



STANDARD OPERATING PROCEDURE

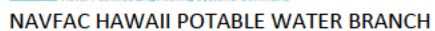
SOP 1.1 Introduction and Overview

Abstract: This SOP provides an overview of the Joint Base Pearl Harbor Hickam (JBPHH) water system.



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9. Annual Task Checklists
10. 2-5 Years Task Checklists

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1. DEFINITIONS/ACRONYMS

1.1. Definitions

- Potable water: Water that is suitable for drinking.
- Safety Data Sheet (SDS): An Occupational Safety and Health Administration (OSHA) standardized hazard communication document detailing a chemical's properties and hazards (physical, health, and environmental); protective measures; and safety precautions for handling, storing, and transporting the chemical.

1.2. Acronyms and Abbreviations

- AMR Aliamanu Military Reservation
- CCCBFP Cross-Connection Control Backflow Prevention Program
- DWSCMP Drinking Water System Compliance Monitoring Plan
- ERP Emergency Response Plan
- ft feet
- JBPHH Joint Base Pearl Harbor Hickam
- MGD million gallons per day
- NAVFAC Naval Facilities Engineering Systems Command
- OSHA Occupational Safety and Health Administration
- PPE personal protective equipment
- PRP32A Potable Water Branch
- SCADA supervisory control and data acquisition
- SDS Safety Data Sheet
- SOP Standard Operating Procedure

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2. OVERVIEW

2.1. Scope and Purpose

This Standard Operating Procedure (SOP) provides an overview of the Joint Base Pearl Harbor Hickam (JBPHH) water system, and the different SOPs provided to ensure proper system operation and efficiency. It includes a description of the system layout, key operational processes, and maintenance procedures. The water system SOPs are structured as follows:

- SOP 1.1: Introduction and Overview
- SOP 1.2: Miscellaneous Maintenance
- SOP 2.1: Water Supply Pump Stations
- SOP 3.1: Booster Pump Stations
- SOP 4.1: Chlorine Feed System
- SOP 4.2: Fluoride Feed System
- SOP 5.1: Water Mains
- SOP 5.2: Valves
- SOP 5.3: Hydrants
- SOP 6.1: Water Storage
- SOP 7.1: Backup Power Supply
- SOP 8.1: Real Time Monitoring
- SOP 8.2: Spot Monitoring
- SOP 9.1: Cybersecurity

These SOPs should be used in conjunction with other documentation including the Emergency Response Plan (ERP), Drinking Water System Compliance Monitoring Plan (DWSCMP), Unidirectional and Maintenance Flushing Program, and Cross-Connection Control Backflow Prevention Program (CCCBFP). Compliance sampling and monitoring will be covered under the DWSCMP. Records of all compliance sampling are maintained by the State of Hawaii and the Naval Facilities Engineering Systems Command (NAVFAC) Hawaii Environmental Division. Historic operational sampling is contained in handwritten operator log sheets, which are digitized as required. Ongoing operational sampling must be maintained in handwritten operator logs, with relevant information, including chain of custody information, test results, and lab notes. Key information, e.g., sample dates and results, should be transcribed into spreadsheet tables for easier sorting, statistical analysis, and sharing.

2.2. Equipment List

Specific equipment is detailed in relevant subsequent sections.

2.3. Operating Summary

Raw water originates from three shafts drilled horizontally into the volcanic rock, skimming water from the top of the freshwater lens. The Waiawa shaft produces up to (b) (3) (B) gallons per day (b) (3) (B) using (b) (3) (B) vertical turbine pumps. The Red Hill Shaft historically produces approximately (b) (3) (B), with (b) (3) (B) vertical turbine pumps. The Aiea-Halawa Shaft produces approximately (b) (3) (B) with (b) (3) (B) vertical turbine pumps. The Aiea-Halawa and Red Hill shafts have not been in operation since the Red Hill fuel spill incident in November 2021. The water supply pump stations are controlled manually based upon water levels in tanks S1/S2, see *SOP 6.1 Water Storage* for details. Under normal circumstances a

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minimum of one pump is running continuously, with additional pumps being turned on and off as required to cycle tanks S1/S2. The Aiea-Halawa Shaft is known to produce elevated saline levels if operated too frequently or for too long of a duration and is currently offline.

After chlorine and fluoride addition at the sources (refer to *SOP 4.1* and *SOP 4.2*), water flows into a distribution system (refer to *SOP 5.1*). Most of the Navy water system is within one pressure zone, ranging in elevation from near sea level to approximately 100 feet (ft). Storage in the main pressure zone includes two ground storage reservoirs: Aiea-Halawa Tanks S1 and S2.

Booster pump systems supply water to areas of the Navy system above 100 ft elevation. These include the Moanalua Terrace Housing Area, the Marine Corps Housing Area at Manana, the Marine Corps Base Hawaii at Camp Smith, and two water storage tanks at Red Hill.

The Supervisory Control and Data Acquisition (SCADA) system controls the booster pump stations. Refer to *SOP 3.1* for details.

At the Red Hill Shaft, there are (b) (3) (F) booster pumps that supply water to two ground storage reservoirs at (b) (3) (F) ft elevation (Tanks 316 and 685). The Navy also serves a consecutive water system owned by the Army through two interconnections: one serving the Red Hill housing area and one serving the Aliamanu Military Reservation (AMR), comprised of Army housing within the Aliamanu Crater and the former Coast Guard Reservation. The Red Hill Housing area receives water from Navy Tanks 316 and 685. AMR is supplied through a metered connection adjacent to the Aiea-Halawa Tanks.

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3. RESPONSIBILITIES AND QUALIFICATION

3.1. Responsibilities

The JBPHH Public Works Department owns and operates the JBPHH drinking water system. Operation and maintenance of the system is the responsibility of the Utilities Maintenance Potable Water Branch (PRP32A). Water system operation and maintenance at JBPHH is performed by all three work centers within their areas of responsibility. Refer to *Figure 3-1* for details.

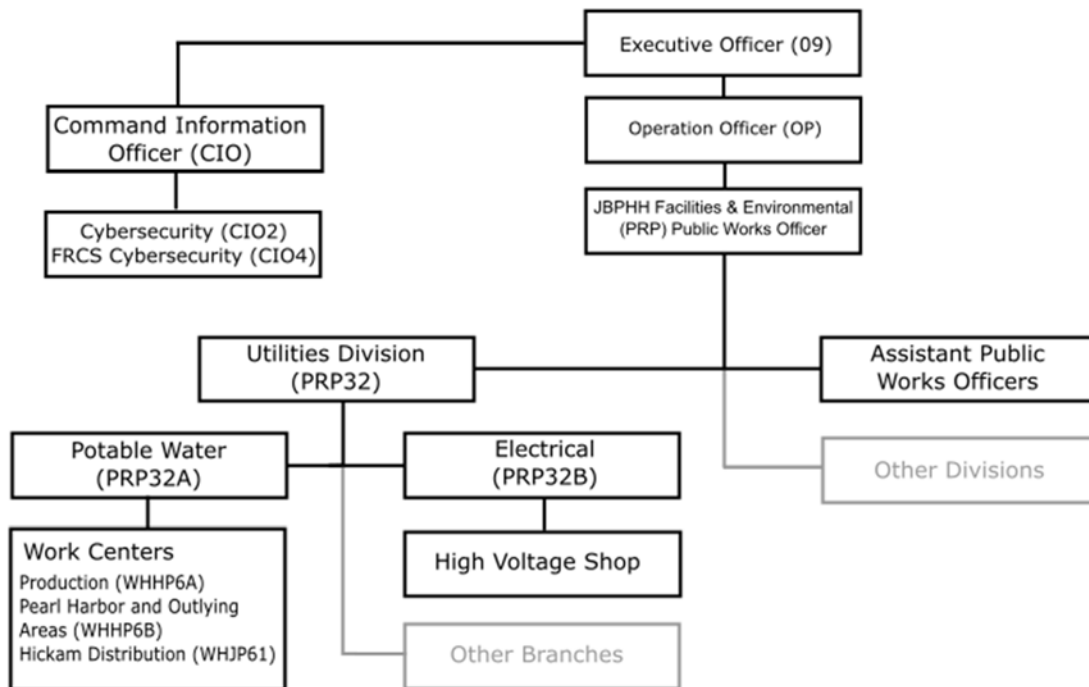


Figure 3-1 Public Works Department Organization

Lead operators and supervisors in PRP32A must ensure that the operators are trained and qualified prior to using this SOP. To support this process, a copy of this SOP should be made readily available to all users. Senior operators are required to update the SOP to reflect any changes in equipment, procedures, or regulations, and train the subordinate operators and maintenance crew(s) accordingly. It is important for senior operators to approve, coordinate, and maintain records of any major repairs on the equipment highlighted in this SOP. Training shall consist of in-depth, hands-on training for all new employees or employees new to the applicable SOP and annual refresher meetings facilitated by the lead operator. Training requirements for individual SOPs are covered in their respective SOP. All training should be documented using *Attachment 1 SOP Acknowledgement and Training Form*.

In the event communication is required, contact the following personnel in the order provided below:

- Operation Lead
- Operation Supervisor
- Operation Control Room

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Communication includes, but is not limited to, reporting safety concerns, hazardous substances spills or exposures, hazardous waste disposal, maintenance observations, equipment issues, maintenance issues, operational issues, lessons learned, efficiency gains, job well done, etc. Any communication to external departments should be handled by shop supervisors, unless specifically approved.

3.2. Qualifications

All personnel involved in operations and maintenance activities must be trained and qualified to perform their assigned tasks:

- The Supervisor and Lead Operator must meet the minimum certification requirement. All other personnel under their supervision must meet the minimum requirement of Operator-in-Training, with the exception of the following personnel who are not directly involved with repair procedures:
 - Heavy equipment operators
 - Traffic control personnel including flaggers
 - Personnel involved with site clean-up after repair has been made including grading, seeding, pavement restoration, and miscellaneous concrete work
- Follow Navy and base-specific safety regulations and directives and obtain appropriate safety training (see *Section 4*).
- Be familiar with the following:
 - Emergency protocols and communications
 - Operation of tools and equipment
 - Procedures outlined in this SOP

3.3. SOP Updates

It is the responsibility of the shop supervisors and Potable Water Commodity Manager to ensure that the SOPs are updated as required. SOPs must be updated annually, and also when new equipment is installed, or when operational changes occur.

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4. HEALTH AND SAFETY

4.1. General Guidelines

With respect to health and safety, operators shall implement the following:

- Comply with the JBPHH Safety Manual.
- Use engineering, operational, administrative controls, or other means of performing work to eliminate or minimize health and safety hazard risk. Eliminating or minimizing health and safety hazard risk is preferred over the use of personal protective equipment (PPE). Use PPE to reduce hazard exposure when the hazard cannot be eliminated.
- Follow all OSHA requirements for work in confined spaces, trenching, roadways, etc.
- Use shoring for any hole deeper than 4 ft.
- Pay specific attention to the hazards outlined in *Section 4.2*.
- Be familiar with all applicable SDSs. Ensure SDSs are up to date. Ensure the SDS displayed / available match the chemical being used (i.e., do not use an SDS for the same chemical from another manufacturer).

4.2. Anticipated Hazards

- Injury due to moving parts and equipment (e.g., forklift, pump, motor)
- Confined space
- Electricity
- Work environment (hot weather, excessive heat, sun exposure, wet or humid environment, wet slippery grounds, elevated platform, uneven/unstable ground, noise, etc.)
- Heavy equipment

4.3. Personal Protective Equipment

Utilize the following PPE based on anticipated activities:

- Safety steel toe shoes with anti-slip soles
- Work gloves
- Eye protection
- Hearing protection
- Hardhat/helmet
- Class 2 safety vest (class 3 vest is required when visibility conditions are limited)

4.4. First Aid

Stocked first aid kits shall be kept in two primary locations: service trucks and water supply pump stations. Promptly remove any expired stock from first aid kits and replace. Operators shall follow detailed instructions in the JBPHH Safety Manual and EM-385-1-1, *Section 3* regarding first aid kit requirements, documentation, and follow up procedures.

Lead operators are responsible for ensuring all necessary first aid supplies are available and should periodically inspect the first aid kits for compliance with the requirements stated above. Operators must order stock in sufficiently advanced time to ensure delivery prior to expiration of old stock. Additionally, lead operators must ensure proper training is provided for all available first aid supplies.

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5. EQUIPMENT AND MATERIALS

See *Attachment 2* for a summary of spare parts and inventory locations. Individual SOPs contain specific spare part inventory requirements. The Transportation Division under Public Works provides access to operators for heavy equipment including bulldozers, flat beds, tanker trucks, Bobcats, offloaded trucks, rollers, excavators, backhoes, and dump trucks. Contact the Transportation Division to coordinate equipment and operator requests.

When equipment or material is transferred between different shops, the originating shop is responsible for completing a Material Inventory Form (MIF). This completed form must be submitted to the Supply Chain department.

Store all parts and equipment in accordance with the manufacturer's specific instructions. Ideally all equipment is stored in a climate (temperature and humidity) controlled facility; however, this is not always feasible. Minimum basic general storage practices are listed below.

- Prevent contaminating materials (dirt, debris, chemicals, and/or bacteria) from entering stored pipes, hydrants, valves, and appurtenances.
 - Temporarily seal openings during storage.
 - Ensure storage location is clean and not a source of contaminants.
 - Provide varmint control to protect storage areas.
- Store parts and equipment in covered areas to protect from sunlight and inclement weather. Protection from sunlight is especially important for plastic, rubber, and fiberglass, including polyvinyl chloride and high-density polyethylene piping, as they can be irreversibly damaged by ultraviolet light.
- Store parts and equipment off the ground to prevent moisture damage.
- Keep storage yards well maintained and organized, ensuring all stock is easily identifiable.
- Protect inventory from damage caused by vegetative growth including weeds and grass, which can both damage the parts and equipment and increase the risk of contamination.
- All parts and equipment with movable parts must be operated and lubricated per manufacturer's recommendations on a regular basis to prevent seizing.
- Start and operate all equipment that is not regularly operated to prevent fuel gumming, dead batteries, or other maintenance issues.
- Ensure storage yards have adequate site security to protect stock from being stolen, tampered with, or intentionally damaged or contaminated.
- Remove all stock that is damaged, excessively corroded, or otherwise not fit for installation.
- Never use chemical storage as a general storage space.
- Never store incompatible chemicals in the same space.
- Always investigate the compatibility of stored chemicals.
- Ensure that chemicals are stored within the confines of their controlled environment requirements, and where applicable, the integrity of secondary containment is maintained.

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6. SCHEDULE AND PROCEDURES

See *Attachment 1* and individual SOPs for detailed operation and maintenance schedules.

6.1. Schedule

Refer to *Table 6-1* for a system operation and maintenance schedule, refer to *Attachment 3-9* for a compiled checklist for the entire system. Detailed procedures are discussed in subsequent sections.

Table 6-1 Overview SOP Schedule

Frequency	Task	Section
Weekly	Review of Capital Improvement Projects	6.2
Monthly	Update Inventory	Error! Reference source not found.
Semi-Annual	Certification Verification	6.4
Annual	SOP Refreshers	6.5
	SOP Updates	6.6
	Record Keeping Review	6.7
	System Operation Review	6.8

6.2. Weekly Capital Improvement Review

- Review outstanding capital improvement projects.
- Generate a list of recommended capital improvement projects.
- Prioritize list of recommended capital improvement projects

6.3. Monthly Inventory Updates

- Review inventory for all major equipment; see individual SOPs for inventory location and details.
- Prioritize and purchase necessary inventory.
- Inspect first aid kit inventories for missing or expired supplies.
- Check the expiration date on all chemical reagents for sampling analysis.
- Rotate and lubricate all inventory with moving parts to prevent seizing.
- Operate all stored equipment that has not been exercised in the previous month.

6.4. Annual Certification Verification

Verify the certifications, expiration dates, and recertification requirements for all operation staff, ensuring staff are properly certified for current work items.

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6.5. Annual SOP Refreshers

Perform SOP refresher training; see individual SOPs for details.

6.6. Annual SOP, ERP, DWSCMP, CCCBFP, and Maintenance Flushing Program Update

Review and update all SOPs, ERP, DWSCMP, CCCBFP, and Maintenance Flushing Program based upon current operation, changes to system, and operational optimization.

6.7. Annual Record Keeping Review

- Review the previous year's construction projects and ensure all updates have been made to geographic information system mapping and computer aided design records.
- Review the previous year's construction projects and update Maximo®.
- Review items replaced under maintenance work and update Maximo®.

6.8. Annual System Operation Review

Review system operation with Lead and Senior Operations Staff to identify operational concerns, safety concerns, or other points of improvement to current operations.

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7. TROUBLESHOOTING

Troubleshooting is covered in each of the specific SOPs. For emergencies, follow the Chain of Command. Call the appropriate shop lead or operation control room.

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8. REFERENCES

See individual SOPs for specific references.

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9. ATTACHMENTS

- Attachment 1: SOP Acknowledgement and Training Form
- Attachment 2: Inventory Overview and Recommendations
- Attachment 3: Spare Parts, Equipment and Materials, and Consumables Inventories
- Attachment 4: Daily Task Checklists
- Attachment 5: Weekly Task Checklists
- Attachment 6: Monthly Task Checklists
- Attachment 7: Quarterly Task Checklists
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- Attachment 10: 2-5 Years Task Checklists

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Attachment 1:
SOP Acknowledgement and Training Form

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SOP ACKNOWLEDGEMENT AND TRAINING FORM

This SOP must be read and signed each time training is provided, or modifications are made to the SOP. This form should accompany the current SOP version.

Document Title:	Introduction and Overview
Document Revision Number:	
Document Revision Date:	

Please sign below in accordance with the following statement: "I have read and understood the above referenced document. I agree to perform the procedures described in this SOP in accordance with the document until such time that it is superseded by a more recent, approved revision."

Print Name	Signature	Date

Notes: _____

SOP Acknowledgement and Training Form (continued)

Trainee:

Sign below to acknowledge that training on this SOP was received, understood, and all questions/concerns were addressed by the trainer.

Trainer:

Sign below to acknowledge that training on this SOP was completed for the individual listed and that the trainee is competent to perform the procedures described within.

Date of Training [mm/dd/yyyy]	Trainee Print Name	Trainee Signature	Trainer Print Name	Trainer Signature

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Attachment 2:
Inventory Overview and
Recommendations

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NAVFAC HAWAII POTABLE WATER BRANCH



INVENTORY

Overview and Recommendations

Abstract: Inventory is stored in various places across JBPHH to be utilized for emergency repairs or smaller capital improvement projects.



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ATTACHMENTS

1. Inventory Spreadsheet



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1. DEFINITIONS/ACRONYMS

1.1. Definitions

None

1.2. Acronyms

- AWWA American Water Works Association
- PWD Public Works Division
- WHHP6A Potable Water Branch Production Work Center
- WHHP6B Pearl Harbor & Outlying Areas Distribution
- WHJP61 Hickam Distribution



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2. OVERVIEW

Inventory is stored in several places as outlined below. See *Attachment 1* for more details.

2.1. Potable Water Branch Production Work Center (WHHP6A)

WHHP6A maintains storage of pumps, motors, chemical feed pumps, chemical feed pump diaphragms and seals, and other miscellaneous equipment and parts.

2.2. Pearl Harbor and Outlying Areas Distribution (WHHP6B)

WHHP6B maintains large diameter pipe, fittings, and appurtenances, small to medium distribution system inventory including repair couplings, repair clamps, backflow preventers, piping, fittings, valves, fire hydrants, and other appurtenances, as well as larger distribution system inventory and overflow pallets of small to medium inventory.

2.3. Hickam Distribution (WHHP61)

WHHP61 maintains small to medium distribution system inventory, including repair couplings, repair clamps, backflow preventers, piping, fittings, valves, fire hydrants, and other appurtenances.

2.4. Operator's Truck

Small, time critical inventory is often kept in operator's trucks for quick access during an emergency, including chemical feed pump diaphragms and seals. Additionally, inventory is kept in the truck as needed for the current task.

3. STORAGE RECOMMENDATIONS

3.1. Introduction

The primary goal of inventory storage is to maintain the availability of materials for emergency repairs or capital improvement projects. To accomplish this goal, the inventory must be stored in a manner that maintains the quality, usability, and cleanliness of the various materials. Therefore, materials shall generally be stored, handled, and transported in the following manner:

- Protected from physical damage
- Protected from degradation by environmental factors including the following:
 - Ultraviolet light
 - Moisture
 - Temperature extremes (hot/cold)
 - Chemical compounds
- The interior of components should be protected from dirt and other contaminants including biological contamination from vermin such as rodents, birds, amphibians, and reptiles. This can be accomplished in a variety of ways including storage inside a well-maintained warehouse or capping/plugging the ends of pipe with commercially available products.

Additionally, materials shall always be handled and stored in strict accordance with all manufacturers' recommendations. Coordinate recommendations during procurement, to ensure proper planning for storage requirements.

3.2. General Guidelines

- Material should be stored on a level surface.
- Material should not be stacked excessively high, which creates safety concerns.
 - American Water Works Association (AWWA) recommends maintaining polyvinyl chloride pipe stacks below 8 feet and provides the table below for ductile iron pipe.
 - Confirm stacking height and shape with manufacturer and supplier.

Table 3-1 Maximum Stacking Heights – Ductile-Iron Pipe (From AWWA C600-23)

Nominal Pipe Size (inches)	Number of Tiers
3	18
4	16
6	13
8	11
10	10
12	9
14	8
16	7
18	6
20	6
24	5
30	4
36	4
42	3

3.3. Metallic Components Including Steel, Ductile Iron, and Cast Iron

Metallic components pose a unique risk of corrosion from moisture and humidity. Store material inside of a warehouse or other enclosed structure that is either fully climate controlled or at a

minimum ventilated whenever possible. If an enclosed structure is not available, ensure the material is stored off the ground and protected from rain. Ensure adequate ventilation around the material including between the material and the cover.

3.4. Plastic, Fiberglass, Rubber, and Painted/Coated Components

Plastic, fiberglass, rubber, and painted/coated components are less susceptible to corrosion from moisture, but do present unique storage criteria and should be protected from the following:

- Ultraviolet degradation by storing inside or under adequate shading
- Temperature extremes, which can make the products brittle (cold) or more flexible (hot). If the pipe may be exposed to warmer temperatures, ensure it is properly supported to avoid unnecessary deformation.
- Chemicals, including oil, grease, fuel, and other hydrocarbons
- Sources of ozone, including electric motors in enclosed areas

3.5. Handling and Transportation

Take care during handling and transportation to protect the material from impact damage, particularly from machinery including forklifts, back hoes, and other material handling equipment.

Specific recommendations for handling pipe include the following:

- If a forklift is utilized
 - Do NOT place the forks inside of the pipe as this can introduce dirt and contamination to the interior of the pipe, damage the interior of the pipe, or damage the pipe bell or plain end. It should be noted that damage to the pipe may not be visibly apparent; damage may consist of hidden stress fractures that create a weak point for failure after installation.
 - Inspect the forks and all components that will contact the pipe for sharp edges or points that could damage the pipe.
 - Use forks at the widest feasible setting to ensure stability and reduce point loading, which can create undue stress on the pipe.
- If a forklift is not available, use spreader bars, clamps, and/or straps to lift the pipe.
 - Spreader bars are ideal to ensure stability and reduce point loading, which can create undue stress on the pipe; however, spreader bars are not strictly required, especially with shorter and lighter pipes.
 - Ensure spreader bars, clamps, and/or straps are in good condition and properly rated for the load.
- Avoid jerky movements, as this can create additional stress on the pipe.
- Do NOT use chains or wires, as these can mar the pipe or coating.
- Special care shall be provided to protect the bell, including avoiding letting the weight of the pipe rest on the bell.



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4. INVENTORY MANAGEMENT

As described in SOP 1.1, inventory should not only be kept up to date but be reviewed monthly. During this review supervisors and lead operators should review upcoming projects and expected repairs to identify and order any missing inventory.

All inventory ordering shall be coordinate with shop supervisors.



NAVFAC HAWAII POTABLE WATER BRANCH

5. REFERENCE

- SOP 1.1: Introduction and Overview - Attachment 2: Inventory Spreadsheet

Attachment 3:
Spare Parts, Equipment and Materials, and
Consumables Inventories

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COMPILED JBPHH EQUIPMENT INVENTORY

Abstract: Inventories for equipment, materials, parts, and consumables are compiled for easy reference; lead operators and supervisors must ensure updates to inventories are reflected both here and in individual SOPs.

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Revision Tracking Sheet

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1. SOP 1.2 Miscellaneous Maintenance

1.1. Equipment and Materials

Description	Quantity	Storage Location
Brooms		
Dustpans		
Floor scrubbers		
Mops and buckets		
Paint cloth		
Rakes		
Scraper		
Shears		
Squeegees		
Tape		
Trimmers		
Weed whackers		
Wire Brush		

1.2. Consumables

Description	Quantity	Storage Location
Paint		
Primer		
Soap, floor detergent, cleaning solutions for windows, equipment surfaces and disinfectants wipes		
Trash bags		

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2. SOP 2.1 Water Supply Pump Stations

2.1. Parts

Description	Quantity	Storage Location
Seals	2 of each type	Waiawa shaft and Aiea/Halawa shaft
Bearings	2 of each type	Waiawa shaft and Aiea/Halawa shaft
Motor couplings	1 of each type	Waiawa shaft and Aiea/Halawa shaft

2.2. Equipment and Materials

Description	Quantity	Storage Location
General hand tools		Operator's truck
Grease gun		Operator's truck
Flashlight		Operator's truck
Straight edge		Operator's truck
Dial indicator		Operator's truck
Infrared thermometer		Operator's truck

2.3. Consumables

Description	Quantity	Storage Location
Grease		Waiawa Shaft
Oil		Waiawa Shaft
Packing material		Waiawa Shaft

Notes: _____

3. SOP 3.1 Booster Pump Stations

3.1. Parts

Description	Quantity	Storage Location
Seals	2 of each type	Waiawa shaft
Bearings	2 of each type	Waiawa shaft
Motor couplings	1 of each type	Waiawa shaft

3.2. Equipment and Materials

Description	Quantity	Storage Location
General hand tools		Operator's truck
Grease gun		Operator's truck
Flashlight		Operator's truck
Straight edge		Operator's truck
Dial indicator		Operator's truck
Infrared thermometer		Operator's truck

3.3. Consumables

Description	Quantity	Storage Location
Grease		Waiawa Shaft
Oil		Waiawa Shaft
Packing material		Waiawa Shaft

Notes: _____

4. SOP 4.1 Chlorine feed system

4.1. Parts

Description	Quantity	Storage Location
Spare metering pump	1	Waiawa pump station storage room
Metering pump valve, valve guide, valve seat	3	Waiawa pump station storage room
Metering pump O-ring and gasket	3	Waiawa pump station storage room
Metering pump diaphragm	3	Waiawa pump station storage room
Metering pump drive unit. 1/3-hp electric motor	1	Waiawa pump station storage room

4.2. Equipment and Materials

Description	Quantity	Storage Location
Access keys	1	
Portable transfer pump	1	
Safety gear and equipment	1	
Spill kit	1	
Tool kit	1	

4.3. Consumables

Description	Quantity	Storage Location
Gear Oil: Esso/Exxon GP80W-90, Shell Spirax/EP80, Mobil Pegasus Gear Oil 80 (Automobile Gear Oil Society of Automotive Engineers [SAE]-80, American Petroleum Institute [API] Grade GL-4), or Castrol Hypoy Gear Oil		

Notes: _____

5. SOP 4.2 Fluoride Feed System

5.1. Parts

Description	Quantity	Storage Location
Spare pump and motor unit (b) (3) (B)	1	Waiawa shaft
Metering pump valve, valve guide, valve seat	3 ea.	Waiawa shaft
Metering pump O-rings and gaskets	3 ea.	Waiawa shaft
Metering pump diaphragm (b) (3) (B)	3	Waiawa shaft
Metering pump drive unit. 1/3 hp electric motor	1	Waiawa shaft
Spare pump and motor unit (LMI Milton Roy)	1	Aiea/Halawa shaft
Metering pump diaphragm (LMI Milton Roy)	2	Aiea/Halawa shaft
Spare Parts Kit SP (LMI Milton Roy)	1	Aiea/Halawa shaft
Fluoride probe O-Rings Material of Construction: Viton®-75	2	Waiawa shaft (1) Aiea/Halawa shaft (1)

5.2. Equipment and Materials

Description	Quantity	Storage Location
Access keys		
Safety gear and equipment		
Tool kit		

5.3. Consumables

Description	Quantity	Storage Location
Gear Oil: Esso/Exxon GP80W-90, Shell Spirax/EP80, Mobil Pegasus Gear Oil 80 (Automobile Gear Oil Society of Automotive Engineers [SAE]-80, American Petroleum Institute [API] Grade GL-4), or Castrol Hypoy Gear Oil		

Notes: _____

6. SOP 5.1 Water Mains

6.1. Parts

Description	Quantity	Storage Location
12-inch polyvinyl chloride (PVC) pipe (18.5 feet)	14	PWD Division yard (near Bldg. 177)
10-inch PCV pipe (18.5 feet)	10	PWD Division yard (near Bldg. 177)
	11	Waiawa Shaft yard
8-inch PVC pipe (18.5 feet)	2	PWD Division yard (near Bldg. 177)
	6	Waiawa Shaft yard
4-inch PVC pipe (18.5 feet)	10	PWD Division yard (near Bldg. 177)
	6	Waiawa Shaft yard
2.5-inch PVC pipe (18.5 feet)	14	PWD Division yard (near Bldg. 177)
2-inch PVC pipe (18.5 feet)	5	Waiawa Shaft yard
1.5-inch PVC pipe (18.5 feet)	6	PWD Division yard (near Bldg. 177)
20-inch high density polyethylene (HDPE) pipe (11.5 feet)	4	Waiawa Shaft yard
6-inch HDPE pipe (11.5 feet)	6	Waiawa Shaft yard
4-inch HDPE pipe (11.5 feet)	8	Waiawa Shaft yard
24-inch steel pipe (18.5 feet)	2	PWD Division yard (near Bldg. 177)
20-inch steel pipe (18.5 feet)	3	PWD Division yard (near Bldg. 177)
12-inch steel pipe (18.5 feet)	5	PWD Division yard (near Bldg. 177)
10-inch steel pipe (18.5 feet)	11	PWD Division yard (near Bldg. 177)
8-inch steel pipe (18.5 feet)	6	PWD Division yard (near Bldg. 177)
6-inch steel pipe (18.5 feet)	2	PWD Division yard (near Bldg. 177)
12-inch coupling (Romac Coupling)	4	PWD Division warehouse (Bldg. 177)
10-inch coupling (Romac coupling)	3	PWD Division warehouse (Bldg. 177)
4-inch coupling (Romac coupling)	2	PWD Division warehouse (Bldg. 177)
42-inch coupling (Romac coupling)	4	Waiawa Shaft yard
30-inch coupling (Romac coupling)	5	Waiawa Shaft yard

Notes: _____

Description	Quantity	Storage Location
4" pipe repair clamps		
6" pipe repair clamps		
8" pipe repair clamps		
10" pipe repair clamps		
12" pipe repair clamps		
20" pipe repair clamps		
24" pipe repair clamps		
30" pipe repair clamps		

6.2. Equipment and Materials

Description	Quantity	Storage Location
Bucket and cloth		
Compression couplings and repair pipe		
Concrete saw		
Extension cords		
Generator		
Hydrant wrench		
Industrial concrete sprayer		
Ladders		
Light plants (at night)		
Manhole lifter or pry bar		
Metal detector		
Outside Diameter (O.D.) tape		
Picks		
Pipe Band-Aid (Size based on water drawings)		
Pipe wrench		
Safety tripod with retrieval safety block		

Notes: _____

Description	Quantity	Storage Location
Shoring		
Shovels		
Socket wrench set		
Torque wrench		
Valve keys		
Wire brush		
Trash pump for trench dewatering		
Backhoe		Transportation operations storage (Bldg. 1673) ¹
Bobcat		
Bulldozer		
Dump truck		
Excavator		
Flatbed truck		
Smooth wheeled roller		
Tanker truck		

6.3. Consumables

Description	Quantity	Storage Location
Caution Tape		
Calcium hypochlorite tablets and adhesive meeting NSF/ANSI/CAN 61		
Hypochlorite solution		
Paint		
Primer		

Notes: _____

7. SOP 5.2: Valves

7.1. Parts

Description	Quantity	Storage Location
6-inch gaskets	7	Hickam inspection truck
8-inch gaskets	8	Hickam inspection truck
10-inch gaskets	20	PWD Division warehouse (Building 177)
8-inch gaskets	30	PWD Division warehouse (Building 177)
6-inch gaskets	8	PWD Division warehouse (Building 177)
2-inch gaskets	50	PWD Division warehouse (Building 177)
2-inch gate valve	3	PWD Division warehouse (Building 177)
1 ¼-inch ball valve	9	PWD Division warehouse (Building 177)
¾-inch ball valve	2	PWD Division warehouse (Building 177)
2-inch ball valve	4	PWD Division warehouse (Building 177)
2 ½ inch ball valve	5	PWD Division warehouse (Building 177)
2-inch gate valve	7	PWD Division warehouse (Building 177)
8-inch gate valve	5	PWD Division warehouse (Building 177)
Diaphragm valve	1	PWD Division warehouse (Building 177)
O-rings	+100	Hickam storage shed (Building 4017)
	+100	PWD Division warehouse (Building 177)

7.2. Equipment and Materials

Description	Quantity	Storage Location
Clipboard		
Flashlight		
Manhole pole		
Metal detector		
Portable generators		
Pry bar		
Screwdrivers		

Notes: _____

Description	Quantity	Storage Location
Tape measure		
Temporary signs/boards (arrow boards, traffic maintenance signs)		
Traffic cones		
Vacuum cleaner		
Valve keys for all sizes		
Bulldozer		Transportation Operations Storage (Building 1673). Coordinate access and equipment operators through transportation division as required.
Flatbed truck		
Tanker truck		
Bobcat		
Smooth wheeled roller		
Excavator		
Backhoe		
Dump truck		

7.3. Consumables

Description	Quantity	Storage Location
Caution tape		
Food-grade grease		
Paint		
Paint protective coating		
Towels		

Notes: _____

8. SOP 5.3 Hydrants

8.1. Parts

Description	Quantity	Storage Location
Gaskets	12	Inspection truck
Bolts	20	Inspection truck
Duct tape	5	Inspection truck
Hydrant valve	2	Inspection truck
Strainers	6	Public Works Department (PWD) Division Warehouse
2.5-inch Hydrant Caps	8	PWD Division Warehouse
4.5-inch Hydrant Caps	8	PWD Division Warehouse
Wet-barrel hydrant	1	PWD Division Warehouse

8.2. Equipment and Materials

Description	Quantity	Storage Location
Hydrant wrench		
Discharge nozzle/diffuser		
Fire hose(s) with 2.5-inch adapter		
Hydrant adapter		
Valve key		
Manhole pole		
Pressure gauge(s)		
Pliers		
Measuring tape		
Painting supplies		
Wire brush		
"Out of service" sign		
Chains and lock		
Traffic cones		
Portable generator(s)		

Notes: _____

Description	Quantity	Storage Location
Shop vacuum cleaner		
Hand-held radios		
Boom Truck or backhoe		
Flashlight		
2-pound hammer		
Clipboard		
Screwdrivers		
Landscaping tools (shears, mower, shovel, etc.)		

8.3. Consumables

Description	Quantity	Storage Location
Food-grade grease		
Paint		

Notes: _____

9. SOP 6.1 Water Storage

9.1. Parts

Description	Quantity	Storage Location
Hatch and manway gaskets	2 for each size	Waiawa storage room
Insect screen (corrosion-resistant #24-Mesh)	10 square yards	Waiawa storage room

9.2. Equipment and Materials

Description	Quantity	Storage Location
Access keys	1	Control room
Flashlight		
Inspection mirror		
Safety gear and equipment		
Digital camera		
High-pressure washer		
Broom		
Brush		
Shop vacuum		
Pruning shears		
Weed trimmer		
Lawn mower		
Chlorine test kit		

9.3. Consumables

Description	Quantity	Storage Location
Detergent		
Sodium hypochlorite (12%)		
Food-grade lubricant		

Notes: _____

10. SOP 7.1 Backup power supply

10.1. Equipment and Materials

Description	Quantity	Storage Location
Voltage meter		
Electrician's toolkit		
Arc flash toolkit		

10.2. Consumables

Description	Quantity	Storage Location
Fuel		
Fuel oil spill control supplies		
Diesel fuel water test kits		

Notes: _____

11. SOP 8.1 Real-Time Monitoring

11.1. Parts

Description	Quantity	Storage Location
Pressure Transducer: Ashcroft (b) (3) (B)	2	Aiea/Halawa Shaft
Pressure Transducer: Ashcroft (b) (3) (B)	2	Aiea/Halawa Shaft
Pressure Transducer: Ashcroft (b) (3) (B)	1	Aiea/Halawa Shaft
Pressure Transmitter: Wika (b) (3) (B)	1	Moanalua Terrace Booster Pump Station

11.2. Consumables

Description	Quantity	Storage Location
Multisorb Technologies DriCan® desiccant		

Notes: _____

12. SOP 8.2 Spot Monitoring

12.1. Equipment and Materials

Description	Quantity	Storage Location
Pump Vibration Meter: Monarch Instrument, Examiner 1000	2	Waiawa shaft and mechanic's truck
Infrared Thermometer	2	Waiawa shaft and mechanic's truck
Hach (b) (3) (B) Pocket Colorimeter, Chlorine, Free + Total, LR/HR Hach Product: (b) (3) (B)	2	Waiawa shaft
Hach (b) (3) (B) Multiparameter Portable Colorimeter Hach Product: (b) (3) (B) Note: utilized for both Chlorine and Fluoride Measurements	2	Waiawa shaft
Pressure gauges and various adaptors	4	Waiawa shaft and operator's truck

12.2. Consumables

Description	Quantity	Storage Location
SpecCheck Secondary Gel Standards, DPD Chlorine – LR Hach Product: (b) (3) (B)	1	Waiawa Shaft
Fluoride Standard Solution, 0.8-mg/L F – 500 mL Hach Product: (b) (3) (B)	1	Waiawa Shaft
DPD Free Chlorine Reagent Powder Pillows Hach Product: (b) (3) (B)	3 boxes of 50 count	Waiawa Shaft
SPADNS 2 Fluoride Reagent AccuVac® Ampuls Hach Product: (b) (3) (B)	4 boxes of 25 count	Waiawa Shaft
Kimtech Kimwipes® Low-Lint Wipers Kimberly-Clark®: 34120	3 boxes of 280 count	Waiawa Shaft
Chemical resistant gloves		
Chemical resistant face shield		
Chemical resistant apron		
Batteries		

Notes: _____

Attachment 4: Daily Task Checklists

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SOP 2.1 Water Supply Pump Stations

Daily Pump Station Observation and Inspection Checklist

Date: _____ to _____									
		S	S	M	T	W	T	F	Comments
Task #	Inspector's initials								
1	Observe pumps for abnormal noise, vibrations, and leaks	☐	☐	☐	☐	☐	☐	☐	
2	Observe motors for abnormal noise, vibrations, and leaks	☐	☐	☐	☐	☐	☐	☐	
3	Record pump run hours and cycle counts	☐	☐	☐	☐	☐	☐	☐	
4	Record pump discharge pressure and flow rate	☐	☐	☐	☐	☐	☐	☐	
5	Inspect pipes for leaks	☐	☐	☐	☐	☐	☐	☐	
6	Document and notify supervisor	☐	☐	☐	☐	☐	☐	☐	
Comments:									



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SOP 3.1 Booster Pump Stations

Daily Pump Station Observation and Inspection Checklist

Date: _____ to _____									
		S	S	M	T	W	T	F	Comments
Task #	Inspector's initials								
1	Observe pumps for abnormal noise, vibrations, and leaks	☐	☐	☐	☐	☐	☐	☐	
2	Observe motors for abnormal noise, vibrations, and leaks	☐	☐	☐	☐	☐	☐	☐	
3	Record pump run hours and cycle counts	☐	☐	☐	☐	☐	☐	☐	
4	Record pump discharge pressure and flow rate	☐	☐	☐	☐	☐	☐	☐	
5	Inspect pipes for leaks	☐	☐	☐	☐	☐	☐	☐	
6	Document and notify supervisor	☐	☐	☐	☐	☐	☐	☐	
Comments:									



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SOP 4.1 Chlorine Feed System

Daily Inspection and Monitoring Checklist

Date: _____ to _____									
Task #	Inspector's initials	S	S	M	T	W	T	F	Comments
1	Inspect grounds for cleanliness, orderliness, and proper material storage	☐	☐	☐	☐	☐	☐	☐	
2	Verify stored materials do not obstruct access	☐	☐	☐	☐	☐	☐	☐	
3	Ensure adequate lighting	☐	☐	☐	☐	☐	☐	☐	
4	Check for safety hazards	☐	☐	☐	☐	☐	☐	☐	
5	Seal entry points and check for pest activity	☐	☐	☐	☐	☐	☐	☐	
6	Inspect hoses, tubing, pipes, and fittings	☐	☐	☐	☐	☐	☐	☐	
7	Ensure chemical feed tank opening/vents/overflows are screened	☐	☐	☐	☐	☐	☐	☐	
8	Conduct a manual chlorine residual check	☐	☐	☐	☐	☐	☐	☐	
9	Monitor chlorine feed tank level	☐	☐	☐	☐	☐	☐	☐	
10	Document findings	☐	☐	☐	☐	☐	☐	☐	
Comments:									



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SOP 4.2 Fluoride Feed System

Daily Inspection and Monitoring Checklist

Date: _____ to _____		S	S	M	T	W	T	F	Comments
Task #	Inspector's initials								
1	Inspect grounds for cleanliness, orderliness, and proper material storage	☐	☐	☐	☐	☐	☐	☐	
2	Verify stored materials do not obstruct access	☐	☐	☐	☐	☐	☐	☐	
3	Ensure adequate lighting	☐	☐	☐	☐	☐	☐	☐	
4	Check for safety hazards	☐	☐	☐	☐	☐	☐	☐	
5	Seal entry points and check for pest activity	☐	☐	☐	☐	☐	☐	☐	
6	Inspect hoses, tubing, pipes, and fittings	☐	☐	☐	☐	☐	☐	☐	
7	Ensure chemical feed tank opening/vents/overflows are screened	☐	☐	☐	☐	☐	☐	☐	
8	Conduct a manual fluoride residual check	☐	☐	☐	☐	☐	☐	☐	
9	Monitor fluoride feed tank level	☐	☐	☐	☐	☐	☐	☐	
10	Document findings	☐	☐	☐	☐	☐	☐	☐	
Comments:									



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SOP 6.1 Water Storage

Daily Remote Tank Monitoring Checklist

Date: _____ to _____								
	S	S	M	T	W	T	F	Comments
Task #	Inspector's initials							
1	Monitor SCADA system for alarm or warning	☐	☐	☐	☐	☐	☐	
2	Check SCADA pump status	☐	☐	☐	☐	☐	☐	
3	Monitor tank levels	☐	☐	☐	☐	☐	☐	
4	Confirm the expected number of pumps are running	☐	☐	☐	☐	☐	☐	
5	Shut off the longest running pump when tanks reach their maximum levels	☐	☐	☐	☐	☐	☐	
6	Monitor pump vibration levels	☐	☐	☐	☐	☐	☐	
7	Document tank levels and any findings	☐	☐	☐	☐	☐	☐	
Comments:								



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SOP 8.2 Spot Monitoring

Daily Chlorine and Fluoride Verification Checklist

Date: _____ to _____									
		S	S	M	T	W	T	F	Comments
Task #	Inspector's initials								
1	Rinse the sample container 3 times	☐	☐	☐	☐	☐	☐	☐	
2	Draw samples from analyzer overflow (from chlorine and fluoride analyzer overflow)	☐	☐	☐	☐	☐	☐	☐	
3	Analyze sample	☐	☐	☐	☐	☐	☐	☐	
4	Document results	☐	☐	☐	☐	☐	☐	☐	
Comments:									

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Attachment 5: Weekly Task Checklists

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SOP 1.2 Miscellaneous Maintenance

Weekly Site Security Maintenance and Housekeeping Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect buildings and equipment	☐	
2	Inspect all physical security measures	☐	
3	Clean all areas from debris	☐	
4	Sweep and mop floors	☐	
5	Empty trash cans	☐	
6	Ensure all equipment are stores securely	☐	
7	Confirm outdoor lighting are functional	☐	
8	Ensure all outdoor access points are clear of obstruction	☐	
9	Document maintenance and findings	☐	

Comments:



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SOP 2.1 Water Supply Pump Stations

Weekly Pump Packing Inspection and Housekeeping Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect pump packing's leakage rate. Adjust accordingly.	☐	
2	Inspect gland temperature	☐	
3	Check for oil and grease levels	☐	
4	Add oil and/or grease if necessary	☐	
5	Inspect operation of sump pumps	☐	
6	Wipe equipment clean	☐	
7	Perform general housekeeping	☐	
8	Document maintenance and findings	☐	

Comments:



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SOP 3.1 Booster Pump Stations

Weekly Pump Packing Inspection and Housekeeping Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Inspect pump packing's leakage rate. Adjust accordingly.	☐	
2	Inspect gland temperature	☐	
3	Check for oil and grease levels	☐	
4	Add oil and/or grease if necessary	☐	
5	Inspect operation of sump pumps	☐	
6	Wipe equipment clean	☐	
7	Perform general housekeeping	☐	
8	Document maintenance and findings	☐	
Comments:			



SOP 4.1 Chlorine Feed System

Weekly Inspection and Calibration Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Switch lead/standby metering pumps	☐	
2	Change chart recorder paper and record date/time	☐	
3	Perform housekeeping (wipe surfaces, trash, floors)	☐	
4	Inspect metering pumps for noise, vibrations, and leaks	☐	
5	Perform Chlorine analyzer calibration	☐	
6	Document findings	☐	
Comments:			



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SOP 4.2 Fluoride Feed System

Weekly Metering Pump and Analyzer Operations Checklist

Date:

Inspector(s):

#	Task		Comments
1	Perform housekeeping (wipe surfaces, trash, floors)	☐	
2	Inspect pumps for noise, vibrations, and leaks	☐	
3	Check discharge pressure, flow rate, and voltage for fluctuations	☐	
4	Calibrate fluoride probe	☐	
5	Document findings	☐	

Comments:



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SOP 6.1 Water Storage

Weekly Site Security Maintenance and Housekeeping Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect security measures (fences, gates, vandalism)	☐	
2	Inspect and secure all ladders access locks, ladder guards, and tank hatches	☐	
3	Trim excessive vegetation, remove dead trees, and branches	☐	
4	Inspect tank openings, vents, and overflow pipes	☐	
5	Ensure proper drainage and flapper valve function	☐	
6	Verify mechanical gauges against SCADA readings	☐	
7	Document maintenance and findings	☐	

Comments:



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SOP 8.1 Real-Time Monitoring

Weekly Control Panel and Appurtenance Inspection Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Inspect panels for corrosion, damage, and proper closure	☐	
2	Check antenna, solar panels, cables, and conduit seals	☐	
3	Note and rest reboot count	☐	
4	Clean control panels with air (per manufacturer's guide)	☐	
5	Document findings	☐	

Comments:

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SOP 8.2 Spot Monitoring

Weekly Tank Level and Temperature Monitoring Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Verify tank levels	☐	
2	Measure the temperature of pump packing	☐	
3	Compare temperatures to ideal operating conditions	☐	
4	Document findings	☐	
Comments:			

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Attachment 6: Monthly Task Checklists

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SOP 1.2 Miscellaneous Maintenance

Monthly Site Ground Maintenance Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Perform vegetation maintenance (trim and remove weeds around facilities and equipment)	☐	
2	Clear obstructions from structures and pipelines	☐	
3	Clear ditches from any obstructions	☐	
4	Unclog drains (if necessary)	☐	
5	Lubricate and exercise locks	☐	
6	Document findings and repairs	☐	
Comments:			



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SOP 2.1 Water Supply Pump Stations

Monthly Miscellaneous Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Verify motor and pump shaft parallelism and alignment	☐	
2	Conduct a sump pump field test	☐	
3	Check bubbler compressor oil level	☐	
4	Check bubbler compressor intake air filter	☐	
5	Check bubbler compressor and air system piping for leaks	☐	
6	Perform housekeeping	☐	

Comments:



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SOP 4.1 Chlorine Feed System

Monthly Metering Pump Calibration and Inspection Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Coordinate calibration with pump station	☐	
2	Isolate non-operating pump (close suction/discharge valves)	☐	
3	Record initial data: flow rate, pumps in service, signal, stroke length	☐	
4	Fill calibration column to 2 L	☐	
5	Record time to withdraw 1000 mL	☐	
6	Re-open feed tank valve, close calibration column valve	☐	
7	Calculate feed rate (mL/min)	☐	
8	Document calibration, issues, and repairs.	☐	
Comments:			



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SOP 4.2 Fluoride Feed System

Monthly Metering Pump Calibration Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Coordinate calibration with pump station	☐	
2	Isolate non-operating pump (close suction/discharge valves)	☐	
3	Record initial data: flow rate, pumps in service, signal, stroke length	☐	
4	Fill calibration column to 2 L	☐	
5	Record time to withdraw 1000 mL	☐	
6	Re-open feed tank valve, close calibration column valve	☐	
7	Calculate feed rate (mL/min)	☐	
8	Document calibration, issues, and repairs.	☐	
Comments:			



Monthly Tank Cleaning Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Ensure fluoride system is offline	☐	
2	Empty remaining solution	☐	
3	Remove distributor piping, suction tubes, and float valves	☐	
4	Scrub tank with brush and soapy water	☐	
5	Rinse tank thoroughly	☐	
6	Refill tank	☐	
7	Document maintenance, repairs, and findings	☐	
Comments:			



SOP 6.1 Water Storage

Tank:

	Date:		
	Inspector(s):		
#	Task	☐	Comments
1	Check for minimum water turnover		
2	Inspect the tank concrete foundation for signs of cracks, spalling for damage		
3	Check exterior of concrete tanks for seepage, cracks, loose or crumbly material		
4	Inspect tank's paint condition		
5	Inspect tank roof for cracks and corrosion		
6	Inspect roof coating signs of peeling		
7	Inspect tank vent screen for damage	☐	
8	Inspect the hatch and inner seal for signs of damage		
9	Inspect the water inside the tank for surface contaminants	☐	
10	use a flashlight to inspect the interior walls and tank bottom	☐	
11	Mark any spots where daylight is visible	☐	
12	Check the cathodic protection system		
13	Collect grab sample for analysis		
14	Document findings and repairs		

Comments:



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SOP 7.1 Backup Power Supply

Monthly Fuel Inspection Checklist

Date:

Inspector(s):

#	Task		Comments
1	Check fuel for water contamination; drain/replace if > 200 mg/L	☐	
2	Investigate water sources	☐	
3	Observe fuel for excessive debris	☐	

Comments:



JBPHH



SOP 8.1 Real Time Monitoring Monthly Data Evaluation Checklist

Date:

Inspector(s):

#	Task		Comments
1	Review pump vibration data trend (weekly, monthly, and quarterly)	☐	
2	Review tank level data trend	☐	
3	Confirm 30% turnover is achieved for all tanks	☐	

Comments:



JBPHH



SOP 8.2 Spot Monitoring

Monthly Spot Vibration Monitoring Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Measure the vibration

☐

2

Compare readings to ideal operations

☐

4

Analyze vibration data

☐

5

Document findings

Comments:

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Attachment 7: Quarterly Task Checklists

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SOP #	Title	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	2-5 Years
1.1	Introduction and Overview							
1.2	Miscellaneous Maintenance	☐	☒	☒	☒	☒	☒	☐
2.1	Water Supply Pump Stations	☒	☒	☒	☒	☐	☒	☐
3.1	Booster Pump Stations	☒	☒	☒	☒	☐	☒	☐
4.1	Chlorine Feed System	☒	☒	☒	☐	☒	☒	☐
4.2	Fluoride Feed System	☒	☒	☒	☐	☒	☒	☐
5.1	Water Mains	☐	☐	☐	☐	☒	☒	☐
5.2	Valves	☐	☐	☐	☐	☒	☒	☐
5.3	Hydrants	☐	☐	☐	☐	☒	☒	☒
6.1	Water Storage	☒	☐	☒	☐	☐	☒	☒
7.1	Backup Power Supply	☐	☐	☒	☒	☐	☒	☐
8.1	Real Time Monitoring	☐	☒	☒	☒	☒	☒	☒
8.2	Spot Monitoring	☒	☐	☐	☐	☐	☐	☐
9.1	Cybersecurity	Checks, upgrades, updates as needed						

☒	Check mark indicates that SOP has a task checklist at that frequency interval.
☐	No Check mark indicates that SOP does not have a task checklist at that frequency interval.



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SOP 1.2 Miscellaneous Maintenance

Quarterly Safety Equipment Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect safety equipment	☐	
2	Verify the operational status of system alarms (audible, visual, SCADA)	☐	
3	Notify supervisor of any findings	☐	

Comments:



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SOP 2.1 Water Supply Pump Stations
Quarterly Miscellaneous Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect pump base and anchor bolts	☐	
2	Check spare parts inventory	☐	
3	Clean, inspect, and repair control panels	☐	
4	Record running amps on all pumps	☐	
5	Inspect well vents and attached screen	☐	
6	Inspect air release valves	☐	

Comments:



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SOP 3.1 Booster Pump Stations
Quarterly Miscellaneous Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Inspect pump base and anchor bolts	☐	
2	Check spare parts inventory	☐	
3	Inspect, clean, and repair control panels	☐	

Comments:



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SOP 7.1 Backup Power Supply

Quartely Leak Detection System Inspection Checklist

Date:

Inspector(s):

#

Task



Comments

1

Verify electronic leak detection system is working

2

Manually check secondary containment area



Comments:



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SOP 8.1 Real Time Monitoring
Quarterly Data Evaluation Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Perform water consumption data analysis

☐

2

Perform system pressure data analysis

☐

3

Perform pump run time data analysis

Comments:

Attachment 8:
Semi-Annual Task Checklists

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SOP #	Title	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	2-5 Years
1.1	Introduction and Overview							
1.2	Miscellaneous Maintenance	☐	☒	☒	☒	☒	☒	☐
2.1	Water Supply Pump Stations	☒	☒	☒	☒	☐	☒	☐
3.1	Booster Pump Stations	☒	☒	☒	☒	☐	☒	☐
4.1	Chlorine Feed System	☒	☒	☒	☐	☒	☒	☐
4.2	Fluoride Feed System	☒	☒	☒	☐	☒	☒	☐
5.1	Water Mains	☐	☐	☐	☐	☒	☒	☐
5.2	Valves	☐	☐	☐	☐	☒	☒	☐
5.3	Hydrants	☐	☐	☐	☐	☒	☒	☒
6.1	Water Storage	☒	☐	☒	☐	☒	☒	☒
7.1	Backup Power Supply	☐	☐	☒	☒	☐	☒	☐
8.1	Real Time Monitoring	☐	☒	☒	☒	☒	☒	☒
8.2	Spot Monitoring	☒	☐	☐	☐	☐	☐	☐
9.1	Cybersecurity	Checks, upgrades, updates as needed						

☒	Check mark indicates that SOP has a task checklist at that frequency interval.
☐	No Check mark indicates that SOP does not have a task checklist at that frequency interval.



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SOP 1.2 Miscellaneous Maintenance

Semi-Annual Gutter Cleaning and Spout Checklist

Date:

Inspector(s):

#	Task	☐	Comments
1	Clean gutters on all buildings	☐	
2	Drain spouts on all buildings	☐	
3	Align splash pads under drain spouts	☐	

Comments:



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SOP 5.1 Water Mains

Semi-Annual Water Distribution Pipes Asset Management Checklist

Date:

Inspector(s):

#	Task	☐	Comments
1	Update pipe asset inventory	☐	
2	Assess and replenish inventory	☐	
3	Maintain and update maintenance records	☐	
4	Update Maximo® to reflect pipe installations, removals, etc.	☐	
5	Document and notify supervisor	☐	

Comments:



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SOP 5.2 Valves

Semi-Annual Valve Asset Management Checklist

Date:

Inspector(s):

#	Task	☐	Comments
1	Update valve asset inventory	☐	
2	Assess and replenish inventory	☐	
3	Maintain and update maintenance records	☐	
4	Update Maximo® to reflect valve installations, removals, etc.	☐	
5	Document and notify supervisor	☐	

Comments:



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SOP 8.1 Real Time Monitoring

Semi-Annual RTU Antenna and Vertical Turbine Flow Meter Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Inspect tower structural integrity		
2	Perform VSWR test		
3	Check the radio power output		
4	verify system addressing and polling effort		
5	Clean strainers of all vertical turbine flow meters		
6	Document findings		

Comments:

Attachment 9: Annual Task Checklists

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SOP #	Title	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	2-5 Years
1.1	Introduction and Overview							
1.2	Miscellaneous Maintenance	☐	☒	☒	☒	☒	☒	☐
2.1	Water Supply Pump Stations	☒	☒	☒	☒	☐	☒	☐
3.1	Booster Pump Stations	☒	☒	☒	☒	☐	☒	☐
4.1	Chlorine Feed System	☒	☒	☒	☐	☒	☒	☐
4.2	Fluoride Feed System	☒	☒	☒	☐	☒	☒	☐
5.1	Water Mains	☐	☐	☐	☐	☒	☒	☐
5.2	Valves	☐	☐	☐	☐	☒	☒	☐
5.3	Hydrants	☐	☐	☐	☐	☒	☒	☒
6.1	Water Storage	☒	☒	☒	☐	☐	☒	☒
7.1	Backup Power Supply	☐	☐	☒	☒	☐	☒	☐
8.1	Real Time Monitoring	☐	☒	☒	☒	☒	☒	☒
8.2	Spot Monitoring	☒	☒	☒	☐	☐	☒	☐
9.1	Cybersecurity	Checks, upgrades, updates as needed						

☒	Check mark indicates that SOP has a task checklist at that frequency interval.
☐	No Check mark indicates that SOP does not have a task checklist at that frequency interval.



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SOP 1.2 Miscellaneous Maintenance

Annual Painting and Control Panel Inspection Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Painting any equipment and components that require a fresh layer of paint	☐	

Comments:



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SOP 2.1 Water Supply Pump Stations

Annual Pump Operation Check and Compressor Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Replace oil	☐	
2	Replace grease	☐	
3	Perform full pump operation	☐	
4	Check compressor oil level	☐	
5	Replace compressor air filter	☐	
6	Change compressor's oil	☐	
7	Record vibration readings	☐	
8	Record bearing temperatures	☐	
9	Document findings	☐	

Comments:



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SOP 2.1 Water Supply Pump Stations

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

Comments:



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SOP 3.1 Booster Pump Stations

Annual Pump Operations Check and Compressor Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Replace oil	☐	
2	Replace grease	☐	
3	Perform full pump operation	☐	
4	Check compressor oil level	☐	
5	Replace compressor air filter	☐	
6	Change compressor's oil	☐	
7	Record vibration readings	☐	
8	Record bearing temperatures	☐	
9	Document findings	☐	

Comments:



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SOP 3.1 Booster Pump Stations
Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#	Task		Comments
1	Schedule training based on availability	☐	
2	Conduct SOP training (review key SOP aspects, address questions)	☐	
3	Document session details and SOP revisions	☐	

Comments:



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SOP 4.1 Chlorine Feed System

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

Comments:



JBPHH



SOP 4.2 Fluoride Feed System

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

Comments:



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SOP 5.1 Water Mains

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#	Task	☐	Comments
1	Schedule training based on availability	☐	
2	Conduct SOP training (review key SOP aspects, address questions)	☐	
3	Document session details and SOP revisions	☐	

Comments:



SOP 5.2 Valves

Annual Pump Station Valve Inspection and Maintenance Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Ensure area is hazard free. If needed, secure area with cones/traffic control	☐	
2	Conduct gas-free test (if confined space)	☐	
3	Inspect valve for corrosion, damage, wear	☐	
4	Check opening/closing device condition	☐	
5	Inspect protective coating	☐	
6	Check for leaks	☐	
7	Clean valve, piping, fittings, gauges	☐	
8	Lubricate moving parts	☐	
9	Inspect/clean/replace filter (if applicable)	☐	
10	Paint pipes, valves, and fittings	☐	
11	Replace damaged valves immediately	☐	
12	Conduct valve specific maintenance	☐	
13	Document findings and repairs	☐	
Comments:			



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SOP 5.2 Valves

Annual Distribution Gate Valve Inspection and Maintenance Checklist

Date:

Inspector(s):

#	Task		Comments
1	Ensure area is hazard free. If needed, secure area with cones/traffic control.	☐	
2	Inspect valve box for damage and clear the area from any obstructions	☐	
3	Inspect and clean valve nut	☐	
4	Lubricate valve stem	☐	
5	Exercise valve (open and close valve)	☐	
6	Note the number of rotations	☐	
7	Estimate pipe size (rotations/3)	☐	
8	Document maintenance/repairs/findings	☐	

Comments:



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SOP 5.2 Valves

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

☐

Comments:



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SOP 5.3 Hydrant

Annual Hydrant Maintenance and Inspection Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Clear the area from any obstruction, vegetation, and debris		
2	Measure height from 4.5-inch outlet to ground level		
3	Check the hydrant for signs of damage, such as cracks, or corrosion		
4	Check for leaks		
5	Exercise hydrant valves to ensure operability		
6	Ensure all outlets are clear of debris		
7	Flush hydrant to remove all foreign material		
8	Clean the nozzle threads and cap threads with a wire brush to remove any debris or corrosion		
9	Clean and grease caps		
10	Paint the hydrant according to NFPA requirements		
11	Document (Findings and Repairs)		
Comments:			



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SOP 5.3 Hydrant

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

Comments:



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SOP 6.1 Water Storage

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task



Comments

1

Schedule training based on availability

2

Conduct SOP training (review key SOP aspects, address questions)

3

Document session details and SOP revisions

Comments:



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SOP 7.1 Backup Power Supply
Annual Coordination Meeting Checklist

Date:

Inspector(s):

#	Task		Comments
1	Verify maintenance and inspections are current	☐	
2	Update inventory lists	☐	
3	Discuss life cycle and upcoming replacement/repairs	☐	
4	Discuss potential system improvements	☐	

Comments:



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SOP 7.1 Backup Power Supply

Annual SOP Refresher Training Checklist

Date:

Inspector(s):

#

Task

☐

Comments

1

Schedule training based on availability

☐

2

Conduct SOP training (review key SOP aspects, address questions)

☐

3

Document session details and SOP revisions

Comments:



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SOP 8.1 Real Time Monitoring

Annual RTU Inspection and Calibration Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Inspect and manually verify instrument reading against RTU readings		
2	Note and resolve any observed alarms		
3	Compare RTU readings to sensor and manual readings		
4	Check battery voltage/amp hours		
5	Document findings		
Comments:			



SOP 8.1 Real Time Monitoring

Annual SOP Refresher Training Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Schedule training based on availability	☐	
2	Conduct SOP training (review key SOP aspects, address questions)	☐	
3	Document session details and SOP revisions	☐	
Comments:			

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Attachment 10:
2-5 Years Task Checklists

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SOP #	Title	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	2-5 Years
1.1	Introduction and Overview							
1.2	Miscellaneous Maintenance	☐	☒	☒	☒	☒	☒	☐
2.1	Water Supply Pump Stations	☒	☒	☒	☒	☐	☒	☐
3.1	Booster Pump Stations	☒	☒	☒	☒	☐	☒	☐
4.1	Chlorine Feed System	☒	☒	☒	☐	☒	☒	☐
4.2	Fluoride Feed System	☒	☒	☒	☐	☒	☒	☐
5.1	Water Mains	☐	☐	☐	☐	☒	☒	☐
5.2	Valves	☐	☐	☐	☐	☒	☒	☐
5.3	Hydrants	☐	☐	☐	☐	☒	☒	☒
6.1	Water Storage	☒	☒	☒	☐	☐	☒	☒
7.1	Backup Power Supply	☐	☐	☒	☒	☐	☒	☐
8.1	Real Time Monitoring	☐	☒	☒	☒	☒	☒	☒
8.2	Spot Monitoring	☒	☒	☒	☐	☐	☒	☐
9.1	Cybersecurity	Checks, upgrades, updates as needed						

☒	Check mark indicates that SOP has a task checklist at that frequency interval.
☐	No Check mark indicates that SOP does not have a task checklist at that frequency interval.



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SOP 5.3 Hydrant

Hydrant Flow Test (every 5 years) Checklist

	Date:		
	Inspector(s):		
#	Task		Comments
1	Record static pressure		
2	Record pitot pressure		
3	Record residual pressure		
4	Document (findings and pressure values)		
5	Calculate flow in GPM		

Comments:

--



SOP 6.1 Water Storage

	Date:		
	Inspector(s):		
#	Task	☐	Comments
1	Conduct tank exterior (including roof) inspection per monthly tasks		
2	Shutdown tank and notify authorities (Waiawa Control Room and local fire department)		
3	Dechlorinate and drain the contents of the tank		
4	Follow safety and confined space entry regulations		
5	Isolate and drain tank		
6	Clean tank (scrub, wash, rinse, and flush)		
7	Disinfect tank following AWWA guidelines		
8	Refill tank and conduct bacteriological test		
9	Return tank to service		
10	Document findings and repairs		

Comments:



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SOP 8.1 Real Time Monitoring Checklist
Annual Meter Calibration (Every 2 Years) Checklist

Date:

Inspector(s):

#

Task

Comments

1

Calibrate mechanical flow meters

☐

Comments: