

# System Overview, Schedule, and Sequence of Operation

## System Overview

To address the *Legionella* Deficiencies, GEAR has selected Sanikill Monochloramine Systems in place of the current chlorine injection system for Buildings 18 (Boiler Plant), Building 10 (Domiciliaries), Building 12 (Main Hospital), and Building 29 (Transition Residence). The order of installation is not important but will be decided and coordinated by the Contracting Officer's Representative (COR) with respect to the timing of Utility Shutdowns. It may be advisable to install the smaller SaniLite Monochloramine Systems prior to the Building 18 installation to allow for a level of water treatment prior to the demolition of the current chlorine injection system. Once the existing chlorine injection system is removed, raw water will not be treated until the new Monochloramine System is installed in Building 18. Equipment and Supplies should be pre-ordered and available at the beginning of construction following the ordering schedule on the following pages, especially long lead time orders including chemicals.

Due to a decision after the 95% submittal regarding eye wash stations (plumbed vs portable), the VA Hot Springs' Industrial Hygienist required plumbed systems. The VA's Technical Information Library (VA TIL) specifies that plumbed eye wash stations are required to be located and installed within 55 feet of each of the Monochloramine chemical drum locations. Further, the VA's TIL states that "Piped drains for emergency eyewash and shower equipment are not required by the IPC, but occupants prefer piped drains for housekeeping purposes. If a waste pipe is available within five feet of the combination eyewash/shower station, provide a floor drain adjacent to the unit." Additionally, the VA TIL requires an ASSE 1071 compliant mixing valve for the tepid water supply. This would require the Contractor to tap into the cold and hot water supply. As a result, and in addition to As-Built drawings, the Contractor shall prepare and submit Shop Drawings for approval from the Design Engineer and the VA depicting the location of eyewash stations, floor drains (as required), mixing valves, and specifications for tapping into the cold and hot water supply lines prior to commencing work.

## Building 18

The Sani-TEC SKLP-1000-K has been selected to inject metered concentrations of Monochloramine into the 7" diameter PVC Manifold located after the two Grundfos pumps. Additionally, an Oxidation Inhibitor will be co-located with the Monochloramine System and will inject into the 7" diameter PVC manifold as well. The installation of the Monochloramine and Oxidation Inhibitor Systems will need to be phased to allow a minimum of downtime for the new raw water treatment systems to be connected and go on-line.

**Demolition** - The existing chlorine injection system will be demolished including all appurtenances and piping located on the wall and through the floors where the current chlorine system is located, leaving the electrical power in place and the outside chlorine shed intact. A new 120v electrical connection will be made with an outlet located on the wall to provide power. The current injection system consists of three pipes; two outer pipes for the injection of chlorine into 8" diameter supply lines prior to the pumps, one middle line source of raw water that is used to dilute chlorine gas as injected. The two outer lines need to be removed, cut and capped above the valves at the location of 8" diameter supply lines. The raw water line will be cut and repurposed as the feedback line to the Monochloramine generator unit. Once all of the appurtenances and pipes are removed, the contractor will need to re-route the telephone cabling directly above the existing phone and relocate the water spigot (if kept) located to the wall's edge to permit enough space to mount the Monochloramine unit to the wall.

## **System Overview, Schedule, and Sequence of Operation**

**Monochloramine and Oxidation System Installation** - With the wall cleared of the former chlorine injection system and un-related appurtenances (trays, boards, spigot, telephone lines, and other miscellaneous unused items), the contractor will need to wall mount the Monochloramine generator at a height (see cut sheets) that allows for the placement of reagent chemicals below and set upon secondary spill containment pallets. The Oxidation (corrosion) Inhibitor is essentially a drum of Klenphos that only requires a dosing pump to operate. The contractor will need to construct a shelf on which to securely fasten the dosing pump.

**Plumbing** – With the Monochloramine and Oxidation Systems in place, a drain line will need to be routed through one of the three holes in the floor where the previous chlorine injection lines ran and then connected to an existing and accessible sanitary line below the bathroom floor using a drip and condensate sanitary funnel (aka air gap waste receptor). Of the remaining two holes in the floor, one will be enlarged to accommodate two injection lines (Monochloramine and Inhibitor), the remaining hole will be utilized for the feedback return line (the repurposed raw water supply line for the existing chlorine system). To supply raw soft water to the Monochloramine unit, a new line will be added where the existing spigot is located and be routed to the incoming side of the Monochloramine unit.

At the 7” diameter PVC manifold located immediately downstream from the two pumps, two (2) SCH 80 CPVC “taps” will be installed. Using corp stops to protect any metal piping, one (1) line will provide injection from the Monochloramine generator and one (1) line will be used as the injection line from the Oxidation Inhibitor pump. The previous water supply line for the chlorine system will be re-routed to the Monochloramine generator and act as a feedback loop that will monitor, adjust, and stabilize the concentration of Monochloramines. Injection lines will be fitted with corp stops, isolation valves, and one-way check valves to protect metal piping and allow for the removal, repair, or replacement of components. A new flow meter will be installed in the 7” diameter influent pump manifold to transmit raw water flow data to the Monochloramine generator. The flow data will be used by the generator to provide the proper monochloramine dosage.

**Electrical** – A new 120v 20 amp circuit breaker will need to be installed with conduit routed to an outlet for the Monochloramine and Oxidation Systems to plug in for power.

### **Building 10 and Building 12**

**Plumbing** - The Sanikill Sanilite SKLP-025 Monochloramine System has been selected to inject, via a corp stop, metered concentrations of Monochloramine into the water supply line using a CPVC SCH 80 piping. The Monochloramine generator will be mounted to a Unistrut frame in both buildings. In Building 10 the unistruts will be connected from floor to ceiling. For Building 12, the existing unistrut that supports the low pressure steam line nearest the wall, will be replaced with a 70” tall unistrut mounted from floor to wall, using an “L” bracket attached to the wall, to support the low pressure steam line and Monochloramine unit. A tap from the Hot Water Supply line will be used as feedback to the Monochloramine generator to allow for adjustment and stabilization of Monochloramine concentrations into the hot water system. A flowmeter will be installed on the supply line.

## System Overview, Schedule, and Sequence of Operation

**Building 10 Electrical** – A 120v 10amp circuit breaker will be added to the panel identified in the drawings. A new conduit will run from the panel to an existing, empty conduit (shown below) located above the bathroom ceiling where wires will be rerouted to a point prior to an existing J-Box where a new J-Box and new conduit will be routed to the Monochloramine generator.



**Building 12 Electrical** – The VA will use a wire puller to remove wiring from an existing 2" conduit that is fed to a circuit panel (BE-EQ1) where a 12 amp breaker will be installed for 120v power to the Monochloramine generator. Due to limited space in the existing electrical conduit, the existing electrical wiring for the mechanical room condensate pump will also be removed with the puller, requiring the need to run new 12 gauge lines to hardwire the condensate pump (see electrical drawings) with wiring repair to the condensate pump motor disconnect. New wiring for the monochloramine generator, per the drawing B12-2, will share the 2" conduit in the crawl space where, after they branch apart in the J-box (abandoned panel) will be routed as shown in drawing B12-2.

### Building 29

**Plumbing** - The Sanikill Sanilite SKLP-025 Monochloramine System has been selected to inject metered concentrations of Monochloramine into the 3/4" CPVC SCH 80 diameter soft water supply line (marked "H") located prior to the first "t" in the supply line and before three (3) hot water heaters. The Monochloramine unit will be wall mounted. A feedback line will be installed downstream of the injection line. Prior to startup of the Monochloramine generator, two existing hard water lines will be cut and removed leaving open lines to fixtures on floor above. At the cuts, new 3/4" copper piping will connect soft water to the open lines providing soft water to upstairs fixtures.

**Electrical** – The existing electrical panel has two available circuits. Only one circuit is needed for a 10amp breaker. Electrical wiring will be routed through the side of the panel (near the bottom) and to an adjacent J-Box where new electrical conduit will be routed to the Monochloramine generator.

# System Overview, Schedule, and Sequence of Operation

## Ordering Schedule

**Klenzoid, Inc. Lead Time 6 weeks**

www2.klenzoidinc.com

912 Spring Mill Ave

Conshohocken, Pa 19428

Rob\_Maxson@Klenzoidinc.com

443-299-8081

One (1) SaniTec SKLP 1000-K for Building 18 (Wall Mount)

Three (3) Sanilite SKLP-025 (Buildings 10, 12 – Unistrut Mount) (Bldg 29 Wall Mount)

One Sanipur Series “K” Dosing Pump for Bldg 18 (Set on constructed platform/shelf)

Each Sanipur unit includes:

**Flowmeter**

**Spill Containment Platforms**

**Corp Stops, Check Valves, and Ball Valves**

**For Unistrut mounted units**

**Unistrut – Frame for Monochloramine Units**

Local Hardware/Plumbing

80 feet – P2000T Slotted Unistrut 1-5/8” channel (Buildings 10 and 12)

**Preliminary Sanipur Chemical Schedule - Lead time 4 weeks**

**Sanipur Chemical Vendor – Ground shipment FOB**

Klenzoid, Inc. – see schedule table

**Chemical Storage and Change-Out Vendor**

Hawkins, Inc. Water Treatment Group – see schedule table

P.O. Box 619

Black Hawk, SD

derek.alexander@HawkinsInc.com

605-787-6881

Chemicals	Change out Schedule - 6 months																								
	Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
<b>Boiler Plant</b>																									
Zebion 480-30 gal drum						1						1							1						1
Enoxin P10-55 gal drum			1			1			1			1			1				1			1			1
Klenphos 400-30 gal drum										1											1				
<b>Buildings 10 &amp; 12</b>																									
Zebion 50- 30 gal drum						1						1							1						1
Enoxin P10-30 drum						1						1							1						1
<b>Building 29</b>																									
Zebion 50-15 gal drum																									1
Enoxin P10-15 drum																									1

## **System Overview, Schedule, and Sequence of Operation**

### **Sequence of Operations**

Once all four (4) Monochloramine Systems are installed and the old chlorine system has been removed, the two (2) bulk water storage tanks need to be drained of its chlorinated water (preferably by using the fire hydrants which will pull water through the system) and replace it with Monochloramine treated water since the water tanks provide the source of pressure to the water distribution system in lieu of the two Grundfos pumps at the Boiler Plant. The VA Hot Springs will need to decide which tank is to be drained first and the process by which to drain the tanks while avoiding discharged chlorinated water reaching the nearby Fall River. These options include the use of 1) heavy irrigation, 2) fire hydrants, or 3) both methods. Either method will require the discharged water to be de-chlorinated using tablets to prevent the accidental discharge to the Fall River. The VA should contact South Dakota DEQ in advance to ensure compliance or request a variance (402-471-4982).

The concept is for the VA to isolate one (1) of the two bulk water storage tanks and drain all water and replace with Monochloramine treated water to the emptied tank using the Grundfos pumps to fill the tank. Once that is completed, the other bulk water storage tank would then be isolated and drained and refilled using Monochloramine treated water. After each tank is filled with Monochloramine treated water, the VA Hot Springs can return to normal operation of the water distribution. Depending on the time of year (summer vs winter), either method of draining the tank could be used and may require multiple attempts to replace the 900,000+ gallons of chlorinated water.