City of Atka

Operation and Maintenance Manual

New Water Treatment Plant

Prepared by:
CE2 Engineers, Inc.

Issue Date: May 2012 *Draft*

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CHAPTER 1 - INTRODUCTION

A. PURPOSE OF THIS MANUAL

The purpose of this Operation & Maintenance (O&M) Manual is to guide you through the workings of the Atka Water Treatment Plant (WTP). This is not an exhaustive guide to every piece of equipment within the system. Rather, it lists the basic safety, preventive maintenance, and record keeping requirements necessary to protect you, the operator, and to keep the plant running. Additionally, this manual describes the system and provides basic troubleshooting advice for common problems.

B. MANUAL OVERVIEW

This manual is in two volumes. Volume I describes the operation and maintenance of the Water System and provides appendices listing additional information about the system. Volume II contains the original manufacturers' literature for key components in the system. The O&M section of Volume I will be the most important and frequently used section of the manual. It is divided into nine chapters:

Chapter	Title	Contents
1	Introduction	An overview of the manual and the system
2	Safety	Information on protecting the operator
3	Preventive Maintenance	Routine actions for keeping the system running properly
4	Records	Paperwork that must be filled out to document maintenance
5	Testing	Procedures for making sure the system is running correctly.
6	System Components	An explanation of each individual piece of the system
7	Emergency Plan	Instructions for how to handle a major malfunction. Instructions for how to shut the plant down.
8	Contacts	A list of phone numbers and addresses you will need to run the system.
9	Glossary of Terms	A dictionary of terms used in this manual.

C. HOW TO USE THIS MANUAL

Read this manual. The back of each page has been left blank so that you may make notes if you wish. You may underline, highlight, or make notes next to passages that you find particularly important or relevant. This is your manual, so do what is necessary to make it clear and usable

for you. If you do not understand a word, check the Glossary of Terms in Chapter 9. If you do not understand a section, mark it and ask for an explanation from your Remote Maintenance Worker (RMW).

The following table explains what the lettering and symbols in this manual mean.

Typography in this manual

	Shows you a telephone number that you may need to call if you need assistance or if have to report a violation.
	Reminds you to write something down, usually in one of the operation logs.
	Shows you an address to which you must mail something, usually a sample or an operation record
	Warns you of a deadly hazard.
red lettering	Warns of possible damage to you
blue lettering	Warns of possible damage to the equipment

If you experience a problem with a particular piece of equipment and you do not know what is wrong, follow these steps:

1. Read the section in Chapter 6 about the troublesome system component. These sections explain normal operation and list common problems and their solutions.
2. If the problem cannot be solved by reading Chapter 6, look at the manufacturers' literature in Volume II. The manufacturer's literature presents specific information about each component and offers additional troubleshooting suggestions. There is often a customer service number listed in this literature.
3. If steps 1 and 2 do not solve the problem, call your RMW at the number listed below.

Before you call, write down the following information to share with your RMW:

- The equipment information
  - Component name
  - Manufacturer name
  - Model number

- The problem
    - What is wrong with the equipment
    - What you have done to try to repair it

Contact information if you need assistance with repairs

Doug Abbas, Remote Maintenance Worker (RMW)
Aleutian Pribilof Islands Association
201 E. 3rd Avenue
Anchorage, Alaska 99501
Phone: (907) 222-4218
Toll free: (800) 478-2742
Fax: (907) 279-4351
Email: douga@apiai.com

D. OPERATOR'S RESPONSIBILITIES

You, the operator of this Water System, are responsible for making sure that the City of False Pass receives safe drinking water from this facility. If you face a problem you cannot solve with the help of this manual, you should contact your supervisor immediately. Problems that prevent the normal delivery of water to the community or that prevent water from being safely filtered can harm the public and yourself.

The following responsibilities are general guidelines for your job. More specific responsibilities are listed as Preventive Maintenance (Chapter 3). Do not attempt to operate this facility without reading Chapter 3.

- Be safe. Above all, protect yourself from injury (see Chapter 2).
- Keep a clean, well-organized facility.
- Protect the water from contamination.
- Properly treat the water to make it safe.
- Test the water to confirm its safety.
- Report the testing results regularly to ADEC. Keep up to date on regulations.
- Perform daily, Weekly, monthly, semi-annual, and annual maintenance.
- Keep clear and accurate records.
- Be aware of problems with the equipment. Look and listen for leaks, strange noises and vibrations, and broken lights or meters.
- Maintain all parts of the system as well as you can.

E. SYSTEM OVERVIEW

This manual provides operation and maintenance information for the City of Atka Water System located in Atka, Alaska (Public Water System Identification Number 2260058). The original WTP was installed by the U.S. Public Health Service in 1977 and 1978.

In 2011 and 2012, the following water system improvements were made:

- A new line valve below the spillway of the raw water impound dam was installed to replace the old, inoperative one.
- A new 130,000 gallon water storage tank (WST) was constructed.
- A new Water Treatment Plant (WTP) was constructed adjacent to the new WST, along with a new lined backwash pond.
- A septic tank and drain field was constructed for the WTP.
- 208 volt 3-phase power was brought to the WTP.
- A 1200 LF buried 8-inch SDR11 HDPE watermain from the WTP was installed and connected to the existing water distribution system.

A series of figures are provided in the FIGURES tab at the end of this section. Figure 1-1 shows the Atka overall site and utilities. Figure 1-2 presents an overview of the water treatment process. Figure 1-3 presents the water treatment plant plan, and Figure 1-4 presents the water treatment plant site plan.

The complete Water System layout and system schematic are shown on the Atka, Alaska Water System Upgrades project as-built drawings provided in Appendix A. A copy of the Atka, Alaska 2010 Water Storage Tank as-built drawings is also provided in Appendix A.

F. DESIGN INFORMATION

DESIGN CRITERIA	
System	
Community	Atka
PWSID#	2260058
Water System Type	Surface
Water Source	Small stream originating in three small lakes
Population	
Current(2010 Census)	61 people
Design	91 people

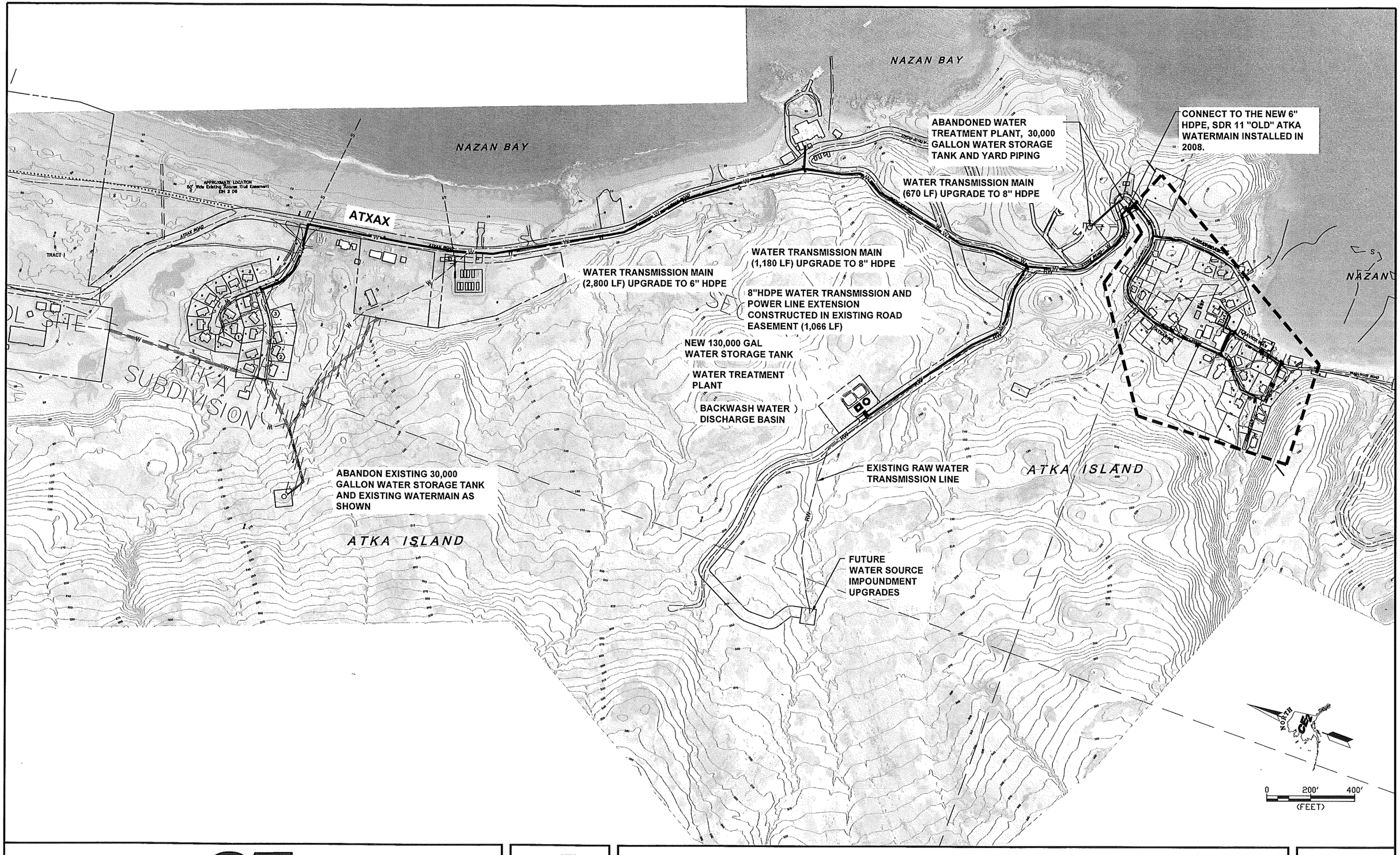
Demand	
Design Daily Use	100 gpcd
Residential Daily Demand	9,100 gpd
Commercial Daily Demand	28,800 gpd
Total Daily Demand	37,900 gpd
Intake	
Raw Water Design Flow	42 gpm
Dam Construction	Timber and plywood dam and spillway
Intake Screen	Twin stainless v-wire screens (0.125" slot) in "dumbbell" arrangement with 4-inch branch outlet from the tee
EQUIPMENT	
Chemical Feed Control	
Flow Switch	FCI #FLT93B-AB00
Chemical Feed Pumps, Flow meter, Streaming Current Detector	LMI Model #AA951-450HI chemical feed pump Endress + Hauser Model 50W50-PL0AIRC1BAAW, 2-inch Magnetic Flow meter M-1 Milton Roy Model # SC5200 Streaming Current Detector with automatic jet wash and cyclone separator
Chemical Tank Mixer	
Manufacturer	Neptune
Model	71636819, Type V63B1, 29" shaft
Coagulant System	
Chemical	Nalco 8185
Tank Capacity	30 gallons
Maximum Pump Flow Rate	1.00 gph (3.7854 lph)
Chemical Dosage Rate	3.0 mg/L (best estimate)
Pump Manufacturer	LMI
Pump Model	A951-450HI
Speed	100
Stroke	29 (varies on input signal from Streaming Current Detector SCD-1)

Static Mixer	Westfall Mfg. Wafer Style, 2" flanged, Model #2800 PVC mounting ring, with ½" NPT PVC chemical injection quill
Multimedia Pressure Filters	
Diameter	60 inches
Filter Media	18" Anthracite 12" Subangular Quartz 4" Garnet layers 18" Gravel layers
Number of Tanks	2 each
Manufacturer	West Coast Filters Inc.
Serial Number	03-05-15B and 03-05-15C
Design Filter Rate	20 gpm each
Backwash System	
When to backwash? After any one of these conditions occurs:	• Increase in turbidity above 0.3 NTU, color above 15 PCU • Increase in pressure drop across filters (6 psi) • Decrease in flow through filters
Backwash Flow Rate	240 to 300 gpm, depending upon water temperature
Turbidimeter System	
Manufacturer	Hach
Model	1720E
Chart Recorder	Honeywell Inkless Chart Recorder, Model #DR4312-0000-C0100-0000-0000-00-000-00, 10" diameter chart paper with two pens
Chlorination System	
Chemical	HTH powder, 65% available chlorine
Tank Capacity	30 gallons
Maximum Pump Flow Rate	1.00 gph
Free Chlorine Residual Target	0.2-0.7 mg/L
Pump Manufacturer	LMI
Pump Model	A771-450HD
Speed	50% (15 ml/min initial at 40 gpm flow rate)
Stroke	50%

Solution	1% solution
WTP Backflow Preventer	
Manufacturer	Watts
Model	774
Size	4-inch, with isolation valves
Water Storage Tank	
Water Tank WT-1 Capacity	130,000 gallons to overflow
How is level regulated?	Operator monitors altitude gauge and starts and treatment process to maintain level between 10.5’ and 15’
Water Mains	
Size	4- to 6-inch
Material	HDPE
Transmission Line to Water Mains	
Size	8-inch
Material	SDR 11 bare HDPE

gpcd = gallons per capita per day
gpd = gallons per day
gpm = gallons per minute
lph = liters per hour
lpm = liters per minute
mg/L = milligrams per liter
NTU = nephelometric turbidity units
O.D. = outside diameter
psi = pounds per square inch
PWSID = public water system identification number

Figures



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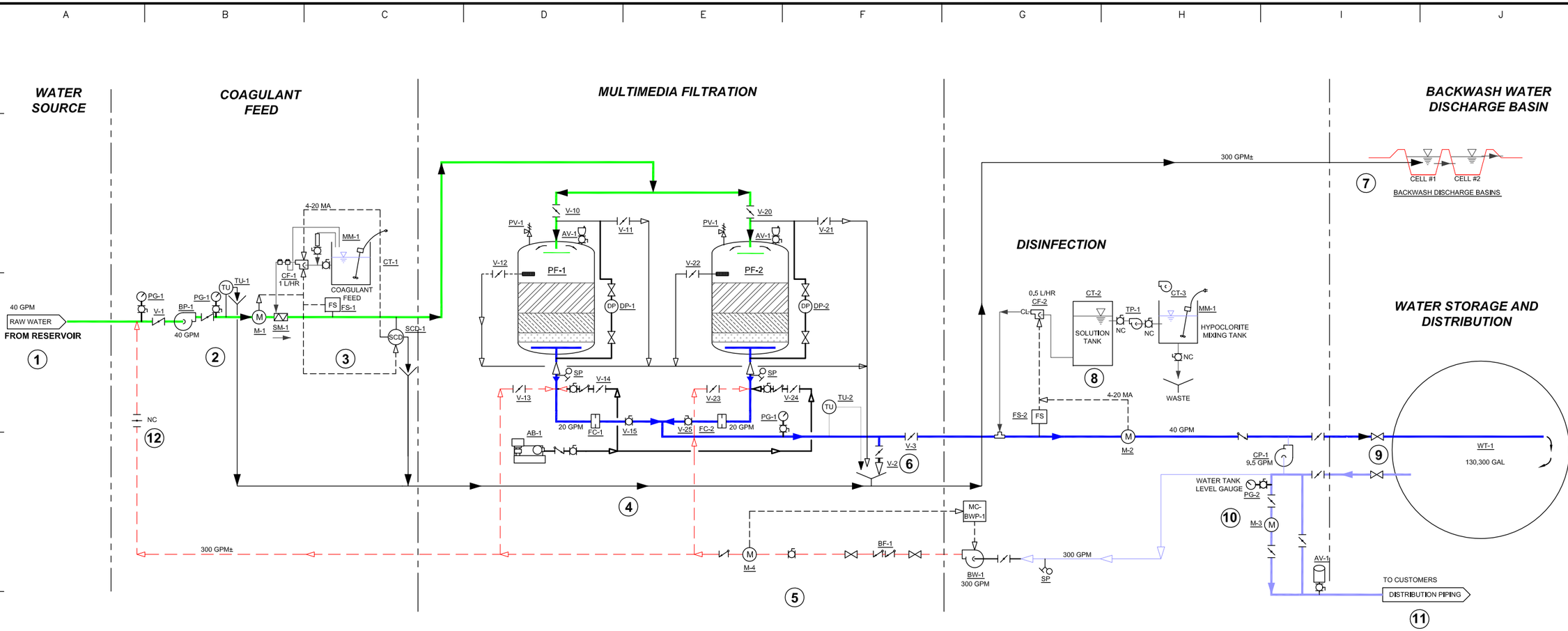
ATKA OVERALL SITE AND UTILITIES

ATKA, ALASKA

FIGURE 1-1

G:\ACAD\ATKA\2009 Water System Upgrades\FIGURES\OM MANUAL\FIG 1-1 OVERALL SITE AND UTILITIES.dwg, 5/30/2012 10:02:53 AM, Flash, LANIER MP C2050_LDS20C PCL 6BLK WHITE.pc3



WATER TREATMENT PROCESS DIAGRAM

NOTE: FOR PROCESS NARRATIVE TEXT, SEE SHEET M1.0

LEGEND

- CONTROL LINK
- POTABLE WATER
- BACKWASH IN
- PROCESS WATER
- BACKWASH OUT
- CHEMICAL FEED
- AIR SCOUR
- SM-# STATIC MIXER
- AB-# AIR BLOWER
- AV-# AIR AND VACUUM RELIEF VALVE
- BF-# BACKFLOW PREVENTOR
- CF-# CHEMICAL FEED PUMP
- CP-# CIRCULATION PUMP
- CT-# CHEMICAL TANK
- CV-# CONTROL VALVE
- (DP) DIFFERENTIAL PRESSURE INDICATOR
- FC-# FLOW CONTROL
- FM-# FLOW METER
- FS-# FLOW SWITCH
- MPFCP MAIN PRESSURE FILTER CONTROL PANEL
- LC-# LEVEL CONTROL
- MM-# MOTORIZED MIXER
- M-# METER
- N.C. NORMALLY CLOSED VALVE
- PF-# PRESSURE FILTER
- PG-# PRESSURE GAUGE
- PT-# MULTIMEDIA PRESSURE FILTER
- PV-# PRESSURE RELIEF VALVE
- SCD-# STREAMING CURRENT DETECTOR
- SM-# STATIC MIXER
- SP SAMPLE PORT
- TH-# THERMOMETER
- TM-# TURBIDIMETER
- TU-# TURBIDY SENSOR
- VB-# VACUUM BREAKER
- WT-# WATER TANK

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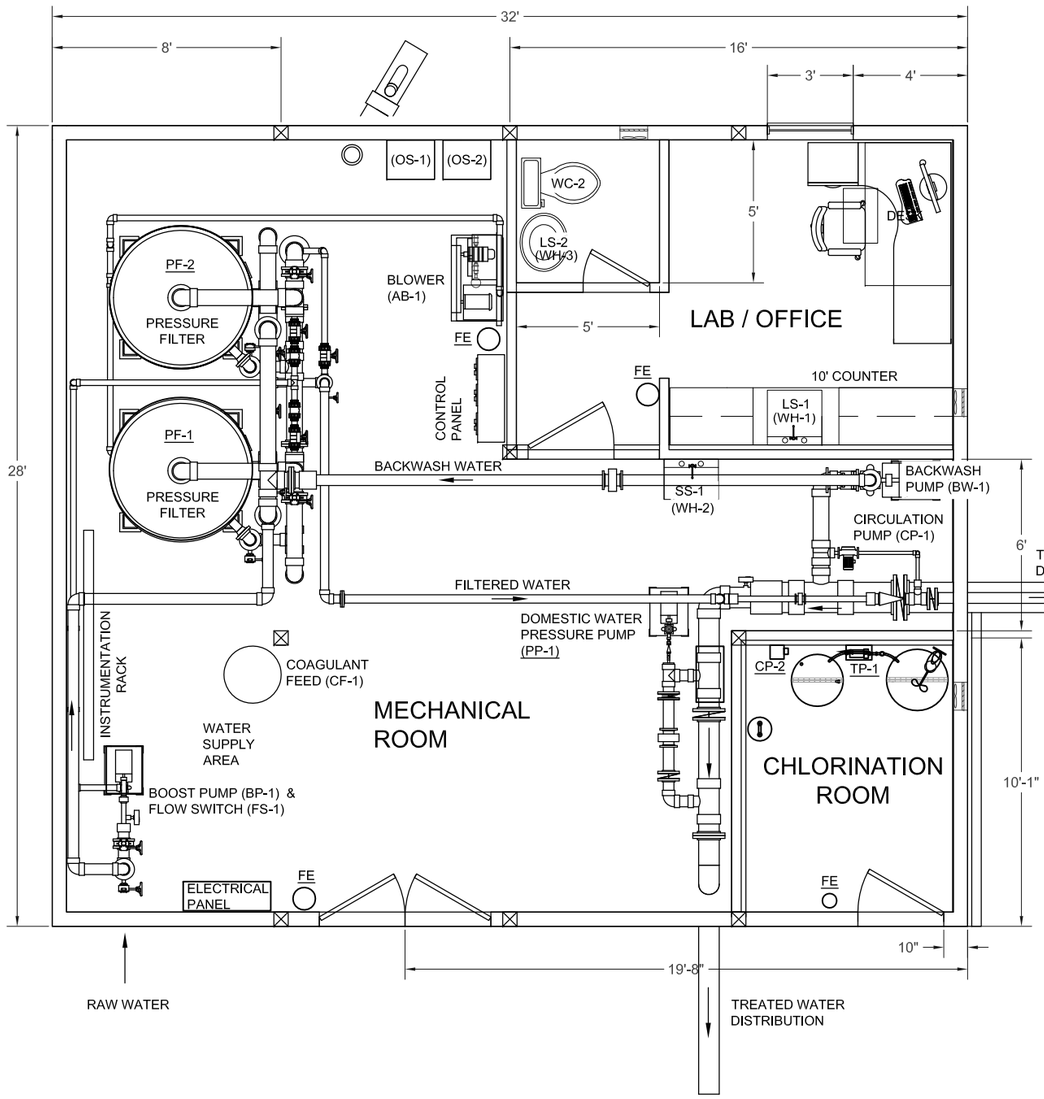
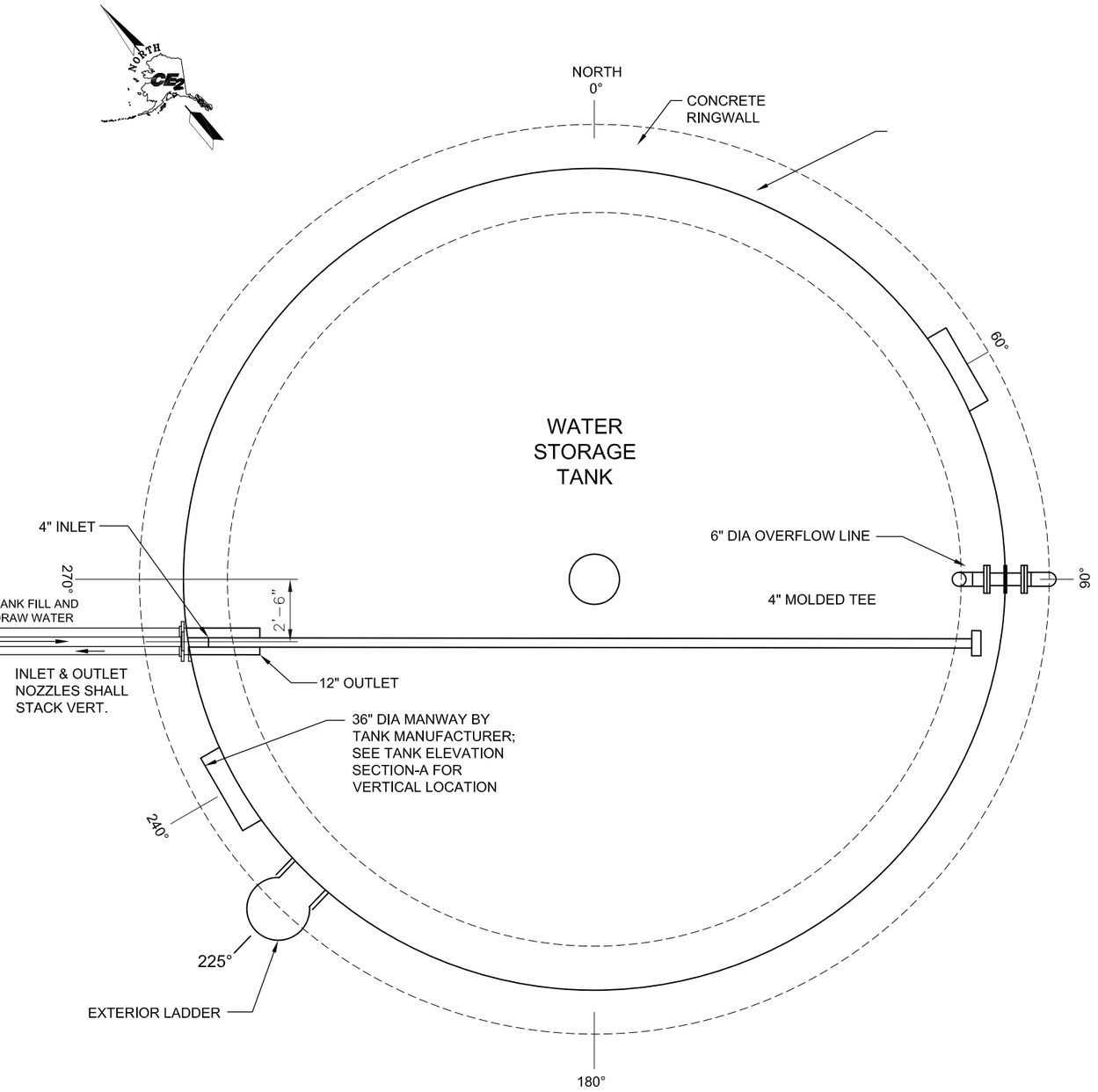
WATER TREATMENT PROCESS OVERVIEW

ATKA, ALASKA

FIGURE 1-2





FLOOR PLAN

Scale: 3/8" = 1'-0"

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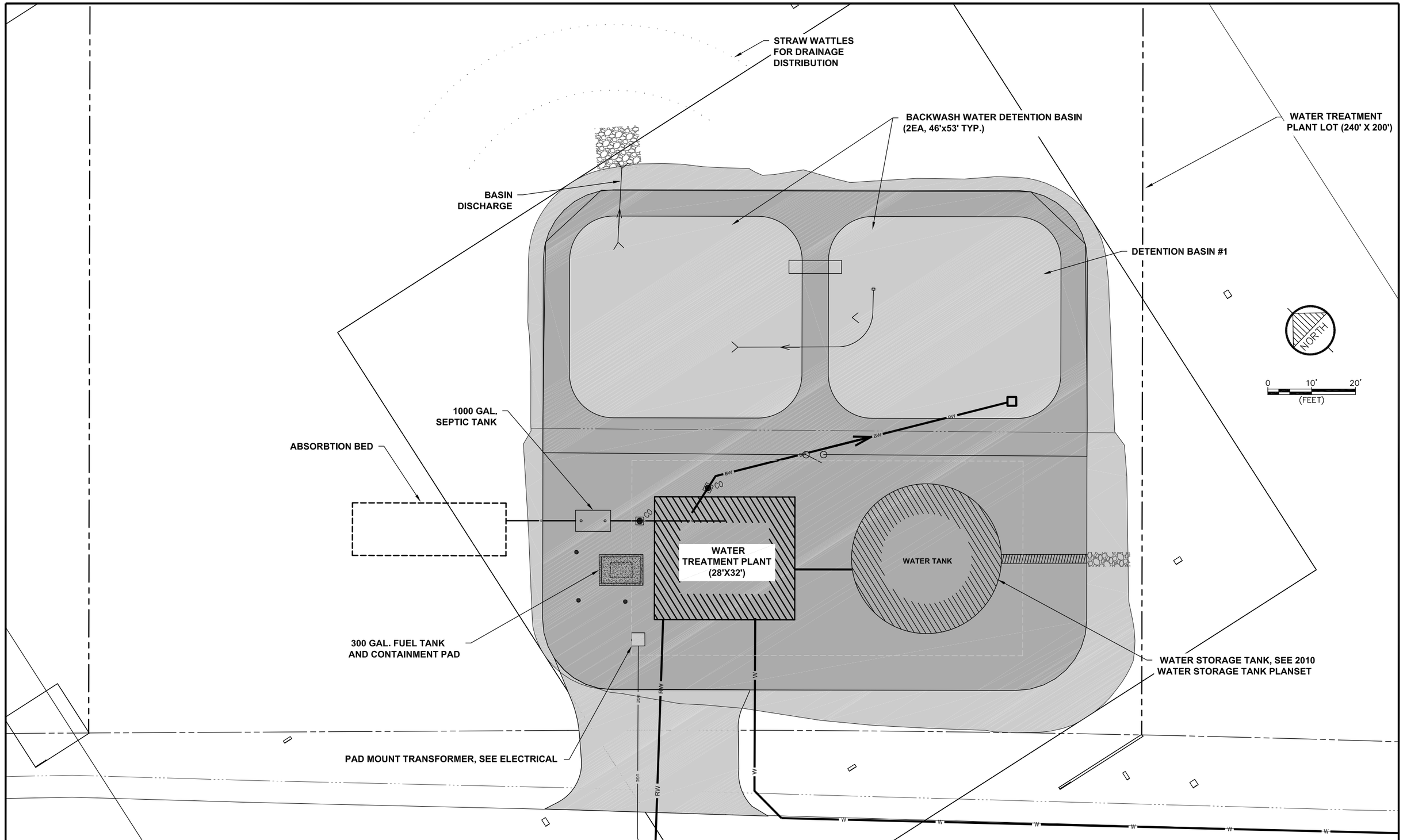
WATER TREATMENT PLANT PLAN

ATKA, ALASKA

FIGURE 1-3



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WATER TREATMENT PLANT SITE PLAN

ATKA, ALASKA

FIGURE 1-4

CHAPTER 2 - SAFETY AND HEALTH

WASH YOUR HANDS FREQUENTLY WHEN WORKING WITH THE ATKA WATER TREATMENT PLANT COMPONENTS. ALWAYS WASH YOUR HANDS AFTER WORKING WITH CHEMICALS AND BEFORE TAKING SAMPLES.

A. GENERAL

Safety must be the operator's highest concern. There are many potential safety hazards associated with the operation and maintenance of a water treatment system. Even routine tasks at this facility can be dangerous. The operator must use caution, judgment, and the appropriate equipment to protect himself, the public, and the facility property.

This section presents some of the dangers involved with working at this facility and ways to avoid injury. More specific safety information about the system components is available in the manufacturer's literature (Behind the appendices of this Manual). The operator and anyone involved with the facility should read this chapter carefully. Report all injuries, accidents, and/or unsafe working conditions to a supervisor.

Do not use the water treatment plant's facilities or tools for maintenance of anyone's personal equipment. All buildings you work in should remain locked when you are not present.

While this section presents basic safety information, the State of Alaska Occupational Safety and Health Administration (OSHA) will expect you to have and follow more detailed written safety procedures. Your local environmental health specialist can provide more information on how to implement a comprehensive safety program.

B. HOUSEKEEPING

One of the easiest ways to create a safe working environment is to practice good housekeeping. This means placing items—especially tools—where they belong. Some chemicals should not be stored near each other. See the Material Safety Data Sheets (MSDSs) for details.

Spills should be cleaned up immediately. Leaks should be patched. Unnecessary equipment should be removed. Floors should be swept and mopped weekly (or more frequently if necessary). A bleach or pine-sol type detergent/disinfectant should be used in a water solution for mopping. Be careful when walking on wet floors (see Section F below). This same solution should be used to clean the walls as needed in order to maintain the air quality in the plant.

Do not use ammonia products for cleaning. Ammonia mixed with bleach or hypochlorite solutions produces hazardous gases!

C. ELECTRICAL

Maintenance work on the facility's electrical systems must be performed by a trained electrician.

When working on electrical equipment,

DO:

- Turn the appropriate circuit breakers and disconnects **OFF** before starting work on any electrical system components or equipment.
- Follow the Lock Out/Tag Out Procedure (see Section D below).

DO NOT:

- Do not work on electrical equipment with wet hands, clothes, or shoes.
- Do not stand in water or on pipes or drains.
- Do not use metal ladders when repairing electrical equipment.

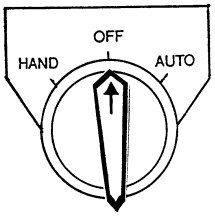
Tripped breakers are one of the more common electrical conditions, and the cause of the overload should be investigated before the breaker is reset.

Replace all operating and warning lights when they burn out.

Assume that all transformers are energized.

D. LOCK OUT/TAG OUT PROCEDURE

Before working on electrical equipment, follow this procedure:



1. Turn off the equipment using the local power switch (HOA)
2. Throw the main breaker for that piece of equipment to disconnect (open) the power.
3. Lock the main breaker with a pad lock, and **DO NOT** give the key to anyone else.
4. Place a "DO NOT OPERATE" tag on the breaker. Do not let anyone else remove the tag.

5. To check that the equipment is not working, try to start the equipment by turning the local switch on (hand or power ON). Check the voltage at the equipment if there is a voltage tester/meter. THERE SHOULD BE NO VOLTAGE. The equipment should not start. If there is no voltage, it is now safe to work on the equipment.
6. When work is complete, remove the lock and tag yourself.

E. MECHANICAL EQUIPMENT

Before working on mechanical equipment, do the following:

- Turn circuit breakers and electricity **OFF**.
- Use a voltmeter or wiggie to check any red or yellow wires coming from the control panel. These may be time delay switch or relay wires. Trace them out.
- Follow Lock Out/Tag Out Procedure (See Section D above).
- Make sure all moving parts are stopped.

After repair, before restarting the equipment, make sure all personnel and tools are clear of the mechanical equipment and all working parts are free to move without obstruction.

F. FALLING

The table below presents the most common places where falling can occur and the safety actions that the operator should take to protect himself and others.

LOCATION	SAFETY ACTION
WTP STEPS	Shovel snow and ice from steps. Use salt if it is necessary. Do not let ice accumulate on the steps.
WATER INTAKE ACCESS TRAIL	Maintain access to trail by clearing brush. Wear boots with good traction.
LADDERS	Be sure all four legs of the ladder are on the ground and stable. When possible, have someone hold the ladder. Carry as little as possible up and down the ladder. Do not stand on the top of the ladder.
FLOORS	Mop up all liquids, powders, and dusts on the floor. If additional time is needed for drying, place a “Wet Floor” sign in the area.

G. LIFTING

Improper lifting techniques can cause permanent damage to your back. Both light and heavy objects can be hazardous if you lift them incorrectly. Following these techniques can help you stay safe:

- Never attempt to lift large, awkward, or heavy objects without assistance.
- Lift by bending the legs, never the back. Keep your back straight.
- Hold objects close to you when lifting. In other words, don't reach out to lift an object.
- Do not twist your back. Use your feet to turn if you have to place an object to your side.
- Use mechanical devices or power equipment whenever possible.
- Do not hurry.
- Store heavy items at waist height to avoid bending or reaching when picking them up.
- Store chemicals below eye level.
- Order items in quantities you can move safely.

H. FIRE

Chemicals and electricity in the WTP may cause fire or make fires more hazardous. To avoid fire and injury, follow the Do's and Don'ts listed below.

DO:

- Throw away greasy and oily rags in a covered metal container outside the building.
- Store chemicals in a safe and correct manner to avoid dangerous chemical combinations. See the MSDSs.
- Talk to your supervisor or Environmental Health Specialist about fire extinguisher training.
- Know where the fire extinguishers are and make sure nothing is blocking you from getting to them.
- Check the fire extinguishers every month to make sure they are fully charged and have an annual professional inspection.

DO NOT:

- Do not let flammable garbage build up in or outside the building.
- Do not smoke or use open flames around flammable chemicals, in manholes, or around pump stations.
- Do not smoke or use open flames while handling fuels, solvents, or greases.

In the event of a fire remember RACE and PASS:

RACE

Rescue any people who are in danger.

Alarm—call the local emergency number.

Confine the fire—keep it to a small area if you can. Close doors and windows.

Extinguish the fire if you can use the fire extinguisher safely.

If you need to use a fire extinguisher, remember:

PASS

Pull the pin.

Aim the nozzle.

Squeeze the trigger.

Sweep back and forth over the area on fire.

I. CHEMICAL HANDLING

Some chemical solutions used in the WTP are harmful and corrosive. Use a respirator, rubber gloves, aprons, and goggles when preparing these solutions. Clean up all spills immediately. Store chemicals in approved safety containers with the lids on and store them in a dry area separate from fuels, oils, and food. If chemicals splash on clothing or skin, clean immediately.

Detailed information on the handling of certain chemicals and the appropriate First Aid procedures are detailed on the MSDS for the chemical of concern. Copies of MSDS forms are provided for known chemicals in use in the WTP are provided in Appendix B. Familiarize yourself with the MSDS for each chemical you use. When additional chemicals are brought into the WTP, be sure to place a copy of the product MSDS in your MSDS binder. All workers must have access to an MSDS for each chemical they may use in the WTP.

Make sure you have access to a working ANSI-rated eyewash system. Work the system weekly to make sure it is ready if you need it.

Be sure to wash your hands after working with chemicals.

J. TOOLS

Incorrect use of hand or power tools may lead to serious injuries or accidents. Remember that tools can be just as dangerous when they are not in use. Follow these guidelines to protect yourself:

- Use the appropriate tool for the job. Don’t use makeshift tools.
- Repair or replace tools if they are defective or damaged.
- Wear the proper protective clothing (for example, gloves or goggles).

- Carry sharp tools pointed away from your body.
- Don't put sharp tools into your pockets.
- Don't leave tools unattended on a ladder, a ledge, or any other high point where it might fall on you or someone else.
- Make sure tools have the proper guards attached to them.

K. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some of the chemicals used at the WTP can irritate or injure you. Eye and skin irritation is noticeable, but your lungs and kidneys may also be affected if you do not take the proper precautions. The MSDS (Appendix B) for each chemical explains what Personal Protective Equipment (PPE) is necessary for handling that chemical. Even though some of the chemicals are in safe forms in the water supply, the concentrated versions of chemicals, such as chlorine, can be dangerous.

Wash your hands before you smoke or eat. This is particularly important after working with chemicals.

L. CONFINED SPACES

Do not enter a confined space. If work must be done in a confined space, contact your Regional Environmental Health Program Manager or Utility Operations Specialist.

A confined space is a space where there is a limited entry or exit. In other words, there is only one way into or out of the space, and that entry/exit may not be very big. These spaces are not created for humans to stay in and may lack proper ventilation. Lift stations, manholes, and utilidor accesses are the most common hazardous confined spaces. Other confined spaces are filters, vaults, and water tanks.

Understand the following primary hazards of working in a confined space:

- Dangerous air conditions
  - Too little oxygen is in the air.
  - The air is flammable because of dust, vapor, or gas mixing with oxygen and a source of ignition.
  - Toxic chemicals may be inhaled.
- Limited movement or visibility
- Chance of getting stuck
- Over 50% of the workers who die in confined spaces were trying to rescue other workers

As operator, you should know which system components contain confined spaces. Ask your regional health program manager or RMW to show you which areas are confined spaces. A confined space may look safe, but it may be filled with dangerous gases or may pose other threats that cannot be seen. **Do not enter a confined space. If work must be done in a confined space, call your local RMW for guidance and assistance on planning an entry.**

CHAPTER 3 - PREVENTIVE MAINTENANCE

A. MAINTENANCE PROCEDURE

You, the operator, are responsible for maintaining a safe and properly functioning Water System. The best way to maintain this system is to practice scheduled preventive maintenance. This will help prevent breakdowns and will help you catch small problems before they become big problems.

This chapter explains your responsibilities to perform the maintenance for the WTP and other Water System components. The contents of this chapter form your preventive maintenance program (PMP). The PMP is a list of jobs that are performed regularly. Some are done daily, some weekly, some monthly, some twice a year, and some annually.

Following this schedule will help you avoid some major repairs later on.

B. MAINTENANCE TASK SCHEDULE

These are general plant tasks. Check the equipment listed. If there is a problem with the equipment, refer to Chapter 6 for details on that specific component.

DAILY		
Equipment	**Make sure that you…**	
Coagulant Solution System	Check the Polymer solution level in the vat and replace the solution as needed. Make sure chemical feed pump CF-1 is injecting the proper amount of coagulant and is not air-locked.	
Multimedia Pressure Filters	Record the pressure reading on pressure gauges on inlet/outlet of each sand filter. Backwash the filters if the differential pressure is in the 4-8 psi range.	
Turbidimeters	Take a filtered water turbidity reading and record the turbidity on the ADEC Report Form. The reading should be 0.3 NTU or lower. Backwash the pressure sand filters if there is an increase in the turbidity above 0.3 NTU.	

Chlorine System	Check and record the chlorine residual at the entry point to the distribution system (downstream of the water storage tank) on the ADEC Report Form. The test result should be a minimum of 0.2 mg/L. Check the chlorine solution level in the vat and replace the solution as needed. Make sure that chemical feed pump CF-2 is injecting the proper amount of chlorine solution and is not air-locked.	
WTP Flow Meters	Check and record the Raw Water (M-1), filtered water (M-2) treated water (M-3) and backwash water meter (M-4) totalizer readings.	
WTP	Check for any strange smells, sounds, or leaks.	
Heating System	Check that the two Toyotomi oil heaters are operating correctly.	
WEEKLY		
Equipment	**Make sure that you…**	
Water Intake	Remove debris from the impoundment dam and spillway. Remove debris from v-wire screens on intake assembly.	
WTP	Clean the plant, remove all trash, and sweep and mop the floors.	
Water System	Check the system for leaks, damage to hydrant and valve boxes, or other problems. Repair any problems.	
MONTHLY		
Equipment	**Make sure that you…**	
Water Intake	Reset valves in WTP to run backwash water from backwash pump BW-1 to raw water transmission line and screen intake. Run backwash pump for 10 minutes to purge pipeline and screen of contaminants.	
Water Testing	Collect a water sample and send it to a lab for coliform bacteriological analysis. Test free chlorine residual in the distribution system according to sample siting plan.	

ADEC Report Form	Send the ADEC Report Form to ADEC and provide copies to the City Administrator.	
Monthly Operation Record	Complete the Monthly Operation Record and provide copies to the City Administrator.	
WTP Valves	Exercise all the valves not used on a regular basis. **CLOSE THE VALVES SLOWLY TO AVOID WATER HAMMER.**	
Chlorine and Coagulant Vats	Clean the vats.	
Water Storage Tank (WST)	Inspect the WST exterior, valves for leaks, damage, or vandalism and repair any damage.	
Fuel Tank	Check and record the fuel level.	

EVERY 6 MONTHS

Equipment	Make sure that you…	
Chemical Pumps	Clean the pump suction strainer and injector.	
Fuel System	Exercise all valves.	
Water System Supplies	Inventory and order spare parts, chemicals, and supplies for the next six months.	

ANNUALLY

Equipment	Make sure that you…	
Water System	Perform general maintenance.	
Water Intake	Flush debris and sediment out of the dam area. Repair any damage to the wooden dam structure	
Annual Operating Budget	Work with the city officials to determine the economic needs of the Water System for the next year.	
Annual Operation Record	Complete the record and provide a copy to the City Administrator.	
Tools and Equipment	Inventory and order any tools and equipment needed for the next year.	
Chemical Pumps	Clean liquid ends. Check the diaphragms, O-rings, and ball check valves for wear or cracking.	

WST and valves	Clean the WST. Look into the tank with a strong flashlight from the tank top hatch when the water level is down. Inspect the tank bottom for accumulated sediment. If there is significant sediment on the tank bottom, drain the tank to clean any settled substances. Call your RMW or Utility Operations Specialist for assistance. You will have to develop some temporary storage while the tank is being cleaned to avoid an interruption in service. Exercise the tank valves during tank cleaning. **CLOSE THE VALVES SLOWLY TO AVOID WATER HAMMER.**	
Water Distribution System	Notify public prior to maintenance activity. Flush water mains. Start nearest the storage tank and work toward the end of the distribution system. Open the ports full open and run until water becomes clear.	

CHAPTER 4 - RECORDS

A. THE IMPORTANCE OF RECORDKEEPING

This chapter describes your recordkeeping responsibilities and offers examples of record forms you will be using. These records should be well organized and accurate. Recordkeeping will alert you to changes that mean you have a small problem, will tell you how often you need to replace and order parts, and will determine what your operating budget should be. Recordkeeping is an important form of preventive maintenance, and a little attention to the records now will help you to avoid some major problems in the future.

The Water System Operators must keep the following records:

- Daily Operation Record
- Monthly Operation Record
- Annual Operation Record

The Atka WTP operation forms are found in Appendix C. The City Administrator can assist you to make changes to the forms as necessary.

B. DAILY OPERATION RECORD

The Daily Operation Record must be completed daily. The first column of this form has the days numbered 1 to 31. An example form is provided in Appendix C. Make copies of the form to use, but be sure to leave the original intact.

At the end of each month, make a copy of this form. Place one copy in a binder in the WTP files, which should be kept in the office in a safe, dry place. Give one copy to your City Administrator.

C. MONTHLY OPERATION RECORD

Fill out the Monthly Operation Record (provided in Appendix C) at the end of each month and make two copies. Give one copy to the City Administrator, mail or fax one copy to your RMW, and keep the original in a binder in the WTP files.

Address to which you send a copy of the Monthly Operation Record at the end of each month

Doug Abbas, RMW - APIA
201 E. 3rd Avenue, Anchorage, Alaska 99501
Phone: (907) 222-4218, Toll free: (800) 478-2742
Fax: (907) 279-4351
Email: douga@apiai.com

D. ANNUAL OPERATION RECORD

Fill out the Annual Operation Record (provided in Appendix C) at the end of each year and make a copy. There should be two copies of the Annual Operating Record. Give one copy to the City Administrator and keep one copy in a binder in the WTP files.

E. ADEC MONITORING AND REPORTING

The Alaska Department of Environmental Conservation requires you to submit three distinct forms. The most current copy of each form can be found on ADEC's website, currently:

http://www.dec.alaska.gov/eh/dw/publications/forms.html

The forms provided in Appendix C were current when this manual was produced. The System Operator is responsible for checking the website periodically to check for updates to the reporting forms.

1. DAILY CHLORINE, COMBINED FILTER EFFLUENT, AND TURBIDITY READINGS

Any system filtering surface water must fill out (daily) and submit the forms each month to measure system compliance for chlorine residual, filter effluent, and turbidity. An example of the ADEC-required forms are provided in Appendix C. Fill in the proper tables each day, and within ten days after the form is complete, mail it to the ADEC office in Anchorage. The address is on the form. *Note: since the current system does not add fluoridation, no reporting on fluoride residual is required.*

The Excel forms, including instructions, can be found in the "Operator Reporting Forms" section of the Drinking Water Forms webpage. The Excel forms workbook is titled: Direct Filtration with less than three (3) filters (Excel).

2. CHLORINE AND CHLORAMINES MRDL REPORT

In addition to the monthly report, you must fill out a quarterly report Chlorine and Chloramines MRDL report. An example is provided in Appendix C. You can fill out this form with the information from your monthly reports. Mail this form every January, April, July, and October when you send in your ADEC Monthly Report (Appendix C) for that month.

This report can be found on the Drinking Water Forms webpage under the "Monitoring Forms" section. The forms are included in the Excel file titled: DBR Reporting Forms (Excel).

3. TTHM/HAA5 MCL REPORT

The ADEC requires you to take one set of samples annually that measure the amount of certain disinfection byproducts (DBPs) in your water. Disinfection byproducts are created when disinfectants from chlorination react with naturally-occurring materials in the water. The DBPs you will be testing for are trihalomethanes and haloacetic acids. The samples

should be taken at the place and time of year when the monitored DBPs are likely to be at the highest levels; this will be during the month when water temperatures are warmest and at the point in the distribution system where chlorine has been in the water for the longest period of time (July). See Section 5TTHM/HAA5 for more information.

This report can be found on the Drinking Water Forms webpage under the "Monitoring Forms" section. The forms are included in the file titled: DBR Reporting Forms (Excel).

Even though the sheet provided for you (Appendix C) indicates quarterly testing, a system of Atka's size only has to take one sample each year. Write the sample into the appropriate quarter. For example, if you take your sample in July, write the information in the rows for Quarter 3.

Mail all ADEC reporting forms to the address below.

Address to which you send your ADEC monthly and quarterly reporting forms

ADEC, Anchorage Drinking Water Program
555 Cordova Street
Anchorage, AK 99501
907-269-7650 fax

F. EXAMPLE FORMS

Examples of the Daily, Monthly, and Annual Operation Record forms are provided in Appendix C, along with copies of the ADEC reporting forms.

G. CCR

A CCR is a Consumer Confidence Report. This document presents information about your community's water quality. Distribute the CCR to all customers of your Water System. Send a copy to ADEC also. The CCR for the previous calendar year must be completed and mailed to customers by July 1. Each community is responsible for meeting the CCR requirements.

A CCR must include the following information:

- Source of drinking water
- Dangers of contamination to the drinking water source
- Method for getting a copy of the complete water source assessment
- Concentration of any contaminant in the water and ADEC's maximum level of that contaminant for comparison
- Likely source of any contaminant

- Potential dangers of any contaminant exceeding ADEC limits and the Water System's actions for decreasing the amount of the contaminant
- Regulations that the Water System follows
- Educational statement about avoiding Cryptosporidium if your community is vulnerable
- Educational information about nitrate, arsenic, or lead in areas where these contaminants are detected above 50% of ADEC's standards
- Phone numbers of additional sources of information, including the Water System and EPA's Safe Drinking Water Hotline (1-800-426-4791)

If you have access to the internet, there is interactive software for creating a CCR document at http://www.ccriwriter.com/.

H. ADEC MONITORING SUMMARY

The ADEC Drinking Water Program requires public water systems to be in compliance with state and federal regulations, for drinking water, for the public health protection of the residents and visitors to the State of Alaska. ADEC monitors all public water systems for the State of Alaska, and periodically produces a monitoring summary showing the status of required system testing for various contaminants of concern which may be present in the treated water. Operator should work with ADEC to perform required testing in a timely manner.

A copy of the current monitoring summary for the Atka Public Water System #2260058 is provided in Appendix D. System information is updated constantly, and can be found on the states website at:

http://146.63.9.103:8080/DWW/

CHAPTER 5 - TESTING

A. TESTING OVERVIEW

This chapter presents testing requirements for the Water System. For surface water sources and for groundwater sources that chlorinate, the Alaska Department of Environmental Conservation (ADEC) requires periodic testing under the *State of Alaska Drinking Water Regulations*. These regulations change, so the reporting requirements outlined in this chapter might also change. The requirements in this chapter were accurate on the date this manual was published, and you are responsible for knowing the most current reporting requirements. Listed below is the contact information for finding out whether these requirements have changed.

Contact information to check whether Water System reporting requirements have changed

Drinking Water and Wastewater Program
ADEC Division of Environmental Health
555 Cordova Street
Anchorage AK 99709
Phone 907-269-7517 or Toll-free 1-800-510-2332
http://dec.alaska.gov/eh/dw/publications/forms.html

A sampling plan is presented on the next page. This page should be carefully reviewed by the operator. This plan may not contain all the information you need to fulfill your testing requirements. Each system must have a monitoring plan on file with ADEC that explains how the Water System works and how you will meet the state testing requirements.

Remember: your community is depending on you to provide healthy water, and testing is the best way to confirm that your system is providing safe water.

WATER SAMPLING PLAN

TEST TYPE	LOCATION	FREQUENCY	NOTES
Chlorine Residual at Entry point		Daily	Record on Daily Operation Log.
Chlorine Residual in Distribution System	According to Sample Siting Plan	Monthly	Each month, take the sample from a different place on a rotating basis.
Bacteriology (total coliform)	According to Sample Siting Plan	Monthly	Each month, take the sample from a different place on a rotating basis.
Volatile Organic Chemicals		Annually	Annually if ADEC gives the Water System a waiver.
Nitrate		Annually	Annually if ADEC gives the Water System a waiver.
Pesticides		Not required	Not required if ADEC gives the Water System a waiver.
TTHM/HAA5		Annually	During the warmest month, at the point where water has been in the system for the longest time.
Old Inorganic Chemicals		1 sample per Cycle	Reduced to once every 9 years with an ADEC waiver.
New Inorganic Chemicals		1 sample per Period	Reduced to once every 3 years with an ADEC waiver.
Lead and Copper		5 samples every 3 years	Reduced by ADEC to every 3 years at 10 locations
CCR		Annually	Complete and mail to ADEC and distribute to customers by July 1, for the previous year.
Gross Alpha Radioactivity		4 consecutive quarterly samples	
Sanitary Survey		every 3 years	Must be conducted by ADEC staff or ADEC-approved surveyor

Note: All sampling is performed on water that has been treated.

B. LABORATORY TESTING

Unfortunately, you cannot do all the testing for your system in your community. You must send some samples to an ADEC-approved laboratory for testing.

The following samples must be sent to a lab:

- Monthly Chlorine Residual
- Coliform Bacteria
- Nitrite
- Nitrate
- Gross Alpha Radioactivity
- Lead and Copper
- TTHM/HAA5
- Volatile Organic Chemicals
- Inorganic Chemicals

You may be able to subscribe to a laboratory. Some laboratories will schedule the tests for you and then send the sampling containers and instructions to you at the right time. Talk to your Environmental Health Specialist about whether there is a good laboratory for your Water System. The contact information for your Environmental Health Specialist is available in Chapter 8. Contacts.

Sampling requires that you do some work in advance:

1. Make sure you have the laboratory sample bottles and paperwork before the date on which you must take the sample.
2. Make sure there is a plane leaving that can get samples to the lab in the required amount of time. Also, you may have to schedule an express delivery service.

When you take the samples, keep these rules in mind:

1. **Practice Cleanliness.** Wash your hands carefully before collecting any samples. Make sure the sink is clean. Remove the aerator from the sink faucet, and do not sample from swing faucets.
2. **Collect the Sample from the Correct Location.** See the Sampling Plan that has been designed for your Water System (See page 5-2).
3. **Do Not Rinse Sample Containers** you receive from the laboratory. Some of the bottles may contain preservatives that keep your sample as it is at the time of collection.
4. **Label Every Sample** with the utility name, Atka Water System, PWSID#2260058, your phone number, your name, and the date and time of collection. Write clearly with a waterproof pen. If the information is not clear on the sample bottle, the lab might refuse the sample, which will cost your utility money.
5. **Keep Samples Cool, Not Frozen.** Samples must arrive at the lab unfrozen, but below 40°F. Wrap the samples in bubble wrap, then pack them with ice packs in the cooler provided by the lab.

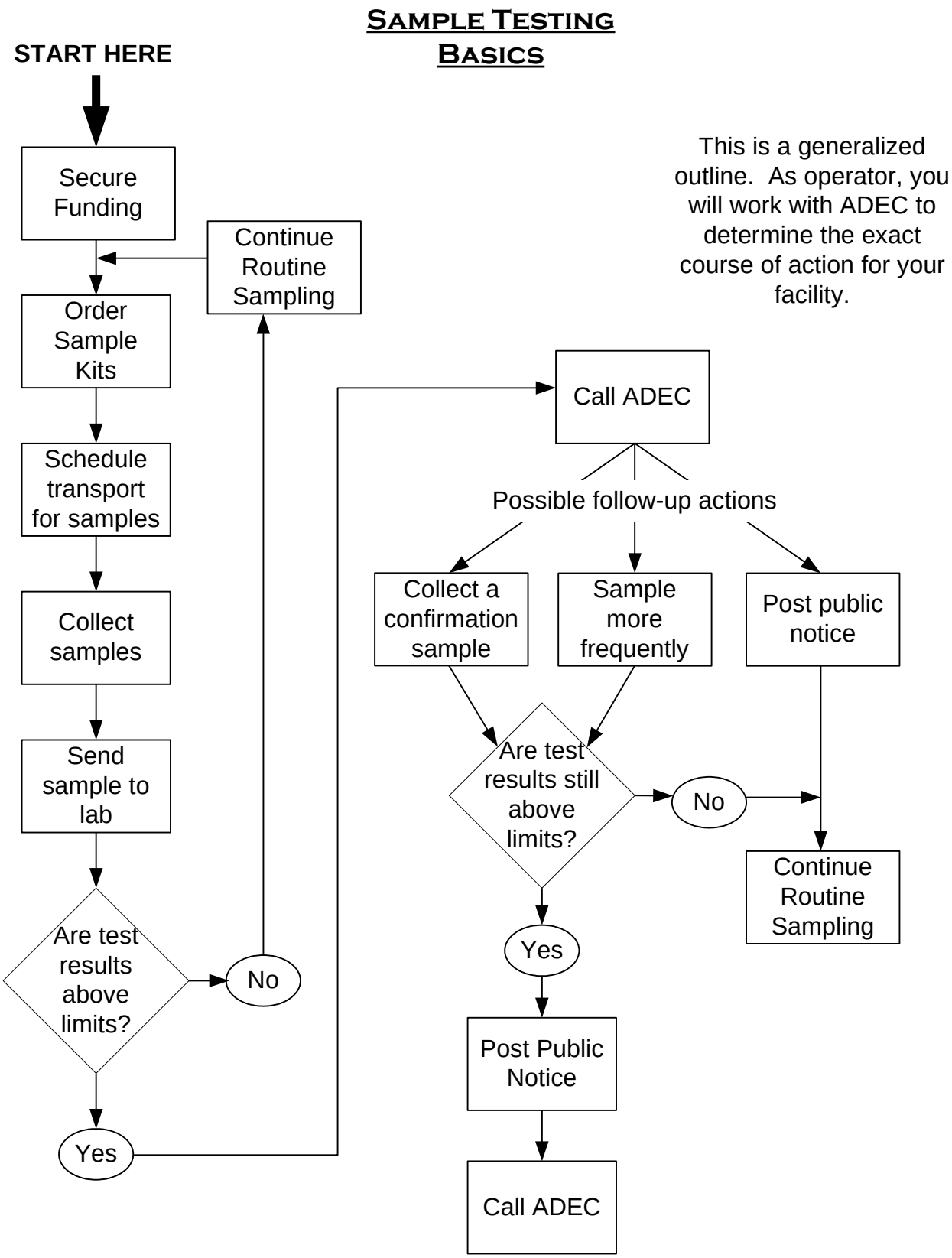
6. **Schedule your Sampling Carefully.** Make sure your samples arrive at the lab in time. Getting the samples to the lab on a weekend or holiday means you have to go through the sampling process again. Schedule your coliform bacteria sample for the beginning of each month.

All laboratory test results must be below certain limits or maximum contaminant levels (MCLs). If tests are above these limits, the lab will call you, and you should call ADEC immediately.

Contact to call if the lab reports that your test results are above limits

ADEC
1-800-510-2332
907-269-7517

A flow chart outlining the procedures for laboratory testing is on the next page.


SAMPLE TESTING BASICS
START HERE
Secure Funding
Order Sample Kits
Schedule transport for samples
Collect samples
Send sample to lab
Are test results above limits?
No
Yes
Continue Routine Sampling
This is a generalized outline. As operator, you will work with ADEC to determine the exact course of action for your facility.
Call ADEC
Possible follow-up actions
Collect a confirmation sample
Sample more frequently
Post public notice
Are test results still above limits?
No
Continue Routine Sampling
Yes
Post Public Notice
Call ADEC

C. CHLORINE RESIDUAL

Chlorine is an element that disinfects the water. This means that it kills harmful microorganisms, such as bacteria.

If you are using chlorine to disinfect your water, you will perform two types of chlorine testing: daily and monthly. Note that these are performed at different locations. Always test the chlorine residual within 15 minutes of collecting the samples.

Test the chlorine residual **daily at the entry point to the distribution system** (after the water comes out of the water storage tank). The minimum amount of chlorine residual at the entry point to the distribution system is 0.2 mg/L. Take the test with a Hach® test kit. Instructions for testing are in the manual that comes with the kit.

If the chlorine residual at the entry point to the distribution system is less than 0.2 mg/L, test the water every 4 hours until the chlorine residual is 0.2 mg/L or greater. Record this information on the Daily Operation Record. If after the first 4 hours, the chlorine residual is still below 0.2 mg/L, contact ADEC at the phone number listed below:

Contact you must call if a chlorine residual at the entry point to the distribution system is below 0.2 mg/L for 4 hours

ADEC
1-800-510-2332
907-269-7517

Test the chlorine residual **in the distribution system monthly**, at the same time and location as you sample for bacteria (see section 5D. Coliform Bacteria, next). The distribution system must maintain a trace of chlorine. To maintain this trace in the system, more than 0.2 mg/L residual might be necessary at the entry point to the distribution system. If the water needs more chlorine residual, you can increase the amount of chlorine in the system by adjusting the stroke length on the chlorine pump.

D. COLIFORM BACTERIA

This test tells you whether your system has coliform bacteria in it. Coliform bacteria can cause illnesses with symptoms that include diarrhea, cramps, nausea, headaches, and fatigue. These illnesses typically affect children and elders first.

Collect one water sample from the distribution system **once each month** at the beginning of the month. Collect the coliform bacteria sample according to the requirements on your sample siting plan. If you do not have a sample siting plan, contact your Environmental Health Specialist (See Chapter 8 - Contacts). ADEC requires a written sample plan for collecting bacteriological

samples. This plan describes your procedure for collecting samples. You should be taking your coliform bacteria at different locations on a rotating basis.

If you do not have a sampling plan, take a sample from the farthest point in the distribution system.

Sample from indoor faucets in clean areas. Avoid outdoor faucets, faucets with leaking valve stems, faucets with swivel spouts, and faucets with mixing valves (a faucet generally has a mixing valve if you cannot control hot and cold water separately). A one-page guide to proper sampling is on the next page.

Send the coliform bacteria sample to a certified laboratory in the state. The sample must reach the laboratory within 30 hours from the time you collect it. Contact the Environmental Health Specialist at the above address to find which certified laboratory is closest to you.

Always have extra coliform sample bottles on hand—if the lab reports that the first sample is positive, you must immediately call ADEC at the number below and collect 4 more repeat samples in the next 24 hours. One of these samples should be collected from the identical location as the original sample. The other 3 samples should be collected immediately upstream or downstream from the original collection location and at the sites identified on the sampling site plan (see below) that is on file with ADEC. Collect 5 samples the next month instead of the usual single sample. ADEC will notify you of the details.

Contact you must call if Coliform Bacteria is detected in your sample

ADEC
1-800-510-2332
907-269-7517

Taking A Total Coliform Bacteria Sample Properly

Sometimes water samples fail a total coliform bacteria test because of sampling error, not because the water system is actually contaminated. To ensure that this does not happen to you follow these steps when taking a coliform sample from your water system:

Step One

DO NOT RINSE OUT THE BOTTLE
The powder in the bottle is meant to be there and will not contaminate your sample.

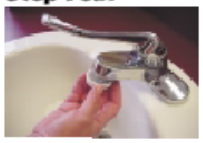
Step Two

WASH YOUR HANDS
Prior to taking the sample. Then remove the sterile strip from the bottle.

Step Three

REMOVE FAUCET SCREEN
Or other hoses or aerators from the end of the faucet. If possible avoid using a faucet that swivels.

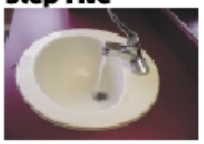
Step Four



DISINFECT THE FAUCET
By dipping the end in a cap full of bleach before running the water. This is optional but is a good idea.

If you're in a remote area, make sure you know the scheduled flights, and verify if the flight will be in. Take the sample as close to departure as possible

Step Five



RUN COLD WATER FOR AT LEAST 2 MINUTES
To ensure that the water you are sampling has not been sitting in the pipes or tanks for a long time.

Step Six

TURN THE WATER DOWN
So it does not splash. Fill the bottle to at least the fill line (100 ml). Do not fill it all the way up to the top, allow 1" head space.

Step Seven

SCREW CAP ON TIGHTLY
Take special care not to touch the inside of the cap or bottle.

If you do, start with a new bottle.

Step Eight

FILL OUT PAPERWORK AND MAIL IT IN
Keep a copy for your files. Pack the sample in a Styrofoam container or bubble wrap when mailing so the bottle doesn't break.

Important! The lab must receive the sample when they are open and within 30 hours of collection

Keep the sample cool but DO NOT Freeze

SAMPLE SITING PLAN

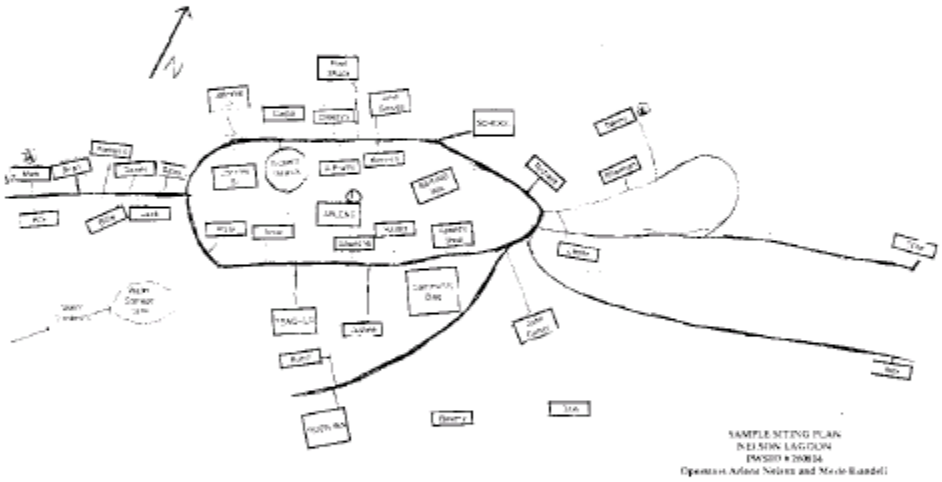
TOTAL COLIFORM (BACTI) SAMPLE SITING PLAN
FOR THE COMMUNITY OF _____
PWSID# _ _ _ _ _ _ _

Preparing your total coliform sampling plan in advance will allow you to quickly collect samples for testing if a regular monthly sample should come back positive. This is important to ensuring public health, and preventing members of the community from getting sick when fecal contamination enters the water system.

Keep this Sample Siting Plan on file in the Water System Files. Mail a copy to ADEC.

Sketch the community, (or attach a map) showing:

- Water Source
- Water Storage Tank
- Water Treatment Plant
- Distribution Lines
- Homes to be Sampled
- First Service Connection
- Pressure Reducing Stations
- Booster Stations
- Dead Ends
- Last Service Connection
- Businesses, Schools, Churches
- Areas, zones or actual sites for routine sampling



1. _____ (One monthly sample taken here)

Within 24 hours of receiving a "Hot Bacti" notice from ADEC, take the following 4 additional samples:

2. _____ Five connections upstream of Sample Site 1.
3. _____ Five connections downstream of Sample Site 2.
4. _____ Sample near the end of distribution, or near the WTP.
5. _____ Repeat of Sample 1.

Contact Person for Water System_____ Phone _____
Address_____
Number of Samples required ____ per (month / quarter)
Number of Service Connections____
Population Served Each Month ____
Reason for Choosing Sites selected:_____
_____
_____
_____

E. VOLATILE ORGANIC CHEMICALS

Volatile organic chemicals (VOCs) include: Nitrate, Pesticides, Inorganic Chemicals, Lead and Copper, Gross Alpha Radioactivity, and Nitrite. Collect VOC samples at the frequency listed in the water sampling plan table (Section 5A). These tests help to determine whether there has been a change in the water quality. Send these samples in the proper containers to a certified laboratory in the state.

F. TTHM/HAA5

Test for total Trihalomethanes (TTHM) and 5 Haloacetic Acids (HAA5) once each year. These are disinfection byproducts that are created when disinfectants from the chlorination process combine with naturally-occurring materials in the water.

These samples should be taken during the month when the water in the system is warmest (July) and at the place where water has been in the distribution system for the longest time. Once you receive the results of these samples, contact ADEC at 1-800-510-2332 to discuss the next step.

Addresses to which you may send your HAA5 sample for analysis

Analytica Alaska – Anchorage 4307 Arctic Boulevard Anchorage AK 99503 907-258-2155 907-258-6634 fax	MWH Americas, Inc. Royal Oaks Drive Suite 100 Monrovia CA 91016-3629 626-568-6400 626-568-6234 fax

Note: Other labs may be approved for testing. Check with your environmental health supervisor or ADEC for more information. These two labs *and* several other labs are approved for TTHM testing. Even though the two samples are taken at the same time and place, they may be sent to different labs.

G. CCR

You must produce a CCR by July 1 each year to report on the water quality for the previous year. The CCR must be mailed to all customers of the Water System. For specific details about and examples of a CCR, see Section 4F.

H. SANITARY SURVEY

Contact your ADEC office to schedule a sanitary survey **every three years.** More information on sanitary surveys is available at: http://www.dec.alaska.gov/eh/dw/dwmain/what-survey.html

CHAPTER 6 - SYSTEM COMPONENTS

A. CHAPTER OVERVIEW

This chapter presents detailed information about each key component of the water treatment system. This chapter is divided into the following key component sections:

- Water Intake and Transmission Main
- WTP Raw Water Feed and Flocculation System
- Multimedia Pressure Filters
- Chlorination System
- Water Storage Tanks
- Water Distribution System

Most component sections are presented in 8 parts:

- Purpose
- Equipment
- Operational Description
- Controls - Describes the component controls
    - Electrical - motor starters, breaker panels, etc.
    - Mechanical - pressure switches, flow meters, etc.
- Start-Up Procedures
- Normal Operating Conditions
- Routine Maintenance and Inspection
- Common Operational Problems

These subsections describe how the component works, the start-up procedures, maintenance tasks, and offers possible solutions for common problems you might encounter. If you need more information about a specific component, consult the manufacturer's literature in Volume II.

B. WATER INTAKE AND TRANSMISSION MAIN

PURPOSE

Raw water enters the system at the water intake collection dam, located about 940 feet west of the WTP. Raw water flows by gravity from the intake to the WTP.

EQUIPMENT

- Lumber and plywood dam
- Impoundment pond behind dam
- Removable intake screen assembly
- 4-inch shutoff valve
- 4-inch buried Schedule 40 PVC line to WTP

DESCRIPTION OF OPERATION

The water source for the system is surface water, originating from a hillside drainage creek located 940 feet west of and above the WTP. Only a portion of the volume of water flowing in the creek is utilized for the water system, and the remainder flows over the dam spillway back into the creek. The raw water intake structure is a small wooden dam with a stainless steel v-wire screen assembly that prevents debris in the creek from entering the raw water transmission line. The dam impounds water to allow it to flow by gravity to the WTP for treatment.

Figure 6-1 – Raw Water Dam and Intake

The elevation of the top of dam is 211.5 feet, which is 34 feet higher than the elevation of the finished floor of the WTP. This allows the water system to flow by gravity from the raw water intake, through the raw water transmission line to the suction side of treatment process boost pump BP-1 WTP.

Raw water from the creek intake structure is piped to the water treatment plant in a buried 4-inch iron pipe sized bare schedule 40 PVC pipeline. The raw water source is accessed by a narrow road from the WTP.

CONTROLS

- In-line valve (4-in flanged AWWA gate valve located 20 feet downstream from the dam)
- In-line valve (4-inch flanged AWWA gate valve located on upstream run of 4-inch tee of raw water line, 50 feet southwest of WTP)
- WTP service valve (4-inch flanged AWWA gate valve located on branch of 4-inch tee of raw water line, 50 feet southwest of WTP)
- WTP isolation valve V-1 (4-inch butterfly valve located inside WTP near floor and boost pump BP-1

- Freeze protection valve (3/4" raw water valve at WTP)

START-UP OPERATING PROCEDURES

- Open all the in-line valves
- Make sure the inlet screen is clear of debris

Figure 6-2: V-wire intake screen assembly

NORMAL OPERATING CONDITIONS

- Water flow through the WTP is not continuous, except in winter when freeze protection flow is set up through the Freeze Protection Valve. A float valve in the water storage tank controls water flow.
- Meter M-1 reads about 40 gpm when BP-1 is running and raw water is flowing through pressure filters.

ROUTINE MAINTENANCE AND INSPECTION

Monthly

- Check the v-wire inlet screen assembly for accumulated debris. Clean.

Every 6 Months

- Exercise the valves on the transmission line.

Annually

- Remove debris and sediment out of the dam area.

At Freeze-up

- Open Freeze Protection Valve and allow a trickle of water to flow into drain for freeze protection of transmission line.

At Break-Up

- Close Freeze Protection Valve.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
The in-line valves are open, but water is not flowing. Pressure gauge on the suction side of BP-1 is reading 0 or well below 14 psig.	Inlet screen is plugged.	Clean inlet screen.
	Valves are shut or frozen.	Make sure valves are open and operate freely.
	Inlet screen is frozen	Thaw out inlet screen assembly using hot water generator and hose directed at the inlet screen.
	Pipeline near intake is frozen	Thaw out with hot water generator and jetter hose and nozzle

C. WTP Raw Water Feed and Flocculation System

PURPOSE

The raw water feed system takes the gravity-fed water from the dam and pressurizes it so that the filter vessels are always pressurized to 20 psig when operating, with enough pressure left over to have water flow to a full water storage tank. During this process, the raw water is metered, and a treatment chemical is added to the raw water, causing fine particles of contaminants to cluster in the space above the pressure filter media in the pressure filters, growing into sizes large enough to be removed by the filter media.

EQUIPMENT

- 1 each 3.7854 gal/hr (259 ml/min) chemical injection pump. LMI model AA951-450HI
- 1 each 30-gallon (113 liter) solution tank
- 1 each motorized mixer
- Static Mixer
- 2-in magnetic flow meter M-1
- Streaming Current Detector (SCD-1), Milton Roy SC5200 with automatic jet wash and cyclone separator
- Turbidity Chart Recorder

OPERATIONAL DESCRIPTION

Refer to Figure 1-3 in Chapter 1 of this manual for a schematic diagram of the water treatment process. The stages of the process are as follows:

1. Raw water enters the WTP, where 1-1/2 hp boost pump BP-1 boosts the pressure of the raw water from 15 psi to at least 35 psi. Process flow rate is about 40 gpm.
2. Turbidimeter TU-1 measures the raw water turbidity for the operator's information.
3. Magnetic flow meter M-1 measures the flow rate and totalizes the raw water flow into the WTP.
4. Static Mixer SM-1 injects and thoroughly mixes the water treatment chemical into the process stream.
5. Chemical feed pump CF-1 feeds the treatment chemical from chemical tank CT-1 to SM-1, based upon a signal from Streaming Current Detector ST-1.
6. ST-1 measures the state of electrical charge in the water with the treatment chemicals and adjusts the feed rate of CF-1 to maintain that constant charge set point.
7. The flow of chemical-laden water is split and half of the flow goes to through pressure filter PF-1 and the other half goes through PF-2.
8. Flow switch FS-1 turns on CF-1 and SCD-1 when flow from the raw water line to the WTP is detected.
9. Flow control valves FC-1 and FC-2 limit the flow through each filter to 20 gpm.
10. The combined flow from the two filters passes by turbidimeter TU-2, which measures the combined turbidity of the filtered water and displays it on the turbidity controller on the instrumentation rack near BP-1. The turbidity level is recorded on a chart recorder with a scale from 0 to 1.0 NTU.
11. Flow switch FS-2 detects filtered water flow that turns on chlorine solution feed pump CF-2.
12. Treated water with a chlorine solution then flows into water storage tank WT-1.

To remove the substances that produce turbidity and color in raw water, a treatment chemical consisting of a blend of inorganic coagulant and polymer is added to the raw water prior to flowing into the headspace in the upper parts of the pressure filters. The small particles of contaminants in the water are coated with this chemical, causing the particles to join into larger, heavier particles, called floc , which is large enough to be trapped in the spaces of the filter media in the pressure filters.

The treatment chemical solution dosage rate should be set to achieve filter effluent turbidity levels of 0.3 NTU or lower (usually achieved down to 0.05 to 0.10 NTU). The operator should monitor the raw water and filter effluent turbidity and color levels to minimize these levels. Proper treatment chemical feed rates are determined by jar testing.

The treatment chemical solution, which is made up from Nalco 8185, a 50% mixture of inorganic coagulant and a polyamine, is "batch" mixed manually by the operator and is automatically injected into the raw water line prior to entering the pressure filters.

Assuming a 40 gpm of raw water flow rate, a maximum of 10 mg/l concentration of Nalco 8185 and the 3.7 liter per hour maximum feed rate of chemical feed pump CF-1, then a 2.5% by weight solution of Nalco 8185 in chemical vat CT-1 is suitable. However, other solution strengths may be used as necessary. Consult your RMW for help if necessary.

Table 6-1—Mixing Proportions for Nalco 8185 2.5% and 5.0% Solutions in Chemical Vat

Mix Volume in Liters	Volume of Nalco 8185 to make 2.5% solution by weight for a maximum of 3.785 l/hr to achieve 10 mg/l feed rate	Volume of Nalco 8185 to make 5.0% solution by weight for a maximum of 3.785 l/hr to achieve 20 mg/l feed rate
10	202 ml	403 ml
20	403 ml	807 ml
30	605 ml	1.210 liter
40	807 ml	1.613 liter
50	1.008 liter	2.016 liters
60	1.210 liter	2.419 liters
70	1.411 liter	2.823 liters
80	1.613 liter	3.226 liters
90	1.815 liter	3.629 liters
100	2.016 liter	4.032 liters
110	2.218 liters	4.435 liters

CONTROLS

Chemical feed pump CF-1 will feed water treatment chemicals by varying the stroke of the pump. The stroke of the pump is varied by a 4-20 milliamp signal from streaming current detector SCD-1. The values for the 4 ma and the 20 ma signal will be set at the SCD controller. Refer to the LMI manual for proper set up procedures.

Electrical

For information on chemical flow control equipment, see 6E. Chlorine System.

START-UP PROCEDURES

Make a 2.5% solution of Nalco 8185, by adding 2.218 liters (2 liters +218 ml) of Nalco 8185 to 110 liters (29.1 gallons) of potable water in the solution tank.

1. Check to see that all equipment is clean and in place, and all connections are tight.
2. Mix the solution in the tank with the electric mixer for about 10 minutes.
3. The pump is self-priming if suction lift is 5 feet or less. Refer to manufacturer's literature for priming if necessary. Run CF-1 at 100% speed and 100% stroke to purge all air out of the hoses and pump body. Remove the hose from the injection fitting at static mixer SM-1 and put end of hose in a beaker.
4. Calibrate CF-1 by running at full speed and stroke, timing with a stopwatch in seconds for the time it takes to fill 100 ml. This will be about 95 seconds. Calculate the 100% stroke feed rate in ml/minute by the following formula:

   Max Feed Rate = 100 x 60/(time to 100 ml in seconds) = M ml/minute
5. Let the raw water flow to waste; then perform jar tests to find the best dose in mg/l of Nalco 8185. The best dose will be C1 in mg/l (probably 3 to 5 mg/l)
6. Calculate the CF-1 feed rate for 40 gpm from the following formula:

   Q2 = Q1 x C1/C2 = 40 gal/min x 3785 ml/gal x C1 mg/l/25,000 mg/l

   Q2 is the chemical feed flow rate of a 2.5% solution of Nalco 8185 in ml/min

   Q1 is plant water flow rate of 40 gal/min

   C1 is mg/l dose of Nalco 8185 in mg/l

   C2 is Nalco 8185 mix in CT-1 tank (2.5% or 25,000 mg/l).

   Example: Jar test results show 3.0 mg/l dose of Nalco 8185. Calculate CF-1 feed rate.

   Q2 = Q1 x C1/C2 = 40 gal/min x 3785 ml/gal x C1 mg/l/25,000 mg/l

   Q2 = 40 x 3785 x 3mg/l/25,000 mg/l = **18.2 ml/min**

   If M (our maximum feed rate from pump calibration) is 63.2 ml/min

   Calculate percent stroke: PctStroke = (Feed Rate/M) x 100

   PctStroke = 18.2/63.2 x 100 = 29%
7. Set SCD on manual setting and set the pump stroke percentage on the SCD. In this example, it will be 29.
8. Allow pump to run at this setting. After 10 minutes, note the voltage setting on the SCD and record. After 45 minutes of CF-1 running, take a 5-gallon water sample from a hose bib, just prior to the water entering the storage tank.
9. Use the turbidity tester t to check the turbidity level. If the reading is not 0.3 NTU or less, adjust the manual setting on the SCD and increase it slightly, say 5%. Wait 45

minutes and take another sample. Note the voltage reading on the SCD. Keep tuning the setting until you achieve the lowest turbidity reading. Then note the percent setting on the SCD and the voltage reading. When that is optimized, set the SCD set point at the voltage reading of the best setting and place the SCD in AUTO mode. CF-1 will now track varying turbidity to give the best water. Sometimes a little tweaking on the voltage set point towards zero will show improvements. MAIN POINT: Make adjustments small and give lots of time (at least 45 minutes) to see results. Keep notes of your actions!

NORMAL OPERATING CONDITIONS

Normal water flow direction through the two pressure filters is through piping in the top of the tank and out through the bottom. Floc formation inside a pressure filter can be monitored by looking through the top viewport window.

- When the flow meter detects water flow through the WTP, the treatment chemical pump operates automatically by a closed contact in flow switch FS-1.
- The Nalco 8185 solution level in the tank is above the 10 gallon (or 30 liter) mark. If the level is not above this mark, clean the solution tank and mix a new solution.
- The Nalco 8185 solution strength should be 2.5% by weight for normal operation.
- The turbidity level of the WTP effluent is 0.3 NTU or lower.

ROUTINE MAINTENANCE AND INSPECTION

Daily

- Check the Nalco 8185 solution level in the vat.
- Record the turbidity level on the ADEC Report Form.

Weekly

- Check the Nalco 8185 solution tank for correct level. If down to 10 gallons or 30 liters, figure out how much volume is required to top off at 100 to 110 liter mark, and mix more solution according to Table 6-1 for 2.5% solution.

Monthly

- Thoroughly clean the Nalco 8185 solution vat.

Every 6 Months

- Clean the pump suction strainer and injector.

Annually

- Clean the pump liquid end. Check the pump diaphragm, O-rings, and ball check valves for wear or cracking. Replace as necessary.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Pump does not run	No Power	Check the circuit breakers, electrical outlet, and plug
	The motor overload may have tripped due to overheating	Let the motor cool, and push the reset button on the pump. If the problem continues, check the electrical system for faults.
	Pump fuse burned out	Some pump models have internal fuses. Check the pump instruction manual.
	The flow switches is defective	Repair or replace the flow switch
Pump runs, no solution injected	Stroke knob set at "0."	Increase the stroke setting
	No solution in tank, or solution level too low.	Mix a new batch of chlorine solution
	Air lock (air bubbles) in the suction line, or the pump is not primed	Remove air by re-priming the pump and all tubing
	Fittings or tubing not tight	Re-check fittings and HAND-TIGHTEN only
	Valves or injector dirty or damaged	Clean or replace the valves or injector
	Pump diaphragm damaged	Replace the diaphragm

D. MULTIMEDIA PRESSURE FILTERS

PURPOSE

To remove fine particles from the raw water and reduce the turbidity and color level of the treated water.

EQUIPMENT

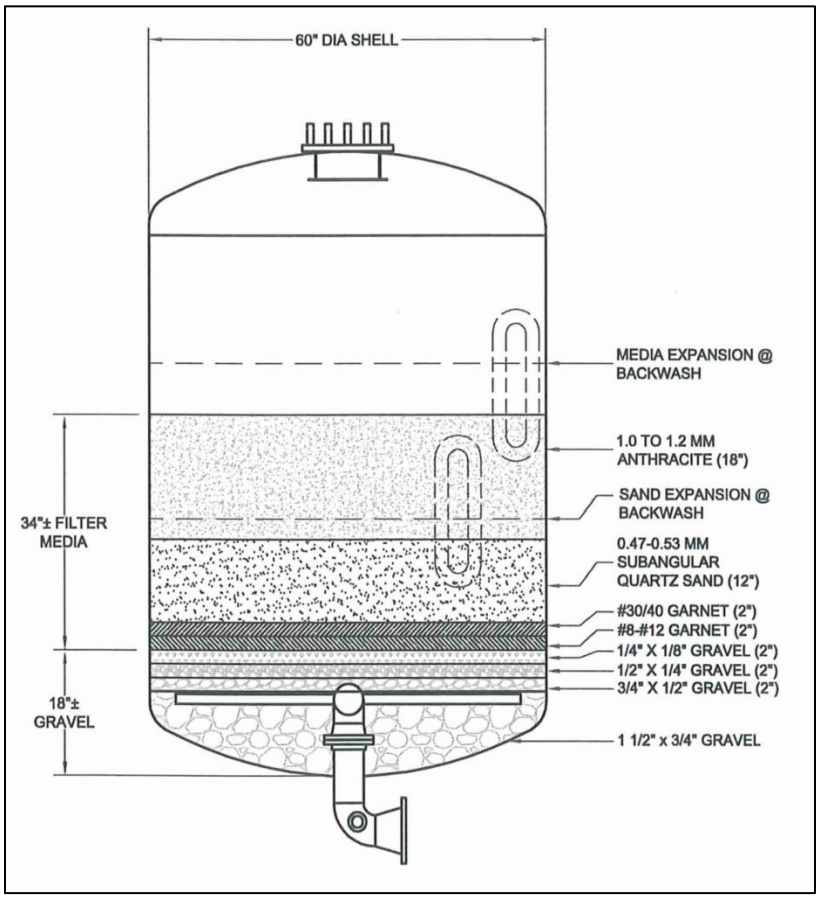
- Two 60-inch diameter multimedia pressure filters
- Associated piping and valves

- Backwash Pump BW-1
- Backwash Magnetic Flow Meter M-4
- Flowmeter M-4 Display
- Air scour blower AB-1
- Wastewater disposal pipe

OPERATIONAL DESCRIPTION

Surface water contains many fine particles that lessen the quality of the water. These particles need to be removed from the water before being consumed by the public. All water to be treated passes through the two filters in parallel operation, as depicted below in Figure XX.

Figure 6-3: Pressure filter section showing media layers



Raw water flows through the water transmission line from the intake dam to the WTP. Boost pump BP-1 then raises the pressure of the gravity fed water. The water is then injected with treatment chemical. The chemical-laden water then flows into the open space above the filter media in the upper part of each pressure filter. Floc starts forming in this space. The flow through each of the pressure filters is controlled by a Dole valve on the outlet of each filter, which limits flow to 20 gpm for each filter. In filtration mode, the raw water flows to the top of the filter then flows down and through the various levels of anthracite, sand, and gravel in the filter vessel, which trap the particles. The clean water flows out the bottom of the filter, and into the backwash settling pond (filter to waste), or to the water storage tank WT-1 (filter to tank). The backwash operation is required to flush the trapped particles out of the filter.

CONTROLS

System is manually controlled by opening and closing a sequence of valves on the filter pipe manifold.

START-UP PROCEDURE

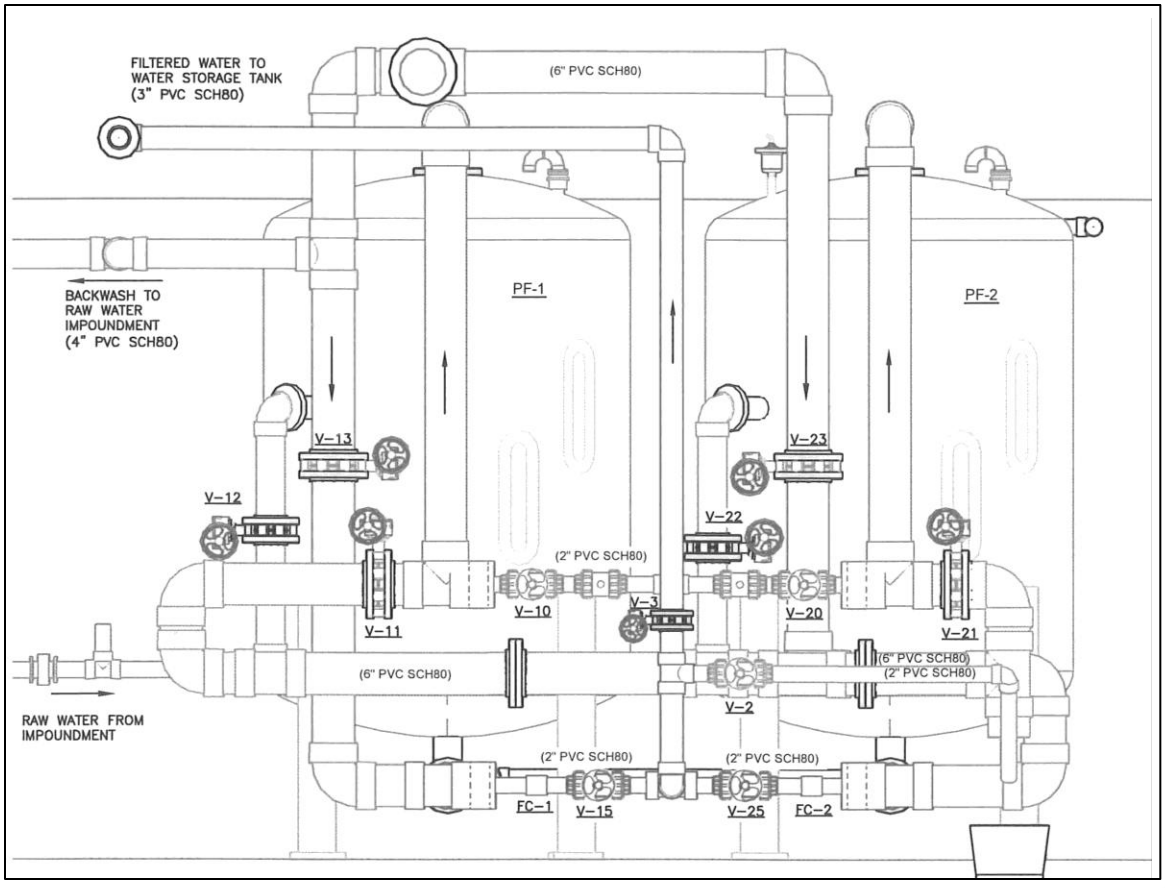
1. Start-up is performed by the Engineer.

NORMAL OPERATING CONDITIONS

- Valves V-10 and V-15 on Pressure filter PF-1 and V-20 and V-25 PF-2 are normally open and all other valves on the filter pipe manifold are closed. See Figure 6-4, below for valve layout.

At the normal flow rate of 40 gpm (20 gpm/filter), water should be flowing through the pressure filters at approximately 1.02 gpm/ft^2 or 0.136 ft/min. This means that a complete change of water in each filter requires at least 45 minutes.

Figure 6-3: Pressure filter section showing media layers



BACKWASH PROCEDURE

The backwash procedure is necessary to clean the filter media. The need to backwash the filters will be determined by any of or a combination of the following factors:

- An increase in the turbidity level in the product water above 0.3 NTU
- An increase in the color PCU readings, which must remain below 15 PCU
- Increase in differential pressure across the filters (6 psid or greater). The pressure differential is read by the differential pressure meter located on the side of each pressure filter
- Decrease in product flow through the filters

The backwash procedure takes about 30 minutes per filter. The filtration process must be stopped for the backwash procedure to commence. Backwash 1 filter at a time. If the system is functioning properly, the pressure drop across the filters should rise at a similar rate. Backwash water is supplied from WT-1 through backwash pump BW-1. BW-1 is controlled by a variable frequency drive (VFD), which is paced by magnetic flow meter M-4.

Drain Down

The drain down procedure removes water from the head space above the filter media. About 2-in of water is left above the anthracite layer.

1. Close all filter valves V-10 throughV-15 for PF-1 and V-20 through V-25 for PF-2.
2. Open drain down valve V-12 for PF-1 or V-22 for PF-2. Allow the water to drain down until the upper chamber is empty of wall, as indicated by the lack of flow down the 10-in floor drain. Drain down is complete.

Air Scour

3. Open air scour valve V-14 for PF-1 or V-24 for PF-2.
4. Turn on air scour blower AB-1 and adjust the speed set point to produce an active agitation in the sight windows on the filter shell. Run the air scour on this active mode for 2 minutes. This step agitates the sand and anthracite media layers, helping to shake the trapped floc from the media particles.
5. Turn off air scour blower then turn off valves V-12 and V-14 for PF-1 or V-22 and V-24 for PF-2. Air scour is complete.

Slow Fill

7. Open valves V-10 and V-13 on PF-1 or V-20 and V-23 on PF-2.
8. Adjust set point on BW-1 VFD to 75 gpm, then turn on BW-1 pump VFD for a 75 gpm slow fill of the space in the pressure filter above the media.
9. When water is seen going down the floor drain, the filter vessel is full of water. This will take between 6 and 8 minutes.

Backwash

10. Slowly raise the set point of the VFD to 240 gpm. Watch the movement of the anthracite and sand in the sight windows. They should have a continuous and steady rolling movement without a violent boiling appearance. Increase the flow rate to produce this described motion. Use a screened funnel-type food strainer underneath the drain pipe above the floor drain. Watch for black particles of anthracite. A few particles a minute is all right. Avoid too violent a backwash, as this could blow out anthracite media. When the filter backwash is performing correctly, note the backwash flow rate and record in the water plant log for future reference. Also note the water tank water temperature. Let the filter backwash for 10 minutes. Sample the back wash water with a 1 liter beaker and note the change in color of the water as the backwash progresses.
11. After backwash, bring down set point on VFD to 75 gpm and shut off BW-1. Shut off all pressure filter valves. Backwash is complete.

Condition Filters by Filtering to Waste

12. After backwashing of all pressure filters are complete, open valves V-10 and V-15 for PF-1 AND V-20 and V-25 for PF-2. Open V-2 for filter-to-waste and close V-3.
13. Turn on Boost Pump BP-1. Once flow commences as sensed by flow switch FS-1, SCD-1 and CF-1 begin to operate. You are now filtering to waste. Filter to waste at least 10 minutes while watching the turbidity level indicated by turbidimeter TU-2. Filter to waste until the turbidity is below 0.20 NTU.

Filter-to-Tank

When the turbidity of the filtered water is acceptable, open valve V-3 (filter to tank) and close valve V-2. You are now filtering to tank. The hypochlorite feed pump CF-2 should now be operating with flow in the pipe that directs filtered water to WT-1.

ROUTINE MAINTENANCE AND INSPECTION

Daily

- Check the pressure differential twice daily. Backwash the filter if the pressure 6 psi or greater, turbidity rises above 0.3 NTU, or the color value of filtered water rises above 15 PCU. Backwashing is necessary typically, every 4 to 7 days. Since turbidity and color can fluctuate in the system, you will need to assess operation conditions to determine when backwash is necessary.

Annually

- Check the filter media at least once each year for voids, mudballs, loss of media and general condition. To check media, backwash the filter, then valve off the filter, drain and remove the inspection manhole cover at the top of the filter. The media should appear clean and level. The bed should be to the proper depth with no cracks or holes in the

media indicating channelization of the backwash waters. If any of these problems are found consult your RMW for help.

- Wipe the outside of the filter vessels and piping once or twice a year to remove any accumulated dust and dirt.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Low flow rate through filter	Sand or silt are collecting in the filter bed	Check the water intake collection box
	Filter bed clogged, channeled, or cemented	Backwash the filter. If extreme, open the filter and physically stir the media.
	Filter is air-locked	Check the air release valve on the top of the filter
Insufficient particle removal	Insufficient backwash or backwash malfunction	Check the backwash flow rate
	Not enough treatment chemical	Check chemical feed system and feed rate
High turbidity after backwashing	Backwash frequency is inadequate	Backwash filters more often
	Filter to waste time is too short	Filter to waste longer

E. CHLORINATION SYSTEM

PURPOSE

To inject a chlorine solution into the water to kill disease-causing bacteria and viruses.

EQUIPMENT

- 1 each 1-gph chlorine injection pump. LMI model AA951-450HI
- 1 each 30-gallon solution tank
- 1 each 55 gallon hypochlorite mixing tank
- Transfer pump TP-1
- Turbine flow meter M-2

OPERATIONAL DESCRIPTION

A chlorine solution is injected into the water after it has been filtered and before it leaves the WTP. Enough chlorine needs to be added to the water so that 1) a free residual of at least 0.2 is evident at the entry point to the distribution system and 2) a detectable residual is available throughout the system.

The chlorine solution, which is made up from High Test Hypochlorite (HTH), is "batch" mixed manually by the operator and is automatically injected into the water transmission line as water flows from the pressure sand filters toward the water storage tanks.

A 1% chlorine solution is recommended. However, other solution strengths may be used as necessary. Refer to HTH Solution Table for guidance on making a batch of chlorine solution using HTH. Consult your RMW for help (See Chapter 8) if necessary.

Use caution when ordering and handling hypochlorite solutions.

Three precautions should be taken when using chemical solutions:

- Order only chemicals approved for **Potable Water.**
- HTH, either wet or dry, can be corrosive. Follow all handling and storage instructions on the chlorine container. Also, HTH is explosive when mixed with petroleum products. WEAR A DUST MASK AND EYE PROTECTION WHEN HANDLING HTH POWDER!
- Whatever gets into the solution vat is injected into your drinking water. Therefore, cleanliness is important in all aspects of the chemical handling, mixing, and treatment process.

HTH SOLUTION TABLE

(Calcium Hypochlorite)

The table below is used to properly mix a known chlorine solution using HTH, which is 65% active chlorine.

Formula for mixing 65% HTH:

$$\text{Kilograms HTH Needed} = \frac{(\quad \%\ \text{Solution}\ ) \times (\quad \text{liters}\ ) \times (\ 1\ \text{kg/liter})}{65\%\ \text{HTH}}$$

Table XX below sets forth the mixing ratios for hypochlorite solutions.

TABLE 6-2: HTH MIXING RATIOS FOR HYPOCHLORITE SOLUTIONS

Liters of Water	½ % Solution Kilograms	1 % Solution Kilograms	2 % Solution kilograms
20	0.154	0.308	0.615
40	0.308	0.615	1.23
60	0.462	0.923	1.85
80	0.615	1.23	2.46
100	0.769	1.54	3.08
120	0.923	1.85	3.69
140	1.07	2.15	4.31
160	1.23	2.46	4.92
180	1.38	2.77	5.54
200	1.54	3.08	6.15

CONTROLS

The metering pump will manually feed a hypochlorite solution, calculated at 1 mg/l initial concentration with a 1% hypochlorite solution at 40 gpm.

Electrical

- The flow switch **FS-2** allows chlorine to be injected only if sufficient flow is detected by the flow switch.

START-UP PROCEDURES

1. Check to see that all equipment is clean and in place, and all connections are tight.
2. Make a 1% chlorine solution as calculated in Table 6-2.
3. Mix the solution in the mixing tank with the electric mixer for about 10 minutes.
4. Let the chlorine solution settle for 1 hour minimum to settle out the clay binders.
5. Use transfer pump TP-1 to transfer over the settled solution to the chlorine feed pump tank, leaving behind the clay binder sludge at the bottom of the mixing tank.
6. Prime the chemical feed pump CF-2 and eliminate all air bubbles in the lines and pump chamber.
7. Set the speed control knob on chemical feed pump CF-2 to 50% speed and the stroke control knob to 50%. This should produce about 15 ml/minute chlorine solution feed rate.
8. Allow the chlorine pump to run at this setting. After five minutes take a 5-gallon water sample from a hose bib, just prior to the water entering the storage tank.

9. Use the chlorine test kit to check the free chlorine residual reading. If the reading is not between 1.0 and 2.0 ppm, adjust the stroke knob on the chlorine pump accordingly.
10. When a chlorine test is done on a water sample from the designated distribution system entry point (See Testing Plan in Section 5A), a minimum chlorine residual of 0.2 ppm is required. For this reason a slightly higher reading should be normal before the water goes into the water storage tank.
11. Record the free chlorine residual test results. Record the chlorine pump stroke and setting.

NORMAL OPERATING CONDITION

- When flow switch FS-2 detects water flow through the WTP, the chlorine pump operates automatically.
- The chlorine solution level in the tank is above the 30-liter mark. If the level is not above this mark, clean the solution tank and mix a new solution.
- The free chlorine residual at the point farthest from the tank must be detectable.

ROUTINE MAINTENANCE AND INSPECTION

Daily

- Check the chlorine level in the vat.
- Record the chlorine residual on the ADEC Report Form.

Monthly

- Thoroughly clean the chlorine solution vat.
- Record the chlorine residual at the farthest point in the distribution system.

Every 6 Months

- Clean the pump suction strainer and injector.

Annually

- Clean the pump liquid end. Check the pump diaphragm, O-rings, and ball check valves for wear or cracking. Replace as necessary.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Pump does not run	No Power	Check the circuit breakers, electrical outlet, and plug
	The motor overload may have tripped due to overheating	Let the motor cool, and push the reset button on the pump. If the problem continues, check the electrical system for faults.
	Pump fuse burned out	Some pump models have internal fuses. Check the pump instruction manual.
	The flow switches is defective	Repair or replace the flow switch
Pump runs, no solution injected	Stroke knob set at "0."	Increase the stroke setting
	No solution in tank, or solution level too low.	Mix a new batch of chlorine solution
	Air lock (air bubbles) in the suction line, or the pump is not primed	Remove air by re-priming the pump and all tubing
	Fittings or tubing not tight	Re-check fittings and HAND-TIGHTEN only
	Valves or injector dirty or damaged	Clean or replace the valves or injector
	Pump diaphragm damaged	Replace the diaphragm

F. WATER STORAGE TANKS

PURPOSE

To provide storage of 130,000 gallons of potable water, and to provide chlorine contact time for disinfection.

EQUIPMENT

- 1 ea 140,000-gallon steel water storage tanks.
  - Diameter = 38.6 feet

  - Height = 16 feet
- Altitude gage on 12-inch supply pipe out of tank in WTP.
- Butterfly valves in WTP for fill and draw piping for tank.
- 4-in drain valve on tank outside.

OPERATIONAL DESCRIPTION

Following filtration and disinfection, water flows from the WTP to one aboveground storage tank by boost pump BP-1 via an insulated 4inch SDR11 HDPE arctic pipe. The Water storage tank WT-1 is a bolted-steel, insulated tank.

Water flows from the WTP through a 4-in HDPE pipe across the diameter of the tank, then enters the branch of a 4-inch HDPE tee and the flow is split in two opposite streams. Water is drawn from the tank in a 12-inch suction elbow with vortex breaker, and then flows into the WTP. The contact time for disinfection is met by having a minimum of 92,140 gallons of water in the tank at all times, or 10.5 feet of water.

CONTROLS

Mechanical

- Butterfly valves control the flow of water in and out of tank.
- The WTP operator controls the tank water level manually by reading the altitude gauge in the WTP. The tank height to overflow is approximately 15 feet.

START-UP PROCEDURES

1. The chlorination system should be ready for operation.
2. Open all inline valves within the WTP and to the storage tank, including the tank inlet and outlet valves.

NORMAL OPERATING CONDITIONS

- The tank is filled when it gets to the 10.5 ft level.
- Roof manway hatch and ladder gate are always kept locked except for Operator maintenance and access.

ROUTINE MAINTENANCE AND INSPECTION

Monthly

- Inspect the tank exterior for leaks, damage, or vandalism. Repair any damage.

Annually

- Exercise the tank valves.
- Clean the WST. During mild weather in summer is the best time to do this. Drain the tank and remove settled solids from the tank bottom. Call your RMW for help with this procedure.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Water level is too high (water is coming out of tank overflow pipe)	Tank float valve is malfunctioning	Repair or replace the valve
Low water level	Tank float valve is malfunctioning	Repair or replace the gauge
	The water intake system is plugged	Troubleshoot the intake system
	A major leak in the system is wasting water	Find and repair the leak as soon as possible
	A valve is closed	Open all in-line valves in the WTP and transmission lines

G. WATER DISTRIBUTION SYSTEM

PURPOSE

The distribution system provides potable water to the City water utility customers within the City of Atka.

EQUIPMENT

- Watermains of PVC or bare SDR11 HDPE pipe of sizes varying from 4-inch to 8-inch.
- 1-inch type K copper service lines.
- Corporation stops.
- Curb stops.

OPERATIONAL DESCRIPTION

Water flowing from water storage tank WT-1 travels by gravity down a buried 8-in SDR11 water main that supplies water to the community.

Corporation stops connect water service lines to the water mains. In between the corporation stop and the house are curb stops so that the water supply to the house can be turned off.

Hydrants throughout the system allow the operator to flush the lines or provide high flow in case of a fire.

CONTROLS

Mechanical

- Valves at curb stops allow the operator to control service to the home or business

START-UP PROCEDURES

As long as the in-line valves are open, and the water treatment system is in operation, the water distribution system should supply water to the connected utility customers.

NORMAL OPERATING CONDITIONS

- Water is supplied to the connected City water utility customers.
- Water pressure in distribution system is in the 50-70 psi range.

ROUTINE MAINTENANCE AND INSPECTION

Weekly

- Check the system for leaks, damage to hydrants and other problems. Repair any problems.

Annually

- Exercise all valves on the distribution lines

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Low water pressure to services	Broken water main	Repair the break
No water to services	Closed valve	Open all in-line valves
	Broken water main	Repair the break

H. HEATING AND VENTILATION SYSTEMS

PURPOSE

The heating system for the WTP provides for the heating of the WTP building space, and the ventilation system provides ventilation of the laboratory, bathroom, and chlorine disinfectant room.

EQUIPMENT

- 2 ea 22,000 BTU/hr self-contained oil fired heating units,
- 300-gallon single wall fuel oil tank with concrete containment basin
- 3 ea exhaust fans
- 1 ea air transfer fan
- Assorted pieces of ductwork

OPERATIONAL DESCRIPTION

The two oil-fired heating units (OS-1 and OS-2) operate with integral on-off thermostats. They get their fuel from the oil storage tank outside by gravity. Combustion air and exhaust are handled through concentric tubes through the wall, with the exhaust pipe in the center. These heating units have force combustion air fans as well as heating fans that circulate air past the firebox heat exchanger.

Ventilation systems consist of the following components:

- Exhaust fan EF-1 exhausts air out of the chlorination room, controlled by a switch outside the entrance to the space.
- Ceiling fan CF-1 runs continuously, and is controlled by a speed control knob/switch.
- Transfer fan TF-1 pulls air off the peak of the ceiling and circulates air from the warm peak to the laboratory space. It is controlled by a thermostat.
- Exhaust fan EF-2 exhausts air from over the laboratory counter and sink.
- Exhaust fan EF-3 exhausts air out of the bathroom, controlled by a light switch.
- Electric radiant heat ceiling panels RP-1 and RP-2 provide heat to the chlorination room, through a remote bulb thermostat.

CONTROLS

Mechanical

Exhaust fan EF-1 has a motorized damper on the suction side that shuts off air from the outside.

Exhaust fan EF-2 has a back draft damper located on the discharge side of the fan.

START-UP PROCEDURES

Fans are started by wall mounted switches.

NORMAL OPERATING CONDITIONS

- All fans run on thermostats except CF-1, which is switched on manually, and the fan speed adjusted. EF-1 and EF-2 are run by wall switches.

ROUTINE MAINTENANCE AND INSPECTION

Weekly

Check the operation of all fan units for running and unusual noises. Fix as needed.

Annually

Clean all fan or blower surfaces of dust and dirt.

Check all outside air hoods for blockage, dirt and debris.

Sparingly lubricate fan motors with oil per manufacturer. Do not over oil.

COMMON OPERATIONAL PROBLEMS

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Fan runs noisy	Debris in fan, making noise	Remove debris from fan housing.
Fan does not run	Motor burned out	Replace fan motor
	No lubrication in motor bearings.	Turn fan by hand and see if it turns hard. If so, oil the motor bearings. Motor may have to be replaced.

CHAPTER 7 - EMERGENCY PLAN

A. EMERGENCY SHUTDOWN PROCEDURE

If the WTP cannot be operated, you should take actions to prevent freezing water from causing pipe or equipment damage to WTP equipment. Ensure that heat is maintained within the WTP building. If freezing is likely to occur, take action immediately.

To shut down the plant, take the following steps:

1. Close the raw water valve into the WTP building and the WTP effluent valve exiting the WTP building.
2. Drain all the plumbing. Remove gauges and disconnect unions to allow air into the lines. Leave these fittings disconnected.
3. Move the chemicals, including the coagulant, to a heated area (city shop or other safe heated space).

B. IF THE WATER IS UNSAFE TO DRINK

If your system violates a drinking water regulation, you may be required to post a public notice. You must coordinate this activity with ADEC. Any violations should be reported to ADEC immediately, and they will communicate with you about the policies governing public notices. Talking to the public or broadcasting the notice over the local radio station will be helpful in communicating the information, but you still have to post a public notice.

C. IN CASE OF AN ELECTRICAL POWER FAILURE

If the electric power fails, shut off the water treatment plant flow by closing the raw water valve into the WTP building. Since the WTP facility does not have back-up power, the chemical feed systems will not maintain service in case of an electrical power failure. The WTP must be shut down if the chemical feed systems are not operating.

CHAPTER 8 - CONTACTS

If	Call	At
You must **report a violation** • If your lab reports that a sample has tested above regulatory limits • If chlorine residual at the entry to the distribution system is less than 0.2 mg/L for more than 4 hours	ADEC	907-269-7517 1-800-510-2332 907-269-7650 fax
You need Information about **training and operator certifications**	ADEC Operator Certification	907-465-5143
	APIA EH Specialist	Mike Brubaker 1-800-478-2742 907-222-4217
You need to order **parts**	AUSC	1-866-800-2872 fax 907-729-3584
You need assistance with **maintenance**	RMW Doug Abbas	1-800-478-2742 907-222-4218
Work must be done in a **confined space**	Regional Health Corporation Program Manager	Mike Brubaker 1-800-478-2742 907-222-4217
You want to check whether **reporting requirements** have changed	ADEC	1-800-510-2332 907-269-7517
You need assistance with **permits**	ADEC Compliance Assistance Office	1-800-510-ADEC (2332)
You need assistance with **business or financial issues**	RUBA	907-269-4569
	ADEC VSW	907-269-7517
If you have to mail	**Mail to**	**At**
Laboratory Testing Samples	Analytica Alaska	4307 Arctic Boulevard Anchorage, AK 99503 Phone (907) 258-2155 Fax (907) 258-6634

Alaska Department of Environmental Conservation (ADEC)
Drinking Water Program
555 Cordova Street

Anchorage AK 99501
1-800-510-2332
907-269-7647
907-260-7655 fax
http://www.dec.alaska.gov/eh/dw/index.htm

Alaska Native Tribal Health Consortium
Division of Environmental Health & Engineering
1901 S. Bragaw St, Suite 200
Anchorage AK 99508
907-729-3600
1-800-560-8637

Paul Gabbert, Utility Operations Consultant
Department of Sustained Operations (DSO) at ANTHC, DEHE
1901 S. Bragaw St, Suite 200
Anchorage AK 99508
907-729-3560
1-800-560-8637 ext. 3560
907-729-4506 fax
pgabbert@anthc.org

Floyd Murphy, Utility Operations Specialist
DSO at ANTHC, DEHE
1901 S. Bragaw St, Suite 200
Anchorage AK 99508
907-729-4086
1-800-560-8637 ext. 4086
907-729-4506 fax
fmurphy@anthc.org

Alaska Utility Supply Center (AUSC)
6130 Tuttle Place #2
Anchorage AK 99507
1-866-800-2872
907-729-3525
907-729-3584 fax
jthein@anthc.org

Alaska Rural Water Association
11723 Old Glenn Highway, Suite 203
Eagle River AK 99577

1-877-694-6792
1-907694-6793 fax
http://www.arwa.org

Alaska Water and Wastewater Management Association
3201 C Street, Suite 406
Anchorage AK 99502
561-9777
563-3447
http://www.awwma.org

Aleutian/Pribilof Island Association
201 3rd Ave.
Anchorage AK 99501
1-800-478-2742
907-276-2700
907-279-4351 fax
http://www.apiai.com

Doug Abbas, Remote Maintenance Worker
Aleutian/Pribilof Island Association, Inc.
201 E. 3rd Ave
Anchorage AK 99501
907-222-4218
1-800-478-2742
907-222-4273 fax
douga@apiai.com

Michael Brubaker, Environmental Programs Coordinator
Aleutian/Pribilof Island Association, Inc.
201 E. 3rd Ave
Anchorage AK 99501
907-222-4217
1-800-478-2742
907-279-4351 fax
mikeb@apiai.com

Analytica Alaska
4307 Arctic Boulevard
Anchorage, AK 99503
Phone (907) 258-2155
Fax (907) 258-6634

CHAPTER 9 - GLOSSARY OF TERMS

The following are some terms that are commonly used in the water industry. A brief explanation of these terms is given to help understand some of the unfamiliar terminology.

ALASKA UTILITY SUPPLY CENTER (AUSC)

The AUSC stocks and expedites parts and supplies needed to operate and maintain qualified water and sewer systems. See Appendix E for details.

ANNUALLY

Every year.

AQUASTAT

A component that measures water temperature and has a switch that opens or closes when the liquid reaches a preset temperature. Aquastats are used to operate boiler systems, hot water pumps, and water temperature alarm systems.

ARCTIC PIPE

Pipe that has a thick coat of insulation and a shell (usually aluminum culvert). Water will not freeze easily in this type of pipe. Arctic pipe is used predominantly in arctic region water and sewer systems.

BACKWASHING

The process of cleaning filters by forcing water backwards through the filter.

BACTERIA

Tiny primitive plants. Many types use sewage for food, breaking down the organic matter into more stable compounds.

BOILER

Equipment that burns fuel (usually fuel oil or natural gas) to heat water or a glycol water mixture used for heating potable water and buildings.

BRITISH THERMAL UNIT (BTU)

BTU is a measure of heat. One BTU is the amount of heat energy needed to heat one pound of water - one degree centigrade.

BURNER

The component on a heating appliance such as a boiler that provides the heat. The burner includes a motor, fuel pump, nozzle, blower fan, ignition electrodes, and an ignition transformer.

CALIBRATE

To adjust or tune a measuring instrument so that it works according to a standard.

CAPACITY

The amount or ability of equipment for holding or storing something.

CAVITATION

The formation and resulting collapse of gas pockets and bubbles on the blade of an impeller or the gate of a valve. The collapse can be so forceful that it drives the water hard enough to create a pit in the gate or valve surface.

CHECK VALVE

A valve in a pipe of duct that allows flow to move in one direction and closes with reversal of flow.

CHLORINATOR

A system used to add chlorine to the water supply for disinfection.

CHLORINE

A chemical used to disinfect potable water. Chlorine can be in liquid, gas or solid form.

CHLORINATION

The process of applying chlorine to water to kill microorganisms that may be harmful or to breakdown undesirable compounds.

CHLORINE RESIDUAL

Chlorine residual is chlorine that is not used up in reacting with impurities in the water. Residual chlorine is used to kill the microorganisms in water. Free chlorine residual is the best disinfectant. Combined chlorine residual is chlorine that reacts with ammonia in water to form chloromines that also kill microorganisms. A chlorine residual test is required to determine if water is safe to drink.

COLIFORM ORGANISM

Any number of organisms (bacteria) that are common to the intestinal tract of man or animals. The presence of coliform organisms in water is an indicator of pollution and of potentially dangerous bacterial contamination.

COMPONENT

One part of a system. A piece of equipment that works with other pieces of equipment.

CONDUIT

Tubes or pipes that are to contain wires for an electrical system.

CONFINED SPACES

Spaces that are not intended for humans to be in for very long. Usually, there is only one way in/out. These spaces may be hazardous because of toxic or flammable gases. These spaces should not be entered. Contact your regional environmental health manager.

CONSUMER CONFIDENCE REPORT(CCR)

A water quality report that must be distributed to all the customers in a system (and to ADEC) each year.

CONTACT TIME

The amount of time between when chlorine is added to the water and when it enters the distribution system. This time allows the chlorine to affect the water before distribution.

CORPORATION STOP

The valve on the water service saddle connection at the water main. The corporation stop can only be activated if the main is excavated.

COUPLING

A device to join pipe, tubing, conduit etc.

CRYPTOSPORIDIUM

A microscopic parasite (an organism that depends on another organism to live) found in water that can cause diarrhea, cramps, weight loss, vomiting, and fevers. Symptoms usually appear 2 to 25 days after contact and may last up to one month.

CURB STOP

A valve on the water service line between the water main and the house. The curb stop allows the water to be turned off to a home for maintenance, or for nonpayment of user fees.

DBR

Disinfection/Disinfectant By-Product Rule. EPA rule which states the limits of disinfection/disinfectant by-products [including Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5)] which can be present in the treated water.

DIELECTRIC COUPLING

A special fitting on plumbing installations where certain dissimilar metals are joined. The dielectric coupling prevents the passage of electrical currents that will corrode or eat away one of the metals.

DISINFECTION

The destruction of most of the microorganisms in water or wastewater, usually by the addition of chlorine.

DRAWER ASSEMBLY

The component of the burner unit that includes the electrodes, nozzle, fuel and air diffuser, which are located in the blast tube of the burner.

ELECTRODES

The electrodes in a burner unit are wires used to conduct a high voltage to an air gap that the high voltage jump across creating a spark that ignites the fuel.

EFFLUENT

The final liquid coming out of a plant of system. Common effluents are filter effluents or effluents from a sewage treatment plant or lagoon.

ELECTROMAGNETISM

Magnetism developed by and electric current. Motors and relays are run by electromagnetism.

EVAPORATE

To convert from a liquid to a gas.

FILTER

A device that is porous and through which matter (usually liquid or gas) is passed to removed solids from it.

FILTER MEDIA

See "Media."

FLEX COUPLING

A variety of flexible couplings that are used to join plumbing and mechanical connections. Flexible couplings are used on pump systems to isolate the pump vibrations from the plumbing system.

FLOAT SWITCH

An electric switch that is turned on or off by a change in water level. Some use a mechanical arm that flips a switch on or off. Others use liquid mercury inside of the float to bridge the contacts from two wires, depending on the float position.

FLOW SWITCH

An electric switch that turns on or off by the flow of water or air in a pipe.

FLUORIDATOR

A system that injects fluoride into a potable water supply. Equipment usually includes a small metering pump, a fluoride saturator and injector on the water line.

FLUORIDE

An element added to water to prevent tooth decay. Fluoride is normally added in the form of sodium fluoride.

FLUSHING PORTS

Large water valves installed on a water line. Flushing ports provide great quantities of water; a place to flush the water line; or a point to drain the water line to prevent freezing.

FREE CHLORINE RESIDUAL

The amount of chlorine available that is not combined with other organic compounds.

GATE VALVE

A valve that by turning the handle on it causes a gate to raise or lower, to let water flow through it or stop it.

GIARDIA

A microscopic parasite (an organism that depends on another organism to live) found in water that can cause diarrhea, cramps, weight loss, vomiting, and fevers. Symptoms usually appear 6 to 16 days after contact and may last up to one month.

GLOBE VALVE

A type of valve opened or closed by a rising or falling stem which fits into a valve seat.

GLYCOL

This substance contains a type of alcohol and can be added to water to keep it from freezing.

GRAVITY FLOW

The process by which matter flows downhill.

HAA5

Haloacetic Acids. The regulated haloacetic acids are a group of chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The regulated haloacetic acids, known as HAA5, are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.

HAZARD

Something that could cause injury.

HEAD

A measure of pressure on water. Head of water can be measured in feet, meters, pounds per square inch (psi), or kilo-Pascal (kPa).

HEAT EXCHANGER

A piece of equipment that converts the heat from one medium to another. The most common heat exchanger is a water vessel with tubes running through it. Hot water in either the tank or the tubes heats the water adjacent to it through the walls of the tubes.

HEAT TAPE

Plastic tape with wires inside. The wires produce heat by resistance to electrical flow and protect water from freezing.

HYPOCHLORITES

Compounds containing chlorine that are used for disinfection.

IMPELLER

The moving part of a water pump that forces water through the pump.

INFILTRATION

Groundwater that seeps into pipes through cracks, joints, or breaks.

INFLUENT

The water coming into a treatment process; raw water from a well or stream.

KILO

Prefix meaning 1000. Example; one kilowatt equals 1000 watts.

KILOWATT

A measurement of electrical power. Kilowatts power can be roughly calculated by multiplying volts times amps and dividing the result by 1000.

MANUFACTURER'S LITERATURE

Documents produced by the manufacturer of each piece of equipment that offer instructions for how to use the equipment and actions to take if the equipment does not work correctly.

MEDIA

A material used for filtering. The individual units of the material are so small that they cannot be counted. Sand is the most common filtering media.

METER

A device that measures the amount of liquid or gas that flows through it. Water meters are used in the water plant to show the rates of flow or the amount of water being supplied to different parts of the system.

MICROORGANISM

A very tiny organism normally visible only under a microscope.

MILLIGRAMS PER LITER (mg/L)

A widely used term in chemical dosage calculations. Essentially it is equivalent to parts per million (ppm), which means one part in one million parts. An example would be one lb. of chlorine in one million lbs. of water = one mg/L.

MOTORIZED VALVE

A valve that is controlled by an electric motor. The motor is usually controlled by an automatic switch, such as an Aquastat, float switch, flow switch, or etc.

MSDSs

Material Safety Data Sheets – these forms are provided by the manufacturer of each chemical and list the properties of a chemical, its dangers, and what precautions you should take when using this chemical.

NOZZLE

A device which converts a liquid stream into a fine spray and into a desired spray pattern. An example is the fuel nozzle in a burner unit which converts a stream of fuel oil into a fine mist that is easily ignited.

ORGANIC

Substances which contain carbon compounds. Fuel oil is an example of a organic substance or compound.

pH

A measure of hydrogen ion concentration. pH is measured on a scale of 1 - 14 to indicate an acid or alkaline nature of any solution. A pH of 7 is neutral. A pH below 7 is considered acidic. A pH above 7 is considered alkaline (or basic).

PER CAPITA

For each person.

PERCOLATION

The downward flow (infiltration) of water or a liquid through the pores or spaces of a rock or soil.

PITORIFICE

A special type of corporation stop used on circulating Water Systems in the Arctic. The pitorifices are used in pairs on the water main; one to flowing water in the main and a second to return the flowing water from the service to the main.

POTABLE WATER

Water that is safe to drink.

PPE (Personal Protective Equipment)

Safety equipment such as goggles, gloves, and respirators.

PPM (PARTS PER MILLION)

See milligrams per liter (mg/l).

PRESSURE SAND FILTER

Water flows through layers of sand and gravel under pressure. In most pressure sand filters, the water flows from the top to the bottom. The sand cleans the water by trapping small particles of dirt or debris.

PRESSURE RELIEF VALVE

The pressure relief valve opens and releases water and pressure when the upstream pressure reaches a set level. The pressure relief valve protects the piping from over-pressurization, which can cause considerable damage.

PRESSURE SWITCH

A pressure switch is an automatic switch that turns on or off with changes in pressure of a liquid or gas. As part of the Water System, they are used to operate pressure pumps, air compressors, or high or low-pressure alarms.

PRESSURE TANK

Also called a hydro-pneumatic tank on Water Systems. Compressed air forces water in the tank to move faster, creating a steady stream to the tap or distribution system.

PROCESS

An action.

ROTOR

The inside spinning part of an electric motor.

SANITARY

Free of disease causing organisms. Clean.

SEDIMENT

The matter that settles to the bottom of a liquid.

SEEP

When water moves into something it is not supposed to. The opposite of a leak.

SERVICE SADDLE

A saddle shaped clamp used to hold the service lines onto the main lines. Used on both water and sewer services.

SIGHT GLASS

A glass or plastic tube mounted on the side of a tank to show the level of the liquid inside of the tank.

SOLENOID VALVE

A globe valve that is operated by on electromagnet.

STATOR

The stationery part of an electric motor that has the electromagnetic charge.

STERILIZATION

The complete destruction of all life in water or sewage.

SUBMERSIBLE

Equipment that is able to work under water.

SUPERNATANT

The liquid that floats above the solids that have settled from it.

SUSCEPTIBLE

Able or likely to be acted upon. For example, if something is susceptible to leaking, there is a good chance it might leak.

SUSPENDED SOLIDS

Small particles of solids that will not settle by ordinary means, and contribute to the cloudiness (turbidity) of water.

SWEATING

Soldering copper pipe joints together; using a heat source (usually a propane torch) with wire solder and flux.

THERMOMETER

A device used to measure the temperature of air or water.

THERMOSTAT

A switch that operates with a change in air temperature. Thermostats may be used to turn on heat when the environment gets too cold; or to operate a low or high temperature alarm.

TOXIC

Poisonous.

TRANSFORMER

An electrical device used to change the voltage of an electrical current. Transformers can be used to step up or step down the voltage to suit the user.

TROUBLESHOOTING

Finding and repairing a problem.

TTHM

Trihalomethanes (THM) are a group of four chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The trihalomethanes are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Total trihalomethanes (TTHM) is the sum of the concentrations of THM present in the treated water.

TURBIDITY

The measure of suspended solids in water.

UNIT HEATER

A heat exchanger that transfers the heat from hot water or glycol to heat the air.

VALVE

A device that stops the flow of water in a pipe when closed. The most common valve is the gate valve.

VELOCITY

Speed.

VENTURI

A small tube that is tapered toward the middle. A tube of this shape increases liquid velocity and decreases pressure. Venturis are used to measure fluid flow or create suction.

VOLTAGE

Voltage is a measure of electrical pressure or potential on an electric circuit.

WATER HAMMER

A condition where a momentary build-up of pressure occurs in a water line due to the fast opening of valves, pump starts, etc. Pipes can knock, shake or even burst from excessive water hammer.

WEIR

A vertical blockade, such as a wall or plate, places in an open channel and calibrated in order to calculate flow rate.

WEIR TROUGH

A v-shaped waterway that moves treated water from a settling tank (clarifier)

WYE

A section of pipe made to join two incoming pipes into one outgoing pipe; shaped like a letter "Y".

Appendices

Appendix A—As-Built Drawings

Appendix B—MSDS Forms

Appendix C—Example Report Forms

WTP DAILY OPERATION RECORD

MONTH_____ YEAR_____ OPERATOR'S SIGNATURE_____

DATE	TIME	METER BACKWASH	METER TANK	TOTAL TO DATE GALLONS	CHLORINE PUMP SPEED	CHLORINE PUMP STROKE	FREE CHLORINE PLANT	FREE CHLORINE SYSTEM	TURBIDITY (NTUs)	GPM	COAGULANT STROKE	COMMENTS
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
											TOTAL	

MONTHLY OPERATION RECORD

Month _____

ELECTRICAL USAGE **WATER SYSTEM**

Meter reading from the last day of this month _____

Meter reading from the last day of previous month _____

kWHs used _____

Total kWHs used: _____ Total Cost: $ _____

FUEL USAGE

Amount of fuel used this month:

_____ gallons Cost: $ _____

COAGULANT USAGE

Amount of coagulant used this month:

_____ liters Cost: $ _____

CHLORINE USAGE

Amount of chlorine used this month:

_____ kg Cost: $ _____

WATER CONSUMPTION

Total Consumption (meter usage)

_____ gallons

PARTS PURCHASED

Vendor	Item	Cost $

Total Parts $ _____

LABOR

Name	Hours Worked

Total hours worked

Water system hours x Operator wage = Operator Cost $ _____

TOTAL MONTHLY COST

$

Comments:

Operator signature: _____ Date: _____

Mayor signature: _____ Date: _____

ANNUAL OPERATION RECORD

Month	Water produced (gallons)	Electric Usage (kWH)	Fuel Oil Usage (gallons)	Coagulant (liters)	Chlorine (kg)	Comments
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Total						

Send 1 copy to the City and keep 1 copy in the Water System files

Note: all usage has been copied from monthly report.

Appendix D—Monitoring Summary for Atka Public Water System ID#AK2260058

Monitoring Summary for **ATKA** **March 14, 2012**

Public Water System ID# **AK2260058** **Population:** **97** (Surface water) Community Water System

Required Water Test and Location	Required Sampling Frequency	Current Sampling Status	
		Last Sample Date	Next Sample Date
Total Coliform Bacteria (Distribution System)	Waiver until 2012	February 2012	March 2012
Distribution Chlorine Residual (Distribution System)	1 Sample Per Month (Same Time and Location as each Coliform	February 2012	March 2012; Record on lab forms for total coliform samples
Combined TTHM & HAA5 (End of Distribution)	1 sample Per Quarter(Increased from Annual with HAA5 exceednc)	September 2010	Overdue! Between January and March 2012
Volatile Organic Compounds (VOCs) (Entry Point)	1 sample Annually	February 2010	OVERDUE! Sample Now
Nitrate (Entry Point)	1 sample Annually	February 2010	OVERDUE! Sample Now
Pesticides & Other Organics SOC (Entry Point)	Renew Waiver or Sample Quarterly in 2013		Renew 2011-2013 Monitoring Waiver App by 12/31/2012
Consumer Confidence Report (CCR)	Annually Before July 1st	2010	Before July 1, 2012
Lead And Copper (Distribution System)	5 samples Every 3 Years	January 2009	During 2012
Sanitary Survey	Every 5 years	2/13/2010	During 2013
Radium 226 and 228 (Entry Point)	1 sample Per Cycle	November 2005	Between 2008 and 2016
Gross Alpha (Entry Point)	1 sample Per Cycle	August 2007	Between 2008 and 2016
Arsenic (Entry Point)	1 sample Per Cycle (Reduced from Periodic)	January 2009	Between 2011 and 2019
Old Inorganics (Entry Point)	1 sample Per Cycle	August 2005	Between 2011 and 2019
New Inorganics (Entry Point)	1 sample Per Cycle	August 2005	Between 2011 and 2019
Asbestos (Distribution System)	1 sample Per Period	**NSF	Waiver on File

Water Log

Distribution Chlorine Residual (Distribution System)	1 Sample Per Month - same time/site as each coliform sample	December 2012	Test and Record Daily. Send Reports to ADEC on the last day of the month (before the 10th day of the following month).
Turbidity (After Filters)	1 sample every 4 hours of filtering	December 2011	
Entry Point Chlorine (Entry Point)	1 sample per day - minimum of 20 days per month	December 2011	

Compliance Schedules

Schedule Type	Effective Date	Closed Date	Status
SRVY	1/1/07		

Activities

Name	Due Date	Achieved Date
SANITARY SURVEY	12/31/2013	

Schedule Type	Effective Date	Closed Date	Status
SBWN	12/9/11	1/23/12	S

Activities

Name	Due Date	Achieved Date
INSTALL TREATMENT	06/30/2012	

Schedule Type	Effective Date	Closed Date	Status
DBP2	1/1/07		F

Activities

Name	Due Date	Achieved Date
DBP- COMPLIANCE MONITORING PLAN	10/01/2013	

Schedule Type	Effective Date	Closed Date	Status
SBWN	1/23/12		

Activities

Name	Due Date	Achieved Date
HAND DELIVER/CONTINUOUSLY POST NOTICE	01/25/2012	
INSTALL TREATMENT	06/30/2012	

**NSF = No Sample Found

1) Periods are three years in length and started in 2002. The current period is 1/1/2011 - 12/31/2013 and the next period will be 1/1/2014 - 12/31/2016. Cycles are nine years in length and started in 2002. The current cycle is from 1/1/2011 - 12/31/2019. The next is 1/1/2020 - 12/31/2028.

2) Entry point - is the entry point to the distribution system. Distribution system - is the homes and buildings that receive water from a piped water system.

3) Water quality parameters are tested in order to conduct a corrosion control study. Please contact your Engineer, Health Corporation, or Certified Laboratories for assistance.

4) Water systems with multiple water sources that do not combine before entering the distribution have to take one sample from each entry point to the distribution and may do a composite sample according to 18AAC80.325(17), 18AAC80.315(4).

5) Periods for radionuclides (Gross Alpha, Radium 226/228, and Uranium) are three or six years in length and started in 2008. The current periods are 1/1/2011 - 12/31/2013 and 1/1/2008 - 12/31/2013 respectively. Cycles for radionuclides are nine years in length and started in 2008. The current cycle is 1/1/2008 - 12/31/2016.

6) SOC- waiver renewal forms are due every three year period. SOC waiver, new and renewal, forms can be found at http://www.dec.state.ak.us/eh/dw/publications/forms.html.

Monitoring summaries reflect sampling information the Drinking Water Program receives from certified laboratories and public water systems. The accuracy cannot be guaranteed. If you notice any errors in this data, please contact your local ADEC Drinking Water Program Office. Public Water Systems are responsible for compliance with monitoring requirements.

Sincerely,

Appendix E—Alaska Utility Supply Center

The Alaska Utility Supply Center (AUSC)

The AUSC has been in operation since January, 2001, with orders coming in daily. The AUSC stocks and expedites parts and supplies needed to operate and maintain your water and sewer systems. We have agreements with many vendors for buying large quantities at reduced prices, and pass these savings on to member communities. Presently there are over 120 items in stock at the RSSC, and we are planning to add more as we determine the needs of the member communities. We can supply you with virtually anything needed for your water and sewer system, whether or not we have it in stock.

To order supplies from the AUSC you must be a federally recognized Alaska Native Tribe; a City with a resolution from a federally recognized Alaska Native Tribe operating a water and or sewer system, or a community with a native population of 50% or greater, as documented by the State of Alaska, Department of Community and Economic Development.

To become a member community, fill out the Member Agreement Form, agree to the terms of the Agreement, have the manager of your utility sign the agreement, and mail it to AUSC.

Address to which you mail your AUSC application

Alaska Native Tribal Health Consortium
Alaska Utility Supply Center
6130 Tuttle Place #2
Anchorage AK 99507
1-866-800-2872
FAX 907-729-3584

If you need a new member application form contact an AUSC representative at **1-866-800-2872 or 907-729-3525.** As a member community of the AUSC you will be able to place orders a number of ways. You can order by phone by calling the toll free number listed above. You can fax your order to us at **907-729-3584**, or e-mail **jthein@anthc.org**

When ordering items from the catalog, list the AUSC item#, quantity needed, and a complete description of the item. When ordering an item not listed in the catalog, indicate the quantity needed and a complete description of the item. NOTE: The prices listed in the catalog are subject to change as they change from our suppliers. If you would like to find the latest price, please contact us on our toll free number, listed above.

The AUSC is an affiliate of the Alaska Native Tribal Health Consortium (ANTHC). Personnel at AUSC includes:
Ed Lohr, Manager – Department of Sustained Operations
John Thein, AUSC Manager
Tonia McWilliams, Inventory Management
Michaela Straughn, Program Assistant
John Spriggs, Association Coordinator

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

Alaska Utility Supply Center (AUSC) Program

Membership Agreement

Community: _____ *Date:* _____

Address: _____ *Billing Address:* _____

_____ _____

_____ _____

Contact Person: _____ *Contact Person:* _____

Phone No.: _____ *Phone No.:* _____

Fax No.: _____ *Fax No.:* _____

Email: _____ *Email:* _____

Authorized Procurement Personnel: _____

_____

For ANTHC Office Use Only:

Region: _____

Account No. _____

Nature of Service

The purpose of the Alaska Utility Supply Center (AUSC) Program is to offer Alaskan communities with a convenient method for ordering various parts and supplies required for the safe and efficient operation of community utilities. Through this Program, the Alaska Native Tribal Health Consortium (ANTHC) will maintain an inventory of essential replacement parts and supplies at a central location to ensure quick response to communities in the event of emergency situations, but will also offer the convenience of centralized ordering, procurement and shipment of parts and supplies needed for routine utility operations. It is anticipated that this Program will enable communities to realize cost savings through a cooperative business venture that consolidates the procurement process statewide and takes advantage of the purchasing power of the ANTHC.

Membership Eligibility

The ANTHC, a statewide nonprofit health services organization, is owned by Alaska Native tribal governments and the regional Alaska Native health services organizations they serve. Therefore, a community will be eligible to become a member of the Alaska Utility Supply Center Program if it meets the following criteria:

- The community utility is operated by a *'Federally Recognized Alaskan Tribe'* (as acknowledged by the Bureau of Indian Affairs) or the community utility is operated by the local City or Municipal government, through a formal resolution from the '*Federally Recognized Alaskan Tribe.'*
- The community has a Native population of 50% or greater, as documented by the State of Alaska, Department of Community and Economic Development (DCED) or other census information.
- If the community has a '*Federally Recognized Alaskan Tribe'* within its jurisdiction, but does not meet the 50% Native Population criteria, then the Tribal organization can formally request that the community be accepted as a member.

Procedures for Ordering and Invoicing

Once a community becomes a member of the AUSC Program, a catalog of available parts and supplies and price list will be provided, along with more specific information on the ordering process. Eventually, this catalog will be maintained on a website to make updates and ordering easier and quicker. However, orders can always be placed by phone, fax or email correspondence. Please refer to the Contact Information Section of this form for ordering information

Once an order is placed, the ANTHC will coordinate with vendors on the procurement, packaging and shipping of the order directly to the customer. In the event of an emergency, local inventory will be used to expedite immediate shipment of parts or supplies. Within one (1) month after the order has been shipped, the ANTHC will send an invoice to the Billing Address provided above. The invoice will itemize the actual costs for materials and shipping, and will include a 5% markup on material costs only for overhead and operating costs related to the Program.

The ANTHC has a limited revolving fund established for purchasing a minimum inventory for emergency parts and supplies, and for procuring materials from vendors for members. As a result, the maximum amount of allowable credit extended to a member utility will be limited to $2,500.00, unless otherwise approved by the ANTHC Program Manager. Because this fund is limited, it is important that communities make prompt payments on their invoices.

Member Obligations

Members are encouraged to make payment to the ANTHC within 30 days after the invoice date. If a community is unable to make payment within 30 days of the invoice date, the

community will need to contact the ANTHC to establish a longer-term credit account for repayment of outstanding debt.

A member community is required to notify the ANTHC if it is unable to meet its financial obligations within the defined timeline. The ANTHC is willing to work with communities and consider alternate repayment methods, on a case-by-case basis, as may be required. However, if a member community fails to make repayment within 30 days of the invoice date and also fails to notify the ANTHC regarding alternate repayment options, then the community's membership in the AUSC Program may be temporarily suspended or terminated.

Finally, members are also encouraged to provide routine updates on address changes, primary contact information and authorized procurement personnel. These updates will assist in maintaining efficient communications between the ANTHC and the community.

ANTHC Obligations

The ANTHC will work with both members and vendors to develop an efficient supply and shipping service for the benefit of communities. More importantly, the ANTHC will be a resource for emergency situations where community systems may have failed or critical components become inoperable. In an effort to reduce costs for members, the ANTHC will implement a competitive procurement process with vendors, but may allow a preference for Alaskan suppliers wherever possible. If preferences are implemented, there will be an explicit agreement with the Alaskan vendors to ensure there is value and benefit to the ANTHC and ultimately to the AUSC Program Membership.

In an effort to create value to the Program Membership, the ANTHC will solicit feedback from communities on additional products, level of service received and suggestions for improvement.

Rights of Termination

Both the ANTHC and the members have a right to terminate the membership agreement as may be warranted by either party.

The ANTHC may decide to terminate the membership of a community if that community has an outstanding debt and has not taken the necessary steps to notify the ANTHC and work cooperatively to resolve the debt. The ANTHC recognizes the financial hardships that may occur during community emergencies and is willing to coordinate with communities on sFalse Passing effective and agreeable solutions to problems.

If a community's membership is terminated by the ANTHC, the community will no longer be able to order parts or supplies through the AUSC Program. However, the community can reapply for membership after any outstanding debt is cleared or a payment plan established to clear its debt. In addition, the ANTHC reserves the right to require full payment at the time of ordering after a member community has been readmitted into the AUSC Program. This probationary period, where full payment is required at the time of ordering, may extend up to one (1) year after re-admittance into the AUSC Program, at the discretion of the Program Manager.

A community may also choose to terminate its membership in the Program. If the community chooses to do so, it will notify the ANTHC in writing and make arrangements to clear up any outstanding debt.

Contact Information

The following ANTHC Departments are responsible for the management, operations and financial aspects of the Community Supply Center.

Management: DEHE Sustained Operations John Spriggs, Association Coordinator 6130 Tuttle Place #2 Anchorage, AK 99507 Phone: (907) 729-4088 1 (800) 560-8637 Fax: (907) 729-3584 Email: jspriggs@anthc.org	Financial: Administrative Offices Glenn Buchta, Staff Accountant 4141 Ambassador Drive Anchorage, AK 99508 Phone: (907) 729-2877 Fax: (907) 729-2890 Email: gbuchta@anthc.org
Operations: TSS Regional Supply Service Center Joe Miljure, Acting Director 6130 Tuttle Place #2 Anchorage, AK 99507 Phone: (907) 729-2990 Fax: (907) 729-2995 Email: hsquarts@anthc.org	Ordering: Alaska Utility Supply Center John Thein, AUSC Manager Tonia McWilliams, Inventory Management Phone: 1 (866) 800-AUSC 1 (866) 800-2872 (907) 729-3525 Fax: (907) 729-3584 Email: jthein@anthc.org

Formal Consent to Terms and Conditions:

As an authorized representative of the community of_____ ,

I agree with the terms and conditions listed above.

Signature:_____ Date:_____