints with cracked gaskets.	Urgent	Remove damaged gaskets and install new gaskets ensure proper torque sequence and specifications are met.
	E7		RHTF		1[redacted] ball valve located on the blind flange on Tank 18's FOR pipeline is not plugged off. This valve is susceptible to being accidentally opened if something were to impact the ball valve handle causing it to open.	Urgent	Provide plug or cap on ball valve to prevent accidental fuel release.
	E11		RHTF		The pressure gauge on the FOR line on the discharge side of the sump pump is out of calibration and the glass gauge is cracked.	Urgent	Replace damaged pressure gauge.
	E12		RHTF		The 2[redacted] FOR pipeline between the tee and gate valve at Door C is covered with a stained plastic wrap and c-clamps. This is indicating a weep at the threaded joint.	Urgent	Remove wrap and repair piping connections to prevent future weeps and drips.
	E21		RHTF		Tank isolation valve on the 6[redacted] FOR pipeline has one fastener that is not fully engaged.	Urgent	Replace bolt on flange with a longer bolt to ensure nut has adequate thread engagement.
	E23		RHTF		The FOR-gate valve flange has three fasteners that are not fully engaged.	Urgent	Replace bolts on flange with a longer bolt to ensure nuts have adequate thread engagement.
	E25		RHTF		The 6[redacted] DBB tank isolation valve on the [redacted] pipeline has product staining on the valve body. This is indicative of a prolonged slow weep possibly from valve plugs in the body.	Urgent	Clean valve body and monitor for drips and weeps. Service the DBB valve as required.
			RHTF		The FOR connection from the product lines is constructed out of a combination of hard pipe and hoses.	Urgent	Replace connections and hoses with hard pipe.
	E32		RHTF		The tank sampling piping associated with Tanks is showing signs of minor to moderate corrosion at areas where the piping has not been upgraded. Tank 9 sample piping is severely corroded and requires replacement.	Urgent	Repair by replacement the small-bore tank sample piping up to the sampling stations associated with Tank 9. Long term - Clean, prep, and recoat other sampling lines associated with the storage tanks.
	E38		RHTF		The tank sampling line associated with the 135 ft sample piping has product staining on valve and joints. Does not appear to be an active weep. Weep appears to be the result of residual fuel taken during sampling operations.	Urgent	Clean valve body and monitor for drips and weeps.
	E48		RHTF		Unsecured flange and pipe nozzle at 6[redacted] ball valve. The flange is missing several fasteners and the pipe is not capped.	Urgent	Provide fasteners to secure flange connection to 6[redacted] ball valve and provide cap to secure pipe end.
	E43		RHTF		A loose fastener was observed on a 4[redacted] pipe flange within the pipe trench adjacent to S-23.	Urgent	Tighten fastener on pipe flange.
	E47		RHTF		The 6[redacted] DBB on the sump pump discharge piping within Sump S-23 is missing a body cavity relief handle and does not have a plug.	Urgent	Provide handle and threaded plug on cavity relief valve.
	E54		[redacted] 3		2[redacted] Low Point Drain – No cap on cam-lock fitting. Two fasteners are not fully engaged on the 2[redacted] low point drain flange.	Urgent	Provide cam-lock cap on fitting and provide longer bolts to ensure nuts are fully engaged.

Table 12 (Sorted) - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	E55		[redacted] 3	[redacted] (b) (3) (A)	2[redacted] Low Point Drain – No cap on cam-lock fitting. Two fasteners are not fully engaged on the 2[redacted] low point drain flange.	Urgent	Provide cam-lock cap on fitting and provide longer bolts to ensure nuts are fully engaged.
			[redacted] 3		Condition of underground segment of the FOR pipeline is unknown. Per the 2021 CP Report, this section of buried pipe had ineffective magnesium anodes.	Urgent	Perform borescope examination of the underground pipeline segment to assess internal condition of the pipeline. This is currently under contract and will be performed in the near future.
	E56		[redacted] 3		1 ½[redacted] low point drain valve is missing a plug.	Urgent	Provide plug on valve. NOTE: Facility Personnel corrected this finding during our inspection.
	E57		[redacted] 3		1 ½[redacted] low point drain valve is missing a plug under the[redacted] 3 staircase.	Urgent	Provide plug on valve. NOTE: Facility Personnel corrected this finding during our inspection.
	E60		TK S-311 – [redacted] 3 Entrance		Severe corrosion and pitting at several locations between[redacted] 3 and S-311. Wall Loss observed between 60%-79%. Severe corrosion also observed at pipe support cradle interfaces.	Urgent	Replace approximately 150 linear[redacted] of 6[redacted] pipe on the aboveground portion of the FOR line outside of[redacted] 3. Limits are from 6[redacted] riser pipe outside[redacted] 3 to the DBB isolation valve outside of the secondary containment area of Tank S-311.
	E63		TK S-311		The body cavity relief valve on the 8[redacted] DBB located on the FOR-receipt pipeline is discharging to isolated segment of piping downstream and should be discharging to the atmospheric, tank side of the valve.	Urgent	Replumb the body cavity relief to relieve towards Tank S-311.
	E64		TK S-311		The 8[redacted] DBB valve, located outside of the secondary containment, has a loose fastener.	Urgent	Tighten loose fastener on valve flange.
	E67		TK S-311		The body cavity relief valve on the 8[redacted] DBB located on the FOR-issue pipeline is discharging to isolated segment of piping downstream and should be discharging to the atmospheric, tank side of the valve.	Urgent	Replumb the body cavity relief to relieve towards Tank S-311.
	E1		RHTF		Threaded pipe nipple was noted on the Tank 20 FOR sample pipeline.	Long	Replace threaded connection with a welded connection.
	E2		RHTF		Metal-to-metal contact was observed between the FOR pipeline and pipe support within the pipe trench, just downstream of the tank sampling manifold.	Long	Provide Teflon pad to prevent metal-to-metal contact.
	E3		RHTF		Moderate corrosion was noted on the 2[redacted] blind flange and fasteners on the abandoned branch to the sampling lines at Tank 19.	Long	Clean, prep, and recoat branch connection, blind flange, and replace fasteners.
	E5		RHTF		Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
	E6		RHTF		Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
	E4		RHTF		General coating failure and corrosion on I-beam type pipe supports for the FOR pipeline within the trench. Moderate corrosion was observed on supports between Tanks 16 through 20.	Long	Clean, prep, and recoat pipe supports.

Table 12 (Sorted) - FOR Findings and Recommendations

Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	E8		RHTF	(b) (3) (A)	Spray foam material in contact with [redacted].	Long	Remove spray foam as required to prevent contact with FOR piping.
	E9		RHTF		[redacted] flange is covered with concrete within the sump.	Long	Remove concrete from pipe flange and fasteners. Clean, prep, and recoat affected flange and fasteners.
	E10		RHTF		Moderate sump floor-to-wall deterioration observed in the concrete FOR sump.	Long	Consider installing a SS tank or lining the concrete pit and testing it annually.
	E13		RHTF		The wall mounted pipe support associated with the [redacted] has a wood shim between the pipe and the support and the pipe is not secured.	Long	Repair/modify pipe support so the pipeline is secured, and the use of a wood shim is eliminated.
	E14		RHTF		[redacted] is constructed out of threaded pipe and joints from Sump 7 to Tank 15/16.	Long	Replace pipe segment with welded pipe
	E15		RHTF		The section of [redacted] from [redacted] is threaded and not supported adequately. The pipeline spans that are unsupported measure 23 ft, 22 ft, and 20 ft.	Long	Provide additional pipe supports at 9-ft on center per industry standard.
	E16		RHTF		Metal-to-metal contact was observed on the FOR pipeline within the electrical room between the pipe and pipe support.	Long	Provide Teflon pad or polymeric half rounds to eliminate metal-to-metal contact between the pipe and the support.
	E17		RHTF		There are four brass/bronze (low melting point) valves where the piping ties into the FOR-trench piping.	Long	Replace valves with Class 150 carbon steel ball valves.
	E18		RHTF		Three pipe support on the FOR pipeline within the trench has become displaced and is no longer supporting the piping.	Long	Reposition the pipe support and Teflon pad to properly support the piping.
	E19		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E20		RHTF		Threaded pipe nipple was noted on the Tank 16 FOR sample pipeline.	Long	Replace threaded connection with a welded connections and Class 150 carbon steel ball valve with flanged ends.
	E22		RHTF		Pipe support on the FOR line within the trench has become displaced and is no longer supporting the piping. Support is also shimmed by a piece of wood.	Long	Provide a new pipe support that fully supports the piping.
	E24		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E28		RHTF		The 4[redacted] FOR pipeline within the pipe trench is being supported with a piece of wood.	Long	Provide new metal pipe support with Teflon pads to eliminate metal-to-metal contact.
	E29		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E30		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E31		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E33		RHTF		Metal-to-metal contact is present at three locations between the 4[redacted] FOR pipeline and pipe supports.	Long	Provide coated U-bolts and Teflon pads between the pipeline and supports at all three locations.

Table 12 (Sorted) - FOR Findings and Recommendations

Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
(b) (3) (A)	E34		RHTF	(b) (3) (A)	Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle. The tank isolation valves are located approximately 30 ft from tank shell/nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E35		RHTF		The [redacted] is covered with plastic within the AFFF Sump #4.	Long	Remove plastic covering and inspect the pipeline for corrosion or damage.
	E39		RHTF		The 4[redacted] FOR pipeline is not supported for a span of [redacted] ft.	Long	Provide additional pipe supports at no greater than 14-ft on center per industry standard.
	E36		RHTF		The [redacted] is not supported for a span of approximately 28 ft.	Long	Provide additional pipe support at 14-ft on center per industry standard.
	E37		RHTF		Tank sample lines do not have tank isolation valves (skin valves) as close as practical to the tank shell and/or nozzle.	Long	Provide tank isolation valves, DBB valves, adjacent to the tank nozzle.
	E40		RHTF		Metal-to-metal contact between the [redacted] and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
	E41		RHTF		Metal-to-metal contact between the [redacted] and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
	E42		RHTF		Metal-to-metal contact between the [redacted] and pipe support within the FOR trench.	Long	Provide Teflon pad to eliminate metal-to-metal contact between the pipe and the support.
	E49		RHTF		Metal-to-metal contact between [redacted] and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
	E50		[redacted] 3		[redacted] is constructed with grooved mechanical fittings. Product staining was noted at FOR [redacted]	Long	The grooved mechanical fittings do not meet current military criteria. Replace the piping system with welded pipe. Urgent maintenance is required at grooved fittings where fuel weeps are evident.
	E51		[redacted] 3		Pipe support [redacted] supporting the [redacted] is damaged and the frame is bent.	Long	Replace damaged pipe support.
	E52		[redacted] 3		Metal-to-metal contact between [redacted] and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
	E52		[redacted] 3		Metal-to-metal contact between [redacted] and pipe support.	Long	Provide coated U-bolt and isolation Teflon pad between pipe and support to eliminate metal-to-metal contact.
	E53 Table H	HT-2 HT-3	[redacted] 3		Coating failure and heavy corrosion on FOR [redacted]. See Table H in API 570 report for exact locations.	Long	Clean, prep, and recoat pipeline in affected area.
	E58		[redacted] 3		Moderate coating failure and minor corrosion was noted on the 8-[redacted] FOR penetration sleeve just below the [redacted] 3 staircase. Some minor corrosion was noted on [redacted] at this location as well. Water infiltration at pipe sleeve was observed.	Long	Clean, prep, and recoat affected areas on the pipeline and penetration sleeve. Provide fuel resistant caulking around sleeve penetration to prevent water infiltration through concrete wall.
	E59		[redacted] 3		Moderate coating failure and corrosion was observed on the FOR-riser pipe just outside [redacted] 3 door.	Long	Clean, prep, and recoat affected areas on the flanges.
	E61		[redacted] 3 to TK S-311		Excessive vegetation was observed around the [redacted] from Tank S-311 to the underground pipeline transition at [redacted] 3 entrance.	Long	Perform routine trimming/cutting of vegetation away from pipeline.

Table 12 (Sorted) - FOR Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	E62		TK S-311	[redacted] (b) (3) (A)	Wooden pipe crossover staircase is in contact with the [redacted]	Long	Modify wooden stairway to eliminate contact with pipeline.
	E65 and E66		TK S-311		[redacted] DBB valve outside of the secondary containment and thermal relief valve flanges are not equipped with proper insulating flange kits.	Long	Provide insulating flange kits on flanges.
	E44 E45 E46		RHTF		Three temporary pipe clamps on 4[redacted] FOR pipeline within trench adjacent to S-23. Pipe clamp lengths are 6[redacted] 16[redacted] 8[redacted] Also, UTT indicates pipe wall loss in this area over 55% metal loss is present.	Other	This piping repair is being performed as part of the "FLC POL Pipeline Repairs" project (E-Project Work Order No. 1615884). The temporary pipe clamps are being removed and pipeline segment is being replaced with a pipe pup.

Table 13 (Sorted) - FOR Pipe Support Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
[redacted]			[redacted] 3	[redacted]	Actively dripping, medium-high corrosion, metal to metal contact, corroded at pipe support interface	Urgent	Replace support.
			[redacted] 3		Highly corroded and deformed, no contact w/ pipe	Urgent	Replace support.
			3		Corroded, in contact w/ pipe	Urgent	Replace support.
			[redacted] 3		Corroded, intact, metal to metal contact, only top anchor to wall present, lower part of bracket not in contact w/ wall	Urgent	Replace support.
	Table E2		[redacted] 3		Not supporting pipe, no anchorage to wall at top, metal to metal contact	Urgent	Replace support.
	Table E2		[redacted] 3		No guide, support broken so pipe is at end of arm	Urgent	Replace Support.
			[redacted] 3		No contact w/ pipe	Urgent	Replace Support or modify to properly support pipe.
			[redacted] 3		No sleeve on U-bolt, U-bolt corroded to delamination, significant corrosion at base plate and anchors	Urgent	Replace Support.
	Table E2		[redacted] 3		Front support flange bent from apparent impact, U-bolt displaced on pipe, not U-shaped.	Urgent	Replace Support.
	E51 Table E2		[redacted] 3		Support completely deformed, removed from base plate	Urgent	Replace Support.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
[redacted] (b) (3) (A)	16-TG-19	RHTF	[redacted] (b) (3) (A)	Threaded Small Bore Valve	Remove 2" threaded bronze gate valve. Provide 2" carbon steel Class 150 ball valve.	Urgent	Same finding was observed. Concur with 2016 recommendation.
	16-TG-2	RHTF		Threaded Small Bore Valve	Remove 2" threaded bronze gate valve. Provide 2" carbon steel Class 150 ball valve.	Urgent	Same deficiency observed. Concur with 2016 recommendation.
	16-TG-5	RHTF		Corroding Pipe Support	Remove, provide, and install the bottom 1 ft column of pipe supports 47 and 48. Provide temporary support before repairs.	Urgent	Same deficiency observed. Concur with 2016 recommendation.
	16-TG-20	RHTF		Failing Gasket	Remove the failing gasket on the 3" blind flange. Provide and install new gasket.	Urgent	Did not observe failing gasket during this inspection. However, observed lack of engagement on fasteners at this flange during inspection. This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	16-UGPH-3	Harbor Tunnel		Threaded Small Bore Pipe/Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Urgent	Same finding observed. Concur with 2016 recommendation. In addition, refer to F24.020 and F24.021 for more information.
	18-TG-34	RHTF		Threaded Small Bore Pipe/Valve	Remove 1 ft of 3/4" threaded pipe and 3/4" gate valve. Provide 3/4" welded/flanged schedule 80 carbon steel pipe and 3/4" flanged carbon steel Class 150 ball valve.	Urgent	A shorter pipe nipple is now installed with ¾[redacted] ball valve but still contains threaded fittings. Product staining was noted at threaded connections. Urgent repair should be to disassemble threaded joints, clean, retape, and reassemble to prevent future weeps. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-59	RHTF		Threaded Small Bore Pipe/Valve	Remove 1" threaded pipe and gate valve. Provide 1" welded/flanged schedule 80 carbon steel pipe and 1" flanged carbon steel Class 150 ball valve.	Urgent	Same finding observed. Concur with 2016 recommendations. Note: This is programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-UGPH-10	Harbor Tunnel		Threaded Small Bore Pipe/Valve	Remove four threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Urgent	Same finding observed. Concur with 2016 recommendation. In addition, refer to JP5.026 for more information.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-LRUT-1 32-LRUT-2	Harbor Tunnel	(b) (3) (A)	Corrosion at Bulkhead	Remove, provide, and install 10 ft 32" pup piece to eliminate the corroded areas in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be reanchored as part of the repair.	Urgent	Not able to verify without performing LRUT at this location. It is unknown whether this has been repaired. If repair has not been performed, concur with 2016 recommendation.
(b) (3) (A)	16-TG-3	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same deficiency observed. Concur with 2016 recommendation.
	16-TG-4	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same deficiency observed. Concur with 2016 recommendation.
	16-TG-12	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	16-TG-13	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	16-TG-16	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. [redacted] were also observed to be floating during this inspection. Concur with 2016 recommendation.
	16-UGPH-2	Harbor Tunnel		Coating Repair	Recoat 400 ft of failing coating on the 16" piping between the UGPH and [redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation. Note that the corrosion in this area is approximately 500 linear [redacted]
	18-TG-1	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendation.
	18-TG-5	RHTF		Missing Guide at Pipe Support	Provide guide for pipe support.	Long	Same finding observed. Guide is missing at the 7 o'clock position. Concur with 2016 recommendation.
	18-TG-12	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-16	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-18	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-21	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding was observed. Concur with 2016 recommendation.
	18-TG-22	RHTF		Corrosion on Sleeve	Install drip shield above pipe.	Long	Moderate coating failure is now present. Concur with 2016 recommendation. In addition, remove corrosion and recoat piping.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
[redacted]	18-TG-40	RHTF	[redacted] (b) (3) (A)	Non-Standard Components	Replace 1 1/2" plastic ball valve with Class 150 carbon steel ball valve. Replace 7 ft of small bore threaded pipe and fittings with welded carbon steel pipe and fittings.	Long	Valve has been replaced but threaded piping still exists. Concur with replacing threaded pipe with welded and reroute out of the way of walking path, golf car or rail path. Note: This repair is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-41	RHTF		Socket Weld	Remove, provide, and install 6 ft 18" pup piece to eliminate the socket welds.	Long	Same finding was observed. At the time of our inspection coating was removed at this location presumably for repair. Concur with 2016 recommendation.
	18-TG-44	RHTF		Corrosion	Remove, provide, and install 18" tee. The repair will require piping rework to fit a new tee. Engineering will be required for the repair design.	Long	Same finding observed. Concur with 2016 recommendations. Coating was removed during inspection presumably for repairs.
[redacted]	18-TG-45	RHTF		Corrosion	Replace pipe support. Recoat bottom of pipe at Pipe Support 67 during Tank Gallery recoat.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-46	RHTF		Socket Weld	Remove, provide, and install 6 ft 18" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendations. Coating was removed at the time of our inspection presumably for repair.
	18-TG-49	RHTF		Welded Saddle Pipe Support	Remove, provide, and install 4 ft 18" pup piece to eliminate the saddle pipe support. Provide new pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-56	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-58	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
	18-TG-60	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendations.
	18-UGPH-1	Harbor Tunnel		Threaded Pipe	Remove threaded 4" blind flange. Provide 4" weld neck flange.	Long	Did not observe 4[redacted] threaded blind flange. There is a 1-inch threaded fittings with a ball valve between [redacted]. Replace 1[redacted] ball valve with welded/flanged fittings and pipe.
[redacted]	18-UGPH-11	Harbor Tunnel		Coating Repair	Recoat 400 ft of failing coating on the 18" piping between the UGPH and[redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation.
	18-LRUT-1	RHTF		Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Long	Same finding observed. Concur with 2016 recommendation.
[redacted]	18-LRUT-2	Harbor Tunnel		Coating Repair	Recoat 5 ft of 18" piping.	Long	Same finding observed. Concur with 2016 recommendation.
[redacted]	18-LRUT-4	Harbor Tunnel		Coating Repair	Recoat 5 ft of 18" piping.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-1	RHTF		Non-Standard Flange	Remove non-standard flange. Provide and install standard weld neck flange.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-TG-3	RHTF	[redacted] (b) (3) (A)	Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket welds.	Long	Deficiency was not identified. Confirmation on repair is needed. If repair has not been performed, recommend repair per 2016 recommendation.
	32-TG-4	RHTF		Dresser Coupling	Remove deteriorating gasket on the Dresser coupling. Provide and install new gasket? Stress analysis?	Long	Deteriorated gasket was not observed during this inspection. Eight lugs on the upstream side of the dresser coupling are installed backwards and are not per manufacturer's detail. Rotate lugs for correct installation.
	32-TG-6	RHTF		Corrosion	Recoat bottom of pipe at Pipe Support 28 during Tank Gallery recoat. Section of pipe support may need to be removed to recoat.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-7	RHTF		Non-Standard Flanges	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream downstream of the flange set.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-8	RHTF		Patch plate	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream downstream of the 6" diameter patch plate.	Long	Same finding observed. Visual inspection did not indicate area of concern during this inspection. Concur with 2016 recommendation.
	32-TG-9	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-10	RHTF		Patch plate	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream downstream of the 12" diameter patch plate.	Long	Same finding observed. Visual inspection did not indicate are of concern during this inspection. Concur with 2016 recommendation.
	32-TG-11	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-13	RHTF		Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Area has been recoated. Inactive pitting observed between 0.050 and 0.100 inches deep. Continue coating maintenance to deter further corrosion.
[redacted]	32-TG-14	RHTF		Floating Pipe Support	Provide shims to close gap between the pipe and pipe support.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-15	RHTF		Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Area has been recoated. Inactive pitting observed between 0.050 and 0.100 inches deep. Continue coating maintenance to deter further corrosion.
	32-TG-17	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-20	RHTF		Non-Standard Flange	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream downstream of the flange set.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-21	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-TG-24a 32-TG- 24b 32-TG-24c	RHTF	[redacted] (b) (3) (A)	Corrosion Dent/Gouge Corrosion	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded/dent area. *Note: 32-TG-24a, 32-TG-24b, and 32-TG-24c have been combined into one repair recommendation.	Long	Same finding observed. Concur with 2016 recommendation. Coating has been applied to arrest corrosion.
	32-TG-27	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket welds.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-29 32-TG-30 32-TG-31 32-TG-32 32-TG-33 32-TG-34	RHTF		Corrosion, Non-Standard Repair, Coating Removal	Remove, provide, and install 30 ft 32" pup piece. Pup piece shall extend approximately 4 ft upstream of Pipe Support 70 and approximately 4 ft downstream of Pipe Support 69. *Note: 32-TG-29 through 32-TG-34 have been combined into one repair recommendation.	Long	Same finding observed. Concur with 2016 recommendation. Coating has been applied to arrest corrosion.
	32-TG-36	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
[redacted]	32-TG-37	RHTF		Tunnel Support	Investigate if supports are load bearing on the piping?	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-38	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-39	RHTF		Socket Weld	Remove, provide, and install 4 ft 32" pup piece to eliminate the socket weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-TG-40	RHTF		Deadleg	Remove, provide, and install 4 ft 32" pup piece to eliminate the deadleg.	Long	Same finding observed. Concur with 2016 recommendation.
[redacted]	32-TG-42	RHTF		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Long	Area of inactive corrosion was observed. Pit depth of 0.196 – 0.200 inches was found. FFS ASME B31G (2012) Level 1 calculations were performed. Per calculations this flaw is acceptable. Coating system should be repaired at this location to arrest further external corrosion. Long term consideration should be given to replacing pipe segment with a 4[redacted] pup.
	32-TG-43	RHTF		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-1	Harbor Tunnel		Threaded Small Bore Pipe/Valve	Remove 2" threaded high point vent (HPV) assembly. Provide welded/flanged HPV assembly with schedule 80 carbon steel pipe and Class 150 ball valve.	Long	Same finding observed. Some product staining was noted but active weeping was not observed. Concur with 2016 recommendation. Recommend high point vent be monitored in until repair can be performed.
	32-A2A3-3	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 5 ft of coating and inspect.	Long	Minor pitting was observed at this location ranging from 0 50-0.080 inches. Repair coating to arrest further corrosion.
[redacted]	32-A2A3-4	Harbor Tunnel		Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
[redacted] (b) (3) (A)	32-A2A3-6	Harbor Tunnel	[redacted] (b) (3) (A)	Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-7	Harbor Tunnel		Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-8	Harbor Tunnel		Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-9	Harbor Tunnel		Coating Repair	Recoat 1 ft of failing coating at the weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-10	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 8 ft of coating and inspect.	Long	Pitting was observed at this location approximate pit depth of 0.120 inches. Repair coating at this location to arrest corrosion.
	32-A2A3-12	Harbor Tunnel		Coating Repair	Recoat 16 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-13	Harbor Tunnel		Coating Repair	Remove 24 ft of wrap coating and recoat.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-14	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 3 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-15	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 12 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-16	Harbor Tunnel		Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-17	Harbor Tunnel		Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-18	Harbor Tunnel		Coating Repair	Recoat 15 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-22	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating at weld.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-24	Harbor Tunnel		Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-25	Harbor Tunnel		Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-28	Harbor Tunnel		Coating Repair	Recoat 3 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-29	Harbor Tunnel		Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-30	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-31	Harbor Tunnel		Coating Repair	Recoat 4 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
[redacted] (b) (3) (A)	32-A2A3-33	Harbor Tunnel	[redacted] (b) (3) (A)	Clockspring	Remove, provide, and install 32" pup piece to eliminate the Clockspring repair.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-34	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-35	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-36	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-37	Harbor Tunnel		Coating Repair	Recoat 12 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-38	Harbor Tunnel		Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-39	Harbor Tunnel		Coating Repair	Recoat 8 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-40	Harbor Tunnel		Coating Repair	Recoat 2 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-41	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-42	Harbor Tunnel		Coating Repair	Recoat 20 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-43	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Clean, inspect, and recoat approximately 75 ft of piping between Pipe Support 595 and the bulkhead.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-44	Harbor Tunnel		Clockspring	Remove, provide, and install 32" pup piece to eliminate the Clockspring repair.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-45	Harbor Tunnel		Coating Repair	Recoat 10 ft of failing coating.	Long	Same finding observed. Inspection observed minimum corrosion and pitting at this area (pit depths 0.030 – 0.060 inches). Concur with 2016 recommendation.
	32-A2A3-46	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 15 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-47	Harbor Tunnel		Coating Repair	Recoat 6 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-48	Harbor Tunnel		Coating Repair	Recoat 20 ft of failing coating.	Long	Same finding observed. Concur with 2016 recommendation.
	32-A2A3-49	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 30 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	32-UGPH-2	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Long	Same finding observed. Concur with 2016 recommendation.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-UGPH-6	Harbor Tunnel	N/A	Threaded Small Bore Pipe/Valve	Remove three threaded low point drain (LPD) assemblies and one threaded high point vent (HPV) assembly. Provide welded/flanged LPD and HPV assemblies with schedule 80 carbon steel pipe and Class 150 ball valves. LPDs and HPVs are located near the UGPH wall.	Long	Same finding observed. Concur with 2016 recommendation.
[redacted]	32-UGPH-7	Harbor Tunnel	N/A	Coating Repair	Recoat 400 ft of failing coating on th[redacted] piping between the UGPH and [redacted] 2.	Long	Same finding observed. Concur with 2016 recommendation.
	32-LRUT-3	Harbor Tunnel	[redacted] (b) (3) (A)	Coating Removal / Unknown Repair Scope	Remove 8 ft of coating and inspect.	Long	Same finding observed. Concur with 2016 recommendation.
	TK10-TG-2	RHTF		Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK12-TG-1	RHTF		Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK13-TG-1	RHTF		Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
	TK16-TG-2	RHTF		Non-Standard Flange	TBD	Long	Replace flange with an ASME B16.5 rated flange and fitting.
[redacted]	TK19-TG-1	RHTF		Pipe Support	Repair pipe support corroding steel and spalling concrete.	Long	Same conditioned identified in July 2021 inspection. Concur with 2016 recommendation.
[redacted]	TK20-TG-1	RHTF		Pipe Support	Replace pipe support corroding steel.	Long	Same conditioned identified in July 2021 inspection. Concur with 2016 recommendation.
	16-TG-1	RHTF		Patch Plate	Remove, provide, and install 4 ft 16" pup piece to eliminate the patch plate.	Other	Repair has been completed. No further action required.
	16-TG-6	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Lifting lug has been removed and is presumed NDE was also conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-7	RHTF		Pitting at Lifting Lug Weld	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Lifting lug has been removed and is presumed NDE was also conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-9	RHTF		Arc Strike	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. It is presumed that NDE was conducted. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-11	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-15	RHTF		2" Diameter Patch Plate	Remove, provide, and install 16" tee. The repair will require piping rework to fit a new tee. Engineering will be required for the repair design.	Other	Same finding observed. Visual inspection did not indicate area of concern during this inspection. Concur with 2016 recommendation.
	16-TG-17	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Same finding was observed. Visual inspection did not indicate area of concern during inspection. Recommend no further action.
	16-TG-21	RHTF		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating has not been removed yet by coating removal contractor.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	16-TG-23	RHTF	[redacted] (b) (3) (A)	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect. Coating was not adequately removed by coating removal contractor.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
[redacted]	16-UGPH-1	Harbor Tunnel		Non-Standard Repair at Bulkhead	Remove, provide, and install 10 ft 16" pup piece to eliminate the non-standard repair in the bulkhead. This will involve cutting out the concrete surrounding the pipe in the bulkhead. The pipe is currently anchored to the bulkhead using welded on collars that are cast in place in the concrete. The piping will need to be reanchored as part of the repair.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	16-LRUT-1	Harbor Tunnel		Coating Removal/Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	Assumed to be completed based on coating at this location appearing relatively new. Current inspection did not identify this as an area of concern. No further action needed.
	16-LRUT-2	Harbor Tunnel		Coating Removal/Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	Assumed to be completed based on coating at this location appearing relatively new. Current inspection did not identify this as an area of concern. No further action required.
	18-TG-2	RHTF		Gouge/Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair has been completed. No further action required.
	18-TG-3	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket weld.	Other	There is a 4[redacted] pup installed between [redacted] and no socket weld. Repair is completed. No further action needed.
	18-TG-6	RHTF		Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
	18-TG-11	RHTF		Dent/Crease	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-14	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket welds.	Other	This repair has been completed. No further action required.
	18-TG-15	RHTF		Lifting Lug	Cut off lifting lug and perform magnetic particle testing. Recoat after testing.	Other	Lifting lugs not identified during inspection. Most likely removed during previous repairs. No further action is recommended.
	18-TG-23	RHTF		Weld Overlay Repair	Remove weld overlay, remove coating, and perform magnetic particle testing. Recoat after testing.	Other	This was not identified during this inspection. No further action is recommended.
	18-TG-25	RHTF		Corrosion	Remove the corroded area of piping between the flange sets 20" downstream and 67" upstream of Pipe Support 20. Provide spool piece. Spool piece includes two rolled 45° elbows, elevation difference of 29", lateral difference of 31", and flange face to face distance of 87".	Other	This repair was being performed during our inspection. No further action required.
	18-TG-27	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	18-TG-28	RHTF	(b) (3) (A)	Socket Weld	Remove, provide, and install 5 ft 18" pup piece to eliminate the socket welds.	Other	Same finding was observed. Concur with 2016 recommendation. NOTE: This segment of pipe was marked for repair during our inspection.
	18-TG-29	RHTF		Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	18-TG-30	RHTF		Dent	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
	18-TG-31	RHTF		Corrosion	Remove, provide, and install 4 ft 18" pup piece. Pup piece shall extend 2 ft upstream and 2 ft downstream of Pipe Support 30.	Other	This repair has been completed. No further action required.
	18-TG-32	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket weld.	Other	This was repaired with a 2 pipe pup. No further action required.
	18-TG-33	RHTF		Dent	Remove coating and perform magnetic particle testing. Recoat after testing.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
	18-TG-35	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket welds.	Other	Repair has been completed. No further action is required.
	18-TG-37	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket welds.	Other	Repair has been completed. No further action is required.
	18-TG-42	RHTF		Socket Weld	Remove, provide, and install 4 ft 18" pup piece to eliminate the socket weld.	Other	Repair has been completed. No further action is required.
	18-TG-48	RHTF		Corrosion	Remove, provide, and install 4 ft 18" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action is required.
	18-TG-50	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-51	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-TG-52	RHTF		Corrosion	Remove, provide, and install 4 ft 18" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action is required.
	18-TG-53 and 18-TG-54	RHTF		Corrosion	Remove, provide, and install 6 ft 18" pup piece. Pup piece shall extend 6 ft upstream and 2 ft downstream of Pipe Support 75. *Note: 18-TG-53 and 18-TG-54 have been combined into one repair recommendation.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	18-UGPH-2	Harbor Tunnel	(b) (3) (A)	Dent/Gouge	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-UGPH-5	Harbor Tunnel		Dent	Term Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	18-UGPH-6	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	18-UGPH-7	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-UGPH-9	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	Per 2019 Inspection and Repair of Red Hill Pipelines – Pipe Pedigree Report, no longer recommended for repair.
	18-LRUT-3	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-LRUT-5	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft 18" pup piece to eliminate the dent/gouge.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	18-LRUT-6	Harbor Tunnel		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	This repair is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	32-TG-5	RHTF		Corrosion	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	This repair has been completed. No further action required.
	32-TG-16	RHTF		Corrosion	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.
	32-TG-19	RHTF		Corrosion	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.
	32-TG-25	RHTF		Corrosion	Remove, provide, and install 4 ft 32" pup piece. Pup piece shall extend upstream and downstream of the corroded area.	Other	Repair has been completed. No further action required.
	32-TG-28	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	No issues noted during inspection. Coating system appears to be relatively new in this area. No further action is required.
	32-TG-35	RHTF		Coating Removal / Unknown Repair Scope	Remove 2 ft of coating and inspect.	Other	No issues noted during inspection. Coating system appears to be relatively new in this area. No further action is required.
	32-TG-41	RHTF		Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	32-TG-44	RHTF	[redacted] (b) (3) (A)	Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. There was a repair sleeve and some inactive pitting (0.05 – 0.180 inches) at this location. No further action is required.
	32-TG-45	RHTF		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. Inactive corrosion/pits identified halfway between [redacted] with max pit of 0.120 inches. No further action is required.
	32-TG-46	RHTF		Coating Removal / Unknown Repair Scope	Remove 4 ft of coating and inspect.	Other	Inspection did not identify areas of concern at this location. Coating was relatively new indicating recent repair. Inactive corrosion/pits identified nea [redacted] with max pit of 0.150 inches. No further action is required.
	32-A2A3-2	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-5	Harbor Tunnel		Corrosion	4' Pup Repair. Greater than 50% corrosion on Weld.	Other	Repair has been completed. No further action required.
	32-A2A3-11	Harbor Tunnel		Coating Repair	Recoat 4 ft of failing coating.	Other	Repair has been completed. No further action required.
	32-A2A3-19	Harbor Tunnel		Dent/Gouge	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-20	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-21	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-23	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-26	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-27	Harbor Tunnel		Dent	Remove, provide, and install 4 ft 32" pup piece to eliminate the dent.	Other	Repair has been completed. No further action required.
	32-A2A3-32	Harbor Tunnel		Corrosion	Remove, provide, and install 4 ft 32" pup piece to eliminate the corroded area.	Other	Repair has been completed. No further action required.
	TK2-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".

Table 14 (Sorted) - Validation of Deficiencies from the 2016 and 2019 Inspection and Repair of Red Hill Pipelines Report							
Report Cross Reference Item No.	EEI Inspection and Repair of Red Hill Pipelines Report Item No.	Geographic Area	Location	Description	Recommendation Reported (2016)	Urgency	Recommendation (August 2022)
	TK4-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK6-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK6-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK8-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK10-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK10-TG-3	RHTF	N/A	Corrosion	Remove jacketing at Dresser Coupling and inspect.	Other	Insulation was removed at Tank 10 during July 2021 inspection and the area was inspected and documented. Add CUI inspection to the API 570 inspection program until dresser couplings are replaced or RHBFSF is defuel and decommissioned.
	TK14-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".
	TK16-TG-1	RHTF	N/A	Dresser Coupling	TBD	Other	Evaluation of Dresser couplings was discussed at length in the SGH Red Hill Final Assessment Report dated April of 2022. Per the DoD Red Hill Bulk Fuel Storage Facility Defueling Plan, evaluation of the need for dresser couplings and removal of them if it can be safely done is "under contract".

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			[redacted] 3	(b) (3) (A)	Actively dripping, medium-high corrosion, metal to metal contact, corroded at pipe support interface, photo taken for how wall support should look, labeled by others.	Urgent	Replace support.
			[redacted] 3		Highly corroded and deformed, no contact w/ pipe, labeled by ABA.	Urgent	Replace support.
			[redacted] 3		Corroded, in contact w/ pipe, labeled by ABA.	Urgent	Replace support.
			[redacted] 3		Corroded, intact, metal to metal contact, only top anchor to wall present, lower part of bracket not in contact w/ wall.	Urgent	Replace support.
	Table E2		[redacted] 3		Not supporting pipe, no anchorage to wall at top, metal to metal contact. API 570: Support anchor dislodged from tunnel wall.	Urgent	Replace support.
	Table E2		[redacted] 3		No guide, support broken so pipe is at end of arm. API 570: Missing pipe clamp bolt (no isolation Teflon pad).	Urgent	Replace support.
			[redacted] 3		Bottom of bracket deformed from impact.	Urgent	Replace support.
			[redacted] 3		No contact w/ pipe.	Urgent	Replace support or modify support to properly support pipe.
			[redacted] 3		No contact w/ pipe.	Urgent	Replace support or modify support to properly support pipe.
[redacted]			[redacted] 3		No sleeve on U-bolt, U-bolt corroded to delamination, significant corrosion at baseplate and anchors.	Urgent	Replace support.
[redacted]	Table E2		[redacted] 3		Front support flange bent from apparent impact, U-bolt displaced on pipe, not U-shaped. API 570: Loose U-bolt.	Urgent	Replace support.
[redacted]	E51 Table E2		Between door and sump		Support completely deformed, removed from baseplate. API 570: Damaged pipe support (impacted by a moving vehicle).	Urgent	Replace support.
			Outside [redacted] 3		Good, new, no teflon pad, pipe not in contact w/ saddle, labeled by others.	Long	Provide teflon pad, adjust support or shim to properly support pipe.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Missing U-bolt, metal to metal contact, labeled by others.	Long	Provide teflon pad and coated U-bolt.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
			Outside [redacted] 3		Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] (b) (3) (A)	PSF-10	Good, metal to metal contact, labeled by others. API 570: Heavy corrosion at saddle-to-pipe crevice (no isolation Teflon pad).	Long	API 570: Reapir support. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
				PSF-11	Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
				PSF-12	Good, metal to metal contact, labeled by others.	Long	Provide teflon pad.
				PSF-17	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
				PSF-18	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
	Table E2			PSF-19	Very minor corrosion, overall good, metal to metal contact. API 570: Missing pipe clamp (no isolation Teflon pad).	Long	Provide teflon pad. API 570: Secure pipe clamp. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
				PSF-20	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
				PSF-21	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
				PSF-22	Very minor corrosion, overall good, metal to metal contact.	Long	Provide teflon pad.
				PSF-23	Additional corrosion at AB (anchor bolt) to concrete at lower bolts.	Long	Provide teflon pad.
				PSF-24	Additional corrosion at upper and lower bolts to concrete.	Long	Provide teflon pad.
				PSF-25	Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
				PSF-26	Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
				PSF-27	Metal to metal contact, corrosion at AB to concrete, minor corrosion at support.	Long	Provide teflon pad, clean corrosion and repaint with high-zinc paint.
				PSF-28	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-29	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-30	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-31	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-32	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-33	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-34	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-35	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-36	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-37	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-38	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-39	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.
				PSF-40	Metal to metal contact, no corrosion at AB, minor corrosion at support.	Long	Provide teflon pad.

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] 3	[redacted] (b) (3) (A)	Metal to metal contact, otherwise good. API 570: Missing pipe strap at the support (no isolation Teflon pad).	Long	Provide teflon pad. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			[redacted] 3		Has teflon pad, but not well supported, C-clamp to hold guide on.	Long	Provide teflon pad.
			[redacted] 3		Has teflon pad, but not well supported, C-clamp to hold guide on.	Long	Provide teflon pad.
			[redacted] 3		No teflon pad, not clearly supporting pipe.	Long	Provide teflon pad, adjust support or shim to properly support pipe.
			[redacted] 3		No teflon pad, not supporting pipe.	Long	Provide teflon pad, adjust support or shim to properly support pipe.
	Table E2		[redacted] 3		Clamp not attached, teflon pad w/ contact. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		[redacted] 3		Overall good. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
	Table E2		[redacted] 3		Clamp not attached. API 570: Dislodged pipe clamp bolt (no isolation Teflon pad).	Long	Attach clamp. API 570: Secure strap. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
			[redacted] 3		No teflon, no contact.	Long	Modify support to properly support pipe and provide teflon pad.

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		[redacted] 3	[redacted] (b) (3) (A)	No teflon, no contact. API 570: Missing pipe clamp bolt (no isolation Teflon pad).	Long	Modify support to properly support pipe and provide teflon pad. API 570: Install bolts clamp. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
			[redacted] 3		Teflon pad in place, no sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites), spattered w/ effluent.	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3		Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Teflon pad in place, no sleeve on U-bolt, very minor spots of corrosion (flea bites).	Long	Replace with coated U-bolt.
			3

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			[redacted] 3		No sleeve on U-bolt, corrosion on outside of front support where sanitary sewer lines bolt to support.	Long	Replace U-bolt and add sleeve.
			[redacted] 3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, corrosion at U-bolt to pipe interface.	Long	Replace U-bolt and add sleeve, clean and paint pipe.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			[redacted] 3	(b) (3) (A)	No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt, not attached to wall.	Long	Replace with coated U-bolt, reattach to wall.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
			3		No sleeve on U-bolt.	Long	Replace with coated U-bolt.
	Table E2		Between door and sump		Paint damaged, corroded, grout under baseplate, chipped and missing chunks. API 570: Missing Teflon spacer/pad between pipe and support.	Long	Clean and repaint, replace grout under baseplates API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
			In sump		2/3 U-bolts missing sleeve, very minor corrosion, 1/3 teflon pad missing.	Long	Add teflon pad and sleeve to U-bolt.
			In sump		All three missing teflon pad, lower line not touching support.	Long	Add teflon pad.
	E2 E4 E5 E6 E13 E15 E16 E18 E22 E28 E36 E39 E40 E41 E42 Table E2		FOR Trench	N/A	Not positively attached to ground (typical), not well seated on ground (typical), teflon pad not completely under pipe (typical), Total number lightly corroded: 59 Total number moderately corroded: 28 Total number severely corroded: 10 Total number missing teflon pad: 5	Long	Replace teflon pads where required, replace severely corroded supports, remove and replace all wood supports.
(b) (3) (A)			Outside [redacted] 3	(b) (3) (A)	Good, new, labeled by others.	Other	None.
			Outside [redacted] 3		Good, new, photo for example, on exit line, unlabeled.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Has teflon pad, supporting pipe adequately.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		Clamp attached ok, teflon pad.	Other	None.
			3		New, some minor cracking, overall good conditioon.	Other	None.
			3		Overall good.	Other	None.

Table 15 (Sorted) - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			[redacted] 3	[redacted] (b) (3) (A)	Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good, photo shows dank area on support is dirty, not corrosion.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			3		Overall good.	Other	None.
			Between door and sump		Overall good.	Other	None.
			Between door and sump		Overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Concrete has been chipped out on tank side around flange for [redacted] JPS lines, [redacted] line has broken concrete out (but not fallen) on opposite side.	Urgent	Replace concrete.
			Harbor Tunnel	[redacted]	Overall good, except [redacted] line has been broken out on tanks side, no flange visible.	Urgent	Replace concrete.
	Table E2		Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle. API 570: Wood shim at saddle #231 (unknown reason, but no corrosion noted).	Long	API 570: Removed wood and install Teflon shim.
	B28 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Concrete saddle support (# 337) between [redacted] has several 1/8" rods between the pipe and the concrete saddle. Reason is unknown.	Long	API 570: Remove the 1/8" rods between the concrete support saddle and pipe. Conduct visual inspection of the interface. Consider a Teflon shim between saddle and pipe.
	Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Pipe is not in contact with saddle # 24 (floating pipe).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Corroded at baseplate.	Long	Monitor for deterioration.
	B46 Table E2		Harbor Tunnel		Pop out at backside w/ exposed and corroded rebar. API 570: Deteriorated saddle with rebar exposed (saddle # 36).	Long	Chip out broken concrete, clean rebar and recast concrete. API 570: Repair concrete saddle.
			Harbor Tunnel		Poorly consolidated but solid at back bottom, both sides.	Long	Monitor for deterioration.
			Harbor Tunnel		Poorly consolidated but solid at back bottom, both sides.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at base back but solid, some corrosion to baseplate and saddle, baseplate not seated flush (typical).	Long	Monitor for deterioration.
	Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Concrete pipe saddle # 110 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
	Table E2		Harbor Tunnel		Efflorescence at bottom. API 570: Concrete pipe saddle # 178 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
	B37 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: Wood shim installed on [redacted] pipe between Teflon pad and concrete saddle in an attempt to correct lack of support at concert saddle # 193 (Between [redacted]). Pipe is not fully and uniformly supported.	Long	API 570: Remove wood. Repair the concrete saddle support or provide a replacement steel support adjacent to this pipe support. Alternatively, the existing pipe support can be evenly shimmed with steel and Teflon pad to uniformly support the pipe.
			Harbor Tunnel		Saddle corrosion.	Long	Monitor for deterioration.
			Harbor Tunnel		Saddle corrosion.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		More corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		More corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle, debris between saddle and pipe.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion at saddle, debris between saddle and pipe.	Long	Monitor for deterioration.
			Harbor Tunnel		Corrosion on saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
	Table E2		Harbor Tunnel		Efflorescence at bottom, corrosion at saddle. API 570: Concrete pipe saddle # 256 is not engaged with pipe (floating pipe).	Long	Monitor for deterioration. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Long	Monitor for deterioration.
			Harbor Tunnel		Steel corrosion and concrete breakout at back [redacted] 1 side, exposed steel.	Long	Chip out broken concrete, clean rebar and recast concrete.
	Table E2		Harbor Tunnel		Efflorescence at back. API 570: Wood shim at saddle #231 (unknown reason, but no corrosion noted).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Top of pier chipped away, including under plate pipe saddle.	Long	Replace concrete.
			Harbor Tunnel		Minor breakout at flange of JP-5 line at [redacted] 1 side.	Long	Replace concrete.
			Harbor Tunnel		Efflorescence and cracking but couldn't knock any concrete off, clearly infiltration, likely rebar corrosion.	Long	Chip out broken concrete, clean rebar and recast concrete.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good. API 570: Concrete pipe saddle # 481 is not engaged with pipe (floating pipe).	Long	API 570: Shim and monitor at next inspection.
	B38 Table E2		Harbor Tunnel		Minor pitting and chipping at base, overall good. API 570: NPS 32 (F-76) pipe has a concrete pipe saddle #501 (Between [redacted] not engaged with pipe (floating pipe). There is loose concrete aggregate between pipe and saddle. Borescope inspection in the cavity did not indicate corrosion/erosion at this area.	Long	API 570: Remove the loose concrete aggregate between pipe and saddle and shim with Teflon pad. Repair the saddle as needed. Monitor at next inspection.
	Table E2		Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), saddle supported on wood block and angles. API 570: Wood shim at saddle #502 (between steel wear plate and saddle).	Long	Replace saddle support. API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), severely corroded saddle and plate on angles, base in standing water.	Long	Replace saddle and saddle support.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates (moderate) in standing water.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ), corrosion on built up plates (moderate) in standing water.	Long	Replace saddle.
			Harbor Tunnel		Bend welded saddle on plate (typ), corrosion at plate and saddle (typ).	Long	Replace saddle.
	B22 Table E2		Harbor Tunnel		Efflorescence at base. API 570: The concrete saddle (Saddle # 530) is cracked on the edge with large splint noted on [redacted] line at about the 7 o'clock position.	Long	API 570: Repair the concrete saddle support. Consider installing a Teflon pad between the saddle and pipe.
	Table E2		Harbor Tunnel		Efflorescence at base but solid. API 570: Corrosion on steel plate on saddle # 548 (there is steel plate between pipe and concrete saddle).	Long	API 570: Repair as needed/ monitor.
			Harbor Tunnel		Saddle overhangs block, condition overall ok.	Other	None.
			Harbor Tunnel		Plate and saddle overhang block, condition overall ok.	Other	None.
			Harbor Tunnel		Plate and saddle overhang block, condition overall ok, minor chipping at concrete edges.	Other	None.
			Harbor Tunnel		Some plate corrosion, saddle not uniformly in contact w/ plate.	Other	None.
			Harbor Tunnel		Area broken out for steel pipe support base.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Saddle overhangs support on back side wall (by 2in or so), front bottom of concrete chipped out for pipe support (metal) base, see photo PSC-5.	Other	None.
			Harbor Tunnel		Moderately corroded.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipping at top of sleeper, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Honeycombing, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipping at saddle under pipe, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipped at front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Rebar corrosion.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at top front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at top, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at front, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good, efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Plate not fully seated on concrete.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Pitted concrete at front.	Other	None.
			Harbor Tunnel		Saddle on plate on large concrete block.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Foam filled.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at bottom, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, some deterioration at bottom of sleeper but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deterioration at bottom but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deterioration at bottom but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, some deterioration at bottom of sleeper but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom w/ deterioration.	Other	None.
			Harbor Tunnel		Efflorescence at bottom w/ deterioration.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Deterioration at base, poorly consolidated at back bottom but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Chipped at saddle under pipe.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom at back but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflourenscence at back, but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Deterioration at back.	Other	None.
	Table E2		Harbor Tunnel		Efflorescence at back, but solid. API 570: Wood shim at saddle #167 (between steel wear plate and saddle).	Other	API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at back, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		More deteriorated, but still fairly solid, surface crumbling.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Cannot see anchorage, all others ok.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Deteriorated at bottom.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Teflon saddle.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Efflorescence at bottom, minor corrosion at saddle.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Large breakout at front.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Excessive efflorescence.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Excessive efflorescence w/ efflorescence at bottom.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Efflorescence at bottom.	Other	None.
			Harbor Tunnel		Continuous cast block at wall begins.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.
			Harbor Tunnel		Efflorescence at back.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Efflorescence at back.	Other	None.
			Harbor Tunnel

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Concrete chipped at front.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, typical.	Other	None.
			Harbor Tunnel		At corner welded saddle on plate, some overhang of saddle over plate.	Other	None.
			Harbor Tunnel		Back to sleeper w/ cast in saddle type.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base, corrosion at saddle, ok w/ teflon pad.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Extremely poor consolidatation at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Very poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Poorly consolidated at lower lift.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, poorly consolidated, dried puddle at back base.	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Wet base, standing water from [redacted]	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Poorly consolidated.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base, cracking at back, but solid.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Wet on ceiling, efflorescence, concrete rough around all pipe penetrations.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		In standing water, deterioration at base.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Minor pitting and chipping at base, overall good.	Other	None.
			Harbor Tunnel		Poorly consolidated at back but solid.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Minor consolidation issues.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.
			Harbor Tunnel		Efflorescence at base but solid.	Other	None.

Table 16 (Sorted) - Concrete Sleepers [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Overall good.	Other	None.
			Harbor Tunnel		Saddle on plate on CIP type, saddle not welded flush to pipe.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Corrosion at saddle, efflorescence at base.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Efflorescence at base, watermarks at base of CIP trapezoid.	Other	None.
			Harbor Tunnel		Corrosion at saddle, efflorescence at base.	Other	None.
			Harbor Tunnel		Overall good.	Other	None.
			Harbor Tunnel		Welded saddle on plate type, efflorescence at base.	Other	None.
			Harbor Tunnel		Built up plates moderately corroded, efflorescence at base.	Other	None.
			Harbor Tunnel		Plates moderately corroded, efflorescence at base.	Other	None.
			Harbor Tunnel		Plates moderately corroded, efflorescence at base.	Other	None.
			Harbor Tunnel		Plates moderately corroded, efflorescence at base.	Other	None.
			Harbor Tunnel		Saddle on CIP sleeper, efflorescence at base.	Other	None.

Table 16 (Sorted) - Concrete Sleepers - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Saddle type ok.	Other	None.
			Harbor Tunnel		Saddle type ok.	Other	None.
			Harbor Tunnel		Saddle type ok, beyond PSC 596(c) pipes move horizontally and have individual supports.	Other	None.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B14 Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Severely corroded baseplate and bottom of column, loss of steel in column, delamination of baseplate, no grout pad, [redacted] connected to wall severely corroded. API 570: Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points.	Urgent	Replace support.
	B14 Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations. API 570: Coating failure and corrosion noted on the steel pipe supports at various locations. Noted on the base plate, on angle iron, and tunnel wall attachment points. Moderate corrosion on horizontal support attachment to wall (QTY 4).	Urgent	Replace support, support on minimum 6" raised concrete pier.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, active dripping.	Urgent	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-33	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchors not visible. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
		HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, complete deterioration through bottom front flange of both columns, extreme deterioration of anchor bolts over back flange of both columns.	Urgent	Replace support.
	Table E2	HT-32	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, severe corrosion over entire support complete less of support at bottom of both columns and both flanges, delamination (severe) at baseplate, angles to wall severely deteriorated. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, wall anchor not visible, flanges at angle column not attached to baseplate, severe delamination at baseplate. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at baseplate and column flanges, appears unattached and detached when sounded.	Urgent	Replace support.
	Table E2		Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme delamination at baseplate, columns not attached due to extreme deterioration, JP-5 bracket to the wall deteriorated and detached. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, column flange deformed.	Urgent	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations, grout pad broken, loss of bearing.	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, JP-5 at wall.	Urgent	Replace support.
	Table E2	HT-26 HT-28	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column flanges completely deteriorated at slab, baseplate is dust, JP-5 attachments to wall completed corroded - not attached at (1) side. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Urgent	Replace support.
			Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, extreme corrosion at bottom of column and significant loss of column flange section at baseplate interface.	Urgent	Replace support.
	B32 Table E2	HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, column moderately corroded, JP-5 anchor to wall complete section loss. API 570: Corrosion on pipe support at the tunnel wall attachment.	Urgent	Replace Support.
		HT-26	Harbor Tunnel		Extreme corrosion w/ no or very little material at any number of locations, moderate column corrosion, complete loss of section at JP-5 and [redacted] anchor to wall on [redacted] 1 side.	Urgent	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, impacted and deformed column flanges.	Urgent	Replace support.
	A7 A10 Table E1 Table E2	LAT-41 LAT-42	RHTF		Severe corrosion and significant loss of support at train-side column (photo), minor corrosion at center column baseplate, grout pad edges destroyed at center column baseplate (photo), severe corrosion and loss of material at beam near wall (photo) API 570: Metal to metal contact. No Teflon shims/insulation strip. Rail-ties wedged between pipe and saddle [redacted]. Corrosion on base of pipe support and I-beam.	Urgent	Replace support Note: This support is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	A7 Table E1 Table E2	LAT-38 LAT-40	RHTF		Severe corrosion and significant loss of support at bottom of column,minor flange deformation at free end, corrosion at JP-5 saddle, corrosion and loss of angle at lower angle support, no saddle at F-24. API 570: Metal to metal contact. No Teflon shims/insulation strip. Missing steel saddle (floating pipe) [redacted] Corrosion on base of pipe support and I-beam.	Urgent	Replace support Note: This support is currently programmed for repair as part of the FY21 Emergent Pipeline Repair Project.
	Table E2		Harbor Tunnel		Severe delamination at baseplate , anchor bolts and bottom of column, no grout, anchor bolts not straight. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support.
	Table E2		Harbor Tunnel		Baseplate corroded, not anchored, minor corrosion at angle to wall connection, corrosion at saddle on backside. API 570: No wear plate or Teflon pad between pipe and pipe support [redacted].	Long	Anchor column to slab. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		Harbor Tunnel		Severe baseplate corrosion, severe corrosion at (1) brace to wall. API 570: No wear plate or Teflon pad between pipe and pipe support [redacted].	Long	Repair brace to wall, anchor column to slab. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Corrosion at baseplate and bottom of column, no grout pad/pier, column baseplate bears on slab, mild corrosion over entire support, severe corrosion at JP-5 bracket to wall (x1) at [redacted] 1 side, moderate corrosion at [redacted] bracket to wall (x1) at [redacted] 1 side, bolts to wall not uniformly flush tight to wall.	Long	Clean corrosion and repaint, replace anchorage to wall.
			Harbor Tunnel		Corrosion at baseplate and bottom of column, top bolt not seated well at [redacted] 2 side, no grout pad.	Long	Clean corrosion and repaint, replace anchorage to wall.
			Harbor Tunnel		Baseplate corroded but ok, small grout pad surrounding top, braces covered w/ effluent from wall.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Anchor bolts corroded, bottom of column moderately corroded, flange deformed, anchor bolts to wall moderately corroded. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair.
			Harbor Tunnel		Bottom of column moderately corroded, anchor bolts and baseplate covered w/ concrete.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Minor corrosion at column bottom, anchor bolts (nuts) corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		JP-5 braces to wall connection hidden, corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderately-minor base of column corrosion, baseplate corrosion, anchor bolts corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderately-minor column corrosion, [redacted] anchors to wall not well seated, severe baseplate and anchor bolts corrosion.	Long	Replace support.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, moderate JP-5 to wall corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, baseplate corrosion, moderate JP-5 to wall corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, mild corrosion at paint damage, moderate a[redacted] anchor bolts to wall at [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolts corrosion, moderate at [redacted] anchor bolts to wall, both sides.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderately severe baseplate and anchor bolt corrosion, moderate a[redacted] anchor bolts to wall, [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, severe anchor bolts corrosion, moderate at JP-5 anchor bolt to wall, deterioration of top flange, very severe a[redacted] anchor bolts to wall, both sides.	Long	Replace support.
			Harbor Tunnel		Moderate column corrosion, severe anchor bolt corrosion, moderate anchor to wall, both lines [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, mild at all bolts on wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor and baseplate corrosion, mild at baseplate in grout.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Mild column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate-severe column corrosion, moderate anchor bolt and baseplate corrosion, mild all anchor bolts to wall, except [redacted] on [redacted] 1 side (moderate).	Long	Replace support.
			Harbor Tunnel		Mild-moderate column corrosion, moderate baseplate and anchor bolt corrosion, mild anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion, mild anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt corrosion, welded connection to wall at JP-5 at [redacted] 2 side, no nut [redacted] at [redacted] 1.	Long	Anchor to wall at all locations.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion [redacted] at [redacted] 2 not tight.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate-severe column corrosion, moderate anchor bolt and baseplate corrosion, ok anchor bolts to wall.	Long	Replace support.
			Harbor Tunnel		Moderate column corrosion, moderate anchor bolt and baseplate corrosion, ok anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, moderate-severe anchor bolt and baseplate corrosion.	Long	Replace support.
			Harbor Tunnel		Mild-moderate column corrosion, mild-moderate anchor bolt and baseplate corrosion, moderate [redacted] both sides.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, moderate [redacted] anchor bolt at [redacted] 1.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild-moderate column corrosion, moderate anchor bolt and baseplate corrosion.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild-moderate column corrosion, moderate anchor bolt and baseplate corrosion, moderate [redacted] at [redacted] 2, anchor bolt not visible at [redacted] 1 side.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild column corrosion, moderate anchor bolt and baseplate corrosion, moderate both [redacted] mild JP-5.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate column corrosion, deformed flange, severe anchor bolt corrosion, moderate anchor bolt at JP-5, moderate anchor bolt at [redacted] top flange at JP-5 deterioration and corrosion.	Long	Replace support.
			Harbor Tunnel		New "T" and baseplate installed at severe column corrosion, mild corrosion to T, moderate to baseplate, mild corrosion to achor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-46	Harbor Tunnel		No saddles or bearing pads, baseplate and anchor bolts corroded, grout pad chipped, minor corrosion paint damage on support. API 570: No wear plate or Teflon pad between pipe and pipe support [redacted] No wear plate or Teflon pad between pipe and pipe support (JP-5). No wear plate or Teflon pad between pipe and pipe suppor[redacted]	Long	Install bearing pads, clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	B17 Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at column, moderate at baseplate, anchor bolts not visible, moderate at JP-5 anchor bolts (x1), moderate at [redacted] API 570: Anchor type welded saddle was cut of the pipe (likely for previous repairs/mods). The existing weld attachment is only tack welded at two location (weaker).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Engineering assessment may be required to determine if this saddle support is sufficiently anchored.
			Harbor Tunnel		Moderate-severe at column, moderate-severe at anchor bolts and baseplate, mild at anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, mild at anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, grout pad damaged, mild at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate at column, moderate at anchor bolt and baseplate, moderate at (1) anchor bolt to wall, mild at (3) anchor bolts to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at anchor bolts to wall, moderate at baseplate anchor bolts and baseplate, severe corrosion at column.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, sever corrosion at column and anchor bolts to wall, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition, replace lower column and grout pad.
			Harbor Tunnel		Mild corrosion at any number of locations, may have efflorescence coating it, grout pad damage.	Long	Clean corrosion and repaint, repair grout pad, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt not tight.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt at baseplate not tight, anchor bolt a[redacted] no nut.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it, wood shim at baseplate.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, chip at grout pad.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, [redacted] no nut.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wood shim at baseplate.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, baseplate broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent x2.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-44	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, corrosion on JP-5 braces, corrosion at [redacted]	Long	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Support wear plate to support not engaged (JP-5) (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken w/ wood shim.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, water flowing starts.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-29 HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
		HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39 HT-41	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-39	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken, anchor bolt bent and baseplate submerged. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36 HT-38	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water, Corrosion on base of pipe support (attachment to tunnel floor).	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken w/ wood shim, water flowing ends. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E2	HT-36	Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2	HT-36	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, no grout pad. API 570: Minor to moderate corrosion on the base plate due to standing water, anchor bolts on the base of plate are not secured down to the floor.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken w/ wood shim, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water. No wear plate or Teflon pad between pipe and pipe support (JP-5).	Long	Replace support, support on minimum 6" raised concrete pier. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflourrescense coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	B16 Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Majority of the piping support in the harbor tunnel has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the [redacted] and [redacted] (JP-5) lines. Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating on the pipe and support. Provide a Teflon shim at location of metal-to-metal contact points.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)	Table E2		Harbor Tunnel	(b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	B25 Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken, anchor bolt bent w/ wood shim. API 570: Pipe support with anchor bolts not embedded in the concrete.	Long	Clean corrosion and repaint, maintain in good condition, remove shim and replace grout pad. API 570: Secure the anchor bolts to the base plate of the pipe support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, no grout pad, connection to wall not visible. API 570: Minor to moderate corrosion on the base plate due to standing water.	Long	Replace support, support on minimum 6" raised concrete pier.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, connection of the wall not visible.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent. API 570: Anchor bolts on the base of plate are not secured down to the floor	Long	Clean corrosion and repaint, maintain in good condition. API 570: Defer to next inspection (has grouting).
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad cracked.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad chipped.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations. API 570: No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, all anchor bolts not visible.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ significant loss of material at any number of locations, grout pad broken. API 570: No wear plate or Teflon provided after repairs (F-24) (floating pipe).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
	Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: No wear plate or Teflon provided after repairs (JP-5).	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, anchor bolt bent, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			Harbor Tunnel	(b) (3) (A)	Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations, grout pad broken.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-28	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-28	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ significant loss of material at any number of locations, no nut on [redacted] to wall.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
		HT-30	Harbor Tunnel		Severe corrosion w/significant loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: No wear plate or Teflon provided after repairs [redacted] (floating pipe).	Long	API 570: Shim and moniter at next inspection.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Clean of corrosion and maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, corroded baseplate, no grout.	Long	Clean of corrosion and maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repairs [redacted]	Long	Clean of corrosion and maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, grout pad broken.	Long	Replace support.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon provided after repairs [redacted]). No wear plate or Teflon provided after repairs (JP-5) (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: No wear plate or Teflon provided after repairs (JP-5).	Long	API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, anchor bolt bent.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, [redacted] anchor bolt to wall corroded.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-23	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, column flange deformation.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations.	Long	Replace support.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Severe corrosion w/ loss of material at any number of locations.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: The original tack welded wear plate between pipe and support is short. The bell-bell weld is resting on directly on pipe support member.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)		HT-19	Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, deformed flange column, grout pad broken.	Long	Replace support.
		SGH p242	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		SGH p242	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		H-11	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, no saddles, no pads.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Small wood shim between wear plate and Steel support member (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Remove wood and install Teflon shim.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-8	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5 brace to wall corroded.	Long	Replace support.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it, F-24 brace at wall corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, stacked washers anchor bolt to wall a[redacted] line on[redacted] 5 side to fit anchor bolt to wall.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad chipped.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, JP-5 supported on frame or[redacted] no attachment to wall, ceiling support threaded rod for frame extension for additional lines (sprinkler lines), abandoned (?) ceiling and pipe supported support (unnumbered) between[redacted] and[redacted] abandoned frame is level 3, threaded rod is badly deteriorated,[redacted] style begins. API 570: No wear plate or Teflon at the intermediate[redacted] next to[redacted] Intermediate[redacted] between[redacted] and[redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, replace ceiling supported threaded rods, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	HT-5	Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Intermediate[redacted] between[redacted] line is welded directly to pipe.	Long	Replace support.
	B16 Table E2		Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations. API 570: Majority of the piping support in the harbor tunnel has tack-welded steel wear plates between pipe and pipe support. Few locations with metal-to-metal contact and some corrosion were noted on the[redacted] and[redacted] (JP-5) lines.	Long	Replace support .
	Table E2	HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Intermediate[redacted] between[redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Monitor at next inspection.

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Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: No wear plate or Teflon a[redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	Table E2	HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Intermediate[redacted] betwee[redacted] line is welded directly to pipe.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
		HT-5	Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, JP-5 on stacked plates.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it. API 570: Pipe is not in contact with support [redacted] (floating pipe).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim and monitor at next inspection.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5[redacted] brace to wall at[redacted] 3 side corroded, column flange deformed.	Long	Replace support.
			Harbor Tunnel		Severe corrosion w/ loss of material at any number of locations, JP-5[redacted] brace to wall corroded.	Long	Replace support.
	Table E2		Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it. API 570: Anchor bolts on the base of plate are not secured down to the floor.	Long	API 570: Secure anchor bolts.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, column flange deformed, grout pad broken.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, extremely long anchor bolt.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, [redacted] line on built up WF, JP-5 on cradle.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, [redacted] line on built up WF, JP-5 on cradle.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, wall to wall WF, high zinc paint, moderate corrosion at paint damage, [redacted] line on built up WF, JP-5 on cradle, both lines on saddles.	Long	Clean corrosion and repaint, maintain in good condition.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, WF supported on angles at walls, high zinc paint, bottom flange deformation at several areas.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		efflorescence at pipe penetrations on tunnel side, moderate cracking in gunnite parge coat.	Long	Clean and repair.
			RHTF		Moderate corrosion at column connection to beam, light corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Moderate corrosion at column connection to beam, light corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
	A15		RHTF		Mild corrosion in small pockets along beam and column.	Long	Provide sufficient spacing between pipe and Unistrut.
	A15		RHTF		Mild corrosion in small pockets along beam and column, more corrosion than [redacted] 96, still mild angle paint is deteriorated.	Long	Clean corrosion and repaint, maintain in good condition, Provide sufficient spacing between pipe and Unistrut.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			RHTF	[redacted] (b) (3) (A)	Mild corrosion in small pockets along beam and column, minor bottom flange deformation between supports.	Long	Clean corrosion and repaint, maintain in good condition.
	A11 Table E2		RHTF		Moderate corrosion along beam and beam brace, grout pad/protection damaged at column. API 570: Pipe is not fully bearing on support (partial support[redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11	LAT-52	RHTF		Missing cross brace arm to[redacted] very mild spot corrosion. API 570: Long segment of the[redacted] pipe is unsupported. The pipe is also not adequately supported betwee[redacted] with only partial support on one side.	Long	Add cross brace arm. API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Very mild spot corrosion. API 570: Long segment of the[redacted] pipe is unsupported. The pipe is also not adequately supported betwee[redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Very mild spot corrosion. API 570: Long segment of the[redacted] pipe is unsupported. The pipe is also not adequately supported betwee[redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Minor corrosion in small areas. API 570: Unistrut in contact with pipe at[redacted] causing coating failure/corrosion. Pipe is not fully bearing on support (partial support[redacted]	Long	API 570: Repair pipe and shim the pipe or pipe support as needed to support the pipe uniformly.
	A11		RHTF		Minor corrosion in small areas. API 570: Long segment of the[redacted] pipe is unsupported. The pipe is also not adequately supported between[redacted] with only partial support on one side.	Long	API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Minor corrosion in small areas, deformation at lower angle brace to[redacted] API 570: Unistrut in contact with pipe at[redacted] causing coating failure/corrosion. Long segment of the[redacted] pipe is unsupported. The pipe is also not adequately supported between[redacted] with only partial support on one side.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair pipe and add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Long segment of the[redacted] pipe is unsupported. One location has 57' 11" of unsupported pipe between[redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Shim the pipe or pipe support as needed to support the pipe uniformly.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe)[redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A11 Table E2		RHTF	[redacted] (b) (3) (A)	Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe [redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		API 570: Pipe is not bearing on support (floating pipe) [redacted] .	Long	API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Cracking and chipping at grout pad. API 570: Pipe is not bearing on support (floating pipe) [redacted] .	Long	Repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2		RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad. API 570: Pipe is not bearing on support (floating pipe [redacted]	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A11 Table E2	LAT-51	RHTF		Moderate corrosion at wall, cracking and chipping of lower grout pad, missing cross brace arm to [redacted] API 570: Moderate corrosion on the steel saddle [redacted] Long segment of the [redacted] pipe is unsupported. One location has 57' 11'' of unsupported pipe between [redacted]	Long	Add cross bracing, clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Replace steel saddle. Shim the pipe or pipe support as needed to support the pipe uniformly.
	Table E2		Tank 3 Lateral		API 570: Pipe is not bearing on support (floating pipe) [redacted] . Pipe is not bearing on support (floating pipe) [redacted]	Long	API 570: Adjust support (raise the plate).
			Tank 4 Lateral		Corrosion at pipe support down to cross beam.	Long	Clean corrosion, maintain in good condition.
		LAT-28	RHTF		Moderate corrosion all over, top flange deformed at wall end, column flange deformed at free end, grout pad damaged, baseplate damaged.	Long	Replace column, anchorage, and grout pad, clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	A19 Table E2		RHTF	[redacted] (b) (3) (A)	Moderate corrosion, minor grout pad cracking and chipping. API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe.	Long	Clean corrosion and repaint, maintain in good condition, API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	A19 Table E2		RHTF		API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe.	Long	API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	Table E2	LAT-48	RHTF		Grout pad chipped. API 570: Pipe is not bearing on support, missing saddle (floating pipe [redacted]	Long	API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A8 Table E2	LAT-47	RHTF		API 570: Wood shim b/w saddle and pipe support member/dislodged [redacted]	Long	API 570: Shim.
	Table E2		RHTF		API 570: Pipe is not bearing on support (floating pipe) [redacted] .	Long	API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
		LAT-46	RHTF		Paint chipping, moderate corrosion more severe at wall, pipe support corroded.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2	LAT-46	RHTF		Paint chipping, moderate corrosion more severe at wall, pipe support corroded. API 570: There are moderate coating failure and some corrosion on the horizontal pipe support I-beam.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating.
	A19 Table E2	LAT-45 LAT-46	RHTF		Corroded at wall, low angle brace between [redacted] deformed API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] (JP-5) pipe. Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition, repair angle brace at deformed area. API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.
	Table E2		RHTF		X bracing removed between [redacted] for new ventilation door (door 3) installation. API 570: Pipe is not bearing on support (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	A19 Table E2		RHTF		Moderate corrosion, splice under pipe, mildly deformed bottom flange at wall. API 570: Some coating failure and corrosion between pipe and pipe support on the [redacted] JP-5) pipe. Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Replace the corroded steel saddle support. Consider a saddle that is secured (welded to the support structure) and a Teflon pad between pipe and saddle. Apply protective coating.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Tank 5 Lateral	[redacted] (b) (3) (A)	Corrosion/efflorescence deformation at support plate at diese[redacted] API 570: No Teflon between pipe and support (Tank 5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to- metal support locations.
	Table E2		Tank 5 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted] API 570: Loose nut on adjustable plate/some deflection on plate[redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Secure the nut on the[redacted] plate.
			Tank 5 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted]	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 6 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted]	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 6 Lateral		Corrosion/efflorescence deformation at support plate at diese[redacted], cracked grout exposed baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		RHTF		Flange deformation at wall anchor moderate corrosion at wall. API 570: Moderate corrosion on the steel saddle (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair pipe and add shim.
			RHTF		Moderate corrosion at wall.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Column flange deformation, top angle brace to[redacted] not attached fully.	Long	Clean corrosion and repaint, maintain in good condition, attach angle brace fully.
	Table E2		RHTF		Moderate corrosion under middle line, column flange deformed. API 570: Contact type abrasion and corrosion at pipe support/pipe (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			RHTF		Lower angle brace deformed.	Long	Clean corrosion and repaint, maintain in good condition.
	Table E2		Tank 7 Lateral		Plate supporting pipe at T7A bent under weight. API 570: Small deflection on pipe support after dresser coupling (Tank 7).	Long	API 570: Adjust support (raise the plate).
			RHTF		Corrosion at baseplate, grout cracked and chipped, beam flange bent.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad.
			RHTF		Moderate corrosion at wall, minor deformation to bottom flange.	Long	Clean corrosion and repaint, maintain in good condition.
			RHTF		Column flange deformation at several locations on braced column.	Long	Clean corrosion and repaint, maintain in good condition.
		LAT-26 LAT-28	RHTF		Beam flange deformation, corrosion at beam-wall interface.	Long	Clean corrosion and repaint, maintain in good condition.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2	LAT-26	RHTF	[redacted] (b) (3) (A)	Corrosion at saddle of wall closest to pipe, corrosion at beam-wall interface. API 570: Coating failure and corrosion at saddle support (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Repair coating. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
		LAT-26 LAT-43	RHTF		Corrosion at base of center column at repair.	Long	Clean corrosion and repaint, maintain in good condition
		LAT-26	RHTF		Baseplate grout chipped.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad.
			RHTF		Baseplate corrosion at wall baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
	A25 Table E2		Tank 9 Lateral		API 570 [redacted] pipe is not in contact with the pipe (floating pipe).	Long	Adjust the elevation of the pipe support plate to provide sufficient load bearing contact between pipe and support plate.
			Tank 10 Lateral		Corrosion on top beam and top of column (efflourescense).	Long	Clean corrosion and repaint, maintain in good condition.
	A9 Table E2		RHTF		Corrosion at beam support at [redacted] minor areas of corrosion elsewhere. API 570: Long segment of the [redacted] pipe is unsupported. One location has 47' of unsupported pipe betwee [redacted] with the saddle support missing at [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Install saddle supports at [redacted] and shim as needed to support pipe on the saddles. Secure the saddles to the pipe support.
	A9 Table E2	LAT-39	RHTF		Cracking and chipping at grout pad. API 570: Long segment of the [redacted] pipe is unsupported. One location has 47' of unsupported pipe between [redacted] with the saddle support missing at [redacted]	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Install saddle supports at [redacted] and shim as needed to support pipe on the saddles. Secure the saddles to the pipe support.
	A9 A24 Table E1 Table E2	LAT-26	RHTF		Minor corrosion at paint loss areas, no saddle to [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip. The [redacted] pipe is not fully supported. The pipe is partially in contact with the pipe support (JP-5). Missing steel saddle (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition, add saddle. API 570: Shim [redacted] pipe support so as to provide positive contact between pipe and saddle support. Consider Teflon shim between pipe and saddle. Shim JP-5 pipe and monitor at next inspection. Install saddle on [redacted] line.
	A24 Table E1 Table E2	LAT-26	RHTF		Minor corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip. The [redacted] pipe is not fully supported. The pipe is partially in contact with the pipe support (JP-5).	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim [redacted] pipe support so as to provide positive contact between pipe and saddle support. Consider Teflon shim between pipe and saddle. Shim JP-5 pipe and monitor at next inspection.
	Table E1 Table E2	LAT-26	RHTF		No saddle to [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.Missing steel saddle (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition, add saddle. API 570: Install saddle. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal to-metal support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-26	RHTF	[redacted] (b) (3) (A)	Overall good. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-26 LAT-36	RHTF		Cross bracing deformed. API 570: Metal to metal contact. No Teflon shims/insulation strip. Moderate corrosion on the steel saddle [redacted].	Long	Repair bracing. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations. Replace steel saddle.
	Table E1	LAT-26 LAT-36	RHTF		Loss of grout and corrosion at baseplate, cross bracing deformed. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Repair bracing, clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26 LAT-35	RHTF		Bottom flange corrosion at downspout. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-28 LAT-35	RHTF		Flange deformation at (2) locations, connection at "wall" not visible. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Minor corrosion at paint damage, moderate flange corrosion at downspout, top flange delamination at beam, moderate baseplate corrosion at train track column w/ minor grout damage. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Flange deformation at [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Minor damage at grout pad. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-26	RHTF	[redacted] (b) (3) (A)	Minor grout pad damage at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Grout pad damage and flange corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Corrosion at paint chipping. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Column flange deformation at train track flange, grout pad damage and minor baseplate corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Beam flange corrosion at downspout. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, repair beam at flange delamination, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Grout pad damage and loss of support. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 13 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 14 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.
			Tank 14 Lateral		Concrete pier/grout pad damage.	Long	Repair grout pad.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-26	RHTF	[redacted] (b) (3) (A)	Baseplate corrosion at wall column (moderate), moderate-severe column flange corrosion at train track column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-26	RHTF		Moderate flange deformation at train track column, column flange damage at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip. Pipe is not bearing on support (floating pipe) [redacted]	Long	Clean corrosion and repaint, maintain in good condition. API 570: Shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
	Table E1	LAT-26 LAT-30	RHTF		Flange deformation at wall column, baseplate grout damage and corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26 LAT-30	RHTF		Overall good. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-28	RHTF		Column flange deformation at train track column, minor grout chipping at wall column baseplate. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26	RHTF		Beam flange corrosion at downspout, baseplate corrosion at wall column. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, relocate downspout. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-26 LAT-27	RHTF		Corrosion (moderate) at wall baseplate, grout chips, minor flange deformation at beam, severe delamination and corrosion at wall beam. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, replace damaged beam at wall column and wall connection, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1 Table E2	LAT-25 LAT-26	RHTF		Corrosion (moderate) at wall baseplate, grout chips, minor flange deformation at beam, severe delamination and corrosion at wall beam. API 570: Metal to metal contact. No Teflon shims/insulation strip. Moderate corrosion on the steel saddle [redacted]	Long	Clean corrosion and repaint, replace damaged beam at wall column and wall connection, maintain in good condition. API 570: Replace steel saddle. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2	LAT-23	RHTF	[redacted] (b) (3) (A)	Beam flange deformation, beam corrosion at JP-5 and [redacted] lines, baseplate grout cracked and chipped. API 570: Moderate corrosion on the steel saddle [redacted]	Long	Replace severely corroded beam area, clean corrosion and repaint, maintain in good condition. API 570: Replace steel saddle.
			Tank 15 Lateral		Corrosion at [redacted] line.	Long	Clean corrosion, maintain in good condition.
	Table E2		Tank 16 Lateral		Baseplate grout damage. API 570: Small deflection on pipe support after dresser coupling (Tank 16).	Long	API 570: Adjust support (raise the plate).
	Table E1	LAT-19 LAT-20 LAT-23	RHTF		Flange deformation at beam, baseplate corrosion and grout damage at [redacted] line. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-20 LAT-21	RHTF		Grout damage and corrosion at baseplate, minor column flange deformation, cross bracing cut. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-19 LAT-20	RHTF		Minor flange deformation, significant corrosion at column base and loss of column, flange steel. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Replace Support; alternatively, cut out area of deformation and corrosion and replace in kind
	Table E1	LAT-18	RHTF		Beam flange corrosion (moderate) at pipe support area on top of beam. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-17 LAT-18	RHTF		Severe corrosion and loss of steel at wall connection. API 570: Not in contact with saddle.	Long	Replace connection to wall, clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.
	Table E1		RHTF		Could not access to perform assessment. API 570: There is no saddle support and the pipe is not resting on the I-beam.	Long	API 570: Add shims to support to gain contact.
	Table E1		RHTF		Could not access to perform assessment. API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	None. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1		RHTF		No saddle to JP-5 line, cracked and chipped grout at wall column. API 570: There is no saddle support and the pipe is not resting on the I-beam.	Long	Clean corrosion and repaint, maintain in good condition, repair grout pad. API 570: Add shims to support to gain contact.
	Table E1	LAT-13 LAT-14	RHTF		Minor corrosion at paint damage, has saddle, wall column grout cracked and chipped. API 570: The pipe is partially in contact with the pipe support.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-11 LAT-12	RHTF	[redacted] (b) (3) (A)	Beam flange deformation, wall baseplate corroded, grout chipped and missing. API 570: Not in contact with saddle.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Add shims to support to gain contact.
			Tank 17 Lateral		Corrosion at column bottoms, loss of steel, corrosion at unknown member, flange cutout at tackwelded member, no visible saddle at JP-5.	Long	Clean corrosion and repaint, maintain in good condition, add saddle.
			Tank 17 Lateral		Corrosion at base of column, no saddle.	Long	Clean corrosion, maintain in good condition, add saddle.
			Tank 18 Lateral		Beam moderately corroded at ends and beam top flange, no saddle for JP-5 line, crack and exposed rebar at unknown gunnite support.	Long	Clean corrosion and repaint, maintain in good condition, repair beam connection each end.
		LAT-10	Tank 18 Lateral		Corrosion at beam to wall, severe corrosion at column baseplate, flange loss and corrosion at JP-5.	Long	Clean corrosion and repaint, maintain in good condition, repair connections beam to wall.
	Table E1		RHTF		Corrosion at beam flanges, loss of flange metal, grout at walkway column chipped away. API 570: The pipe is partially in contact with the pipe support.	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Add shims to support to gain contact.
	Table E1	LAT-5	RHTF		Grout at wall column broken and displaced, beam at wall corroded (beyond column). API 570: Metal to metal contact. No Teflon shims/insulation strip.	Long	Clean corrosion and repaint, maintain in good condition, repair connections beam to wall. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1	LAT-5	RHTF		Painted flange damage at red pipe, moderate corrosion at wall column, grout cracked and missing. API 570: Missing one nut at concrete footing. Broken grouting.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Replace missing nut and re-grout.
	Table E1	LAT-5 LAT-8 LAT-55	RHTF		Saddle damaged only (1) side, grout removed from elevator column baseplate, space between wall column baseplate and grout pad. API 570: Metal to metal contact. No Teflon shims/insulation strip. Pulled anchor stud at concrete footing. Broken grouting.	Long	Clean corrosion and repaint, maintain in good condition, replace grout pad. API 570: Install support with insulation or half-round Teflon strip. Re-secure anchor stud and re-grout. Note: The repair to replace deformed anchor bolt at this support is currently programmed as part of the FY21 Emergent Pipeline Repair Project.
	Table E1	LAT-5 LAT-6 LAT-7	RHTF		No Saddle. API 570: Pipe is resting on I-beam with Teflon shims/insulation strip and wood.	Long	Add saddle. API 570: Remove wood shim. Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations. Note: The repair to replace grout and anchor bolt at this support is currently programmed as part of the FY21 Emergent Pipeline Repair Project.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E1	LAT-5	RHTF	[redacted] (b) (3) (A)	Overall good. API 570: Pipe is resting on I-beam with no saddle or Teflon shims/insulation strip.	Long	API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1		RHTF		Minor areas of corrosion at paint damage, column at Tank 19 side corroded w/ exposed baseplate. API 570: Not in contact with saddle with minor gaps.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure at all pipe support locations.
	Table E1		RHTF		Minor areas of corrosion at paint damage, column at Tank 19 side corroded w/ exposed baseplate. API 570: Saddle is displaced from support beam with 1 5" Unistrut support placed underneath.	Long	Clean corrosion and repaint, maintain in good condition. API 570: Remove Unistrut and reposition saddle.
			Tank 19 Lateral		No saddle, grout damage and corrosion at tunnel-side column, corrosion at unknown member-column interface.	Long	Clean corrosion and repaint, maintain in good condition.
			Tank 19 Lateral		No saddle, top flange damage at pipe corrosion at beam to wall (beyond column) and at tunnel side top.	Long	Clean corrosion and repaint, maintain in good condition, replace beam-wall connection.
			Tank 20 Lateral		No saddle.	Long	Add saddle.
		LAT-1 LAT-2	Tank 20 Lateral		Corrosion at wall-beam interface beyond column, severe corrosion and loss of flange at baseplate corrosion on beam.	Long	Replace column and beam to wall connection, clean corrosion and repaint with high zinc paint, maintain in good condition.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, same style as others, wall shield, wall anchor bolt not visible.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Moderate corrosion at any number of locations, may have efflorescence coating it, corroded baseplate, no grout.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, no grout.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.

Table 17 (Sorted) - Frame Pipe Supports [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			Harbor Tunnel	[redacted] (b) (3) (A)	Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it, grout pad broken.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			Harbor Tunnel		Mild corrosion at any number of places, may have efflorescence from wall coating it.	Other	None.
			RHTF		Moderate pitting and paint flaking, moderate deformation of lower flange at (1) location.	Other	None.
			RHTF		Mild corrosion in small pockets along beam and column, no flange deformation.	Other	None.
			Tank 1 Lateral		Good condition.	Other	None.
			Tank 1 Lateral		Good condition.	Other	None.
			Tank 2 Lateral		Plate deformed at diesel fuel line.	Other	None.
			Tank 2 Lateral		Good.	Other	None.
			Tank 3 Lateral		None.	Other	None.
			Tank 4 Lateral		None.	Other	None.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			RHTF	[redacted] (b) (3) (A)	Column flange deformation.	Other	None.
			RHTF		Minor corrosion at wall.	Other	None.
			RHTF		Overall good.	Other	None.
			RHTF		Bulkhead anchor in good condition.	Other	None.
			RHTF		Overall good.	Other	None.
			Tank 7 Lateral		Overall good.	Other	None.
			Tank 8 Lateral		Overall good.	Other	None.
			Tank 8 Lateral		Overall good.	Other	None.
			RHTF		Overall good.	Other	None.
			Tank 9 Lateral		None.	Other	None.
			Tank 10 Lateral		None.	Other	None.
			RHTF		Overall good.	Other	None.
			Tank 11 Lateral		Minor chipping at baseplate and grout.	Other	None.
			Tank 11 Lateral		None.	Other	None.
			Tank 12 Lateral		Minor chipping at baseplate and grout.	Other	None.
			Tank 12 Lateral		None.	Other	None.
		LAT-31	RHTF		Overall good.	Other	None.
			RHTF		Overall good.	Other	None.
			RHTF		Overall good.	Other	None.
			Tank 15 Lateral		None.	Other	None.
			Tank 16 Lateral		None.	Other	None.
			RHTF		Overall good.	Other	None.
			Tank 17 Lateral		Overall good.	Other	None.
	Table E1		RHTF		Overall good. API 570: Shimmed with Teflon pads.	Other	None. API 570: None.
		LAT-5	RHTF		Overall good.	Other	None.

Table 17 (Sorted) - Frame Pipe Supports - [redacted] Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted]			Tank 20 Lateral	[redacted]	Severely deteriorated.	Other	None.

Table 18 (Sorted) - Underground Pumphouse Pipe Support Findings and Recommendations

Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted]			UGPH	[redacted]	Grout pad cracked and exposing baseplate.	Long	Repair grout pad and maintain in good condition.
			UGPH		No grout layer.	Long	Repair grout pad and maintain in good condition.
			UGPH		Grout chipped, baseplate displaced (no anchorage except for grout surround).	Long	Repair grout pad and maintain in good condition.
			UGPH		Grout chipped.	Long	Repair grout pad and maintain in good condition.
			UGPH		Pier minor chipping, minor corrosion at baseplate.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Grout pad chipped and missing.	Long	Repair grout pad and maintain in good condition.
			UGPH		Minor corrosion at base of column.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Unpainted, no grout base, corrosion at baseplate and bottom half of X.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Grout cracked apart, baseplate displaced.	Long	Repair grout pad and maintain in good condition.
			UGPH		Painted, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Grout broken out at front.	Long	Repair grout pad and maintain in good condition.
			UGPH		Painted top, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Painted top, no grout, circular baseplate corroded.	Long	Repair grout pad and maintain in good condition.
			UGPH		Minor cracking to grout base.	Long	Repair grout pad and maintain in good condition.
			UGPH		Loss of support under baseplate at sleeper between [redacted] shimmed w/ wood scrap.	Long	Modify support to adequately support pipe without need for shim.
			UGPH		Cut for flange, corrosion at saddle.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Wood shim under JP5.	Long	Modify support to adequately support pipe without need for shim.
			UGPH		Minor corrosion at all bearing plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Missing (1) anchor bolt and nut.	Long	Install anchor bolt and nut.
			UGPH		Corrosion at plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Shared pier w/ [redacted] no anchor bolt.	Long	Install anchor bolt and nut.
			UGPH		Corrosion at plates.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Moderate corrosion at baseplate .	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Baseplate corroded.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		Moderate corrosion at plate under saddle.	Long	Clean corrosion and repaint, maintain in good condition.
			UGPH		No grout pad.	Long	Repair grout pad and maintain in good condition.
			UGPH		Chipped concrete pier.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 18 (Sorted) - Underground Pumphouse Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			UGPH	(b) (3) (A)	Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Covered in oil.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Pier doesn't span trench, covered in oil.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Minor pier cracking.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overhangs the trench.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 18 (Sorted) - Underground Pumphouse Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)			UGPH	[redacted] (b) (3) (A)	Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Minor concrete chips.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Poorly consolidated concrete at base.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Poorly consolidated concrete at base, minor concrete chips.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Pier shared w/ grating support column, no baseplate at grating support column, angle out at grating column flange, support unpainted at column.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Chipping at pier under baseplate.	Other	None.
			UGPH		Chipping at pier under baseplate, shared pier w/ grating column.	Other	None.
			UGPH		Chipping at pier.	Other	None.
			UGPH		Top channel bottom flange cut for pipe clearance.	Other	None.
			UGPH		Top channel bottom flange cut for pipe clearance.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Interior column flange cut fo[redacted] flange each side.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Pier chipping at baseplate.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Separate pier under each baseplate, pier straddles trench.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 18 (Sorted) - Underground Pumphouse Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
(b) (3) (A)			UGPH	(b) (3) (A)	Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.
			UGPH		Overall good.	Other	None.

Table 19 (Sorted) - Surge Tank Pipe Support Findings and Recommendations							
Item No.	Appendix C – API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Pipe Support No.	Condition Notes	Urgency	Recommended Repairs
[redacted] (b) (3) (A)	Table E2		Surge Tank	[redacted] (b) (3) (A)	No teflon pads visible, concrete at junction between [redacted] API 570: No wear plate or Teflon provided after repairs [redacted]	Long	Provide teflon pad. API 570: Consider Teflon shims/insulation strips between pipe and saddle or half-round Teflon strips between pipe and I-Beam structure or other metal-to-metal support locations.
			Surge Tank		F-76 part of concrete is broken through and chipped under saddle.	Long	Repair concrete and maintain in good condtion.
			Surge Tank		Grout loss under baseplates, not all nuts are tightened, not all anchors are plumb.	Long	Replace grout pad and maintain in good condtion.
			Surge Tank		Concrete over baseplate cracked, baseplate not displaced.	Long	Repair concrete and maintain in good condtion.
			Surge Tank		Sleeper broken in half at edge of saddle baseplate and displaced, loss of support under baseplate.	Long	Repair concrete, replace grout pad, and maintain in good condtion.
			Surge Tank		Sleeper broken in half at edge of saddle baseplate and displaced, loss of support under baseplate.	Long	Repair concrete, replace grout pad, and maintain in good condtion.
			Surge Tank		Minor loss of grout under baseplate.	Long	Replace grout pad and maintain in good condtion.
			Surge Tank		Corroded baseplates but overall good.	Long	Clean corrosion and repaint, maintain in good condition.
	D2		Surge Tank		Loss of grout and support anchors exposed, anchor bolts knocked crocked.	Long	Replace grout pad and anchor bolts and maintain in good condtion.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Could not access for condition assessment.	Other	None.
			Surge Tank		[redacted] part of concrete is chipped.	Other	None.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		[redacted] part of concrete is cracked but overall good.	Other	None.
			Surge Tank		[redacted] part of concrete is cracked but overall good.	Other	None.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Overall good.	Other	None.
			Surge Tank		Overall good.	Other	None.

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