SECTION 10: OPERATING PROCEDURES FOR THE CHLORINE PROCESS

"The owner or operator shall prepare operating procedures that provide clear instructions or steps for safely conducting activities associated with the covered process consistent with the safety information of the process." 40 CFR 68.69 & 29 CFR 1910.119(f)

Operating procedures are guidance documents telling employees how to work safely every day, providing them with quick information on how to prevent or mitigate an accident and providing management and employees a standard to assess their performance. The procedures include operating limits such as consequences of deviations, steps required to avoid or correct the deviations, safety and health considerations, and safety systems and their functions. Operating procedures must be readily accessible to employees who work in or maintain the process. The procedures must be reviewed as often as necessary to assure that they reflect the current work practice. Whenever a major change occurs the operating procedures must be updated. The owner has to certify annually that the work procedures are current and accurate. An Operating Procedures Certification document is provided at the end of Section 10.7. The RMP/PSM require operating procedures for at least the following: initial startup; normal operations; temporary operations; emergency shutdown procedures with the responsibilities of the operators defined, normal shutdown, and startup following a shutdown. In addition to these, standard work procedures for lockout/tagout, confined space entry, opening process equipment or piping, and entrance into the facility must be maintained (separate from this PSM/SMP document). RMP-required procedures are discussed below.

10.1 Initial Startup Procedures

The following pre-start checks must be carried out before the system can be taken into operation.

10.1.1 Physical Check

1. Ensure that the gas supply lines from the cylinder or ton containers are securely connected and that all valves in the system are closed.
2. Check that the water inlet line from the source of supply to the injector is securely connected.
3. Ensure the pressure relief vent line is securely connected to the pressure relief valve and that it is terminated correctly.
4. Ensure the injector gas suction line is correctly fitted to the control unit gas outlet and to the injector.
5. Check the solution line form the injector to the point of application.

10.1.2 Injector and Vacuum leak check

1. Keep the valves on the gas supply tanks closed. Open the valves in the water supply line to the injector and at the point of application. Check for leaks. Ensure that there is water at the point of application ready for operation.
2. Injector operating vacuum is indicated on the vacuum gauge of the control unit, the pointer should be full scale.
3. Check that the flowmeter float remains at the bottom stop. Any movement of the float indicates an entrance of air in one of the following locations:

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(1) Through the pressure relief valve seat. This can be determined by holding a finger over the vent connection on the pressure relief valve. Refer to section 4 for correction.

(2) Through the O-ring on the bottom of the flowmeter or through cracks in the flowmeter at the ring gasket at the bottom of the rotameter. This can be corrected by proper lubrication of the O-ring with a thin film of Halocarbon grease and ensuring that the rotameter is seated on the O-ring.

(3) Through the O-rings at the pipe connections or tuning connections.

(4) Through any incorrectly cemented joints at any tubing connector or pipe fitting in the gas supply line. This may be corrected by tightening the connector or fitting, or by replacing any defective connector O-ring. Apply a thing film of Halocarbon grease to all O-rings before installing.

4. Check the following to ensure all connections are tight:

(1) The V-notch extension change through which the V-notch plug travels.

(2) The gasket at the bottom of the differential regulating valve and pressure relief valve.

(3) The connections of both ends of the plastic tubing on the gas discharge line to the injector.

** Vacuum leaks ahead of the rotameter (as listed in preceding step c) will result in errors in gas feed. Vacuum leaks after the rotameter (as listed in step d) may impair the performance of the injector.

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10.1.3 Gas Supply Check for Leaks

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, DO NOT TOLERATE ANY GAS LEAKS. LEAKS ALWAYS GET PROGRESSIVELY WORSE AND MUST BE CORRECTED PROMPTLY.

1. After the vacuum regulator unit is in place and before the gas tubing that will connect it to the control unit is installed, check for gas leaks as directed in the separate instruction book provided with the vacuum regulator.

10.1.4 Startup Procedures

1. Open the point of application and the injector operating water valves.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, DO NOT OPEN THE GAS SUPPLY CONTAINER VALVE MORE THAN ONE COMPELTE TURN. THIS WILL PERMIT MAXIMUM DISCHARGE AND CAN ALSO BE TURNED OFF QUICKLY IN CASE OF A GAS LEAK.

2. Turn on the gas supply at the supply container valve and the vacuum regulator. If there are two units (automatic switchover system), turn on only the one on the supply container which is to be used first.

3. Turn on the feed rate adjuster knob counterclockwise (unscrew) to obtain maximum feed. The injector should develop a dynamic vacuum of at least six inches of mercury at maximum gas flow rate. If maximum indicated feed rate cannot be obtained:

(1) Ensure that no vacuum leaks exist. See injector Vacuum and Leak test.

4. Adjust the gas feed rate as desired. Rotation of the knob counterclockwise increases the feed rate.

5. If there are two vacuum regulators, turn on the gas supply at the second supply container valve and vacuum regulator.

10.1.5 Startup following a Shutdown

Startup following a turn-around, shutdown, or emergency shutdown should be conducted in the same manner as an initial startup. The initial startup procedures are listed in Section 10.1. If an emergency situation was the cause for the shutdown, make sure all hazards associates with the emergency are under control and no longer pose any danger.

10.2 Normal Operations

10.2.1 Chlorine Tank Changing

1. Always have two people on site when changing tanks, with both employees possessing escape respirators.
2. Make sure exhaust fan is on.
3. Turn off main valve on both Cl_2 cylinders.
4. Wait 5 minutes for Cl_2 lines to empty.
5. Remove regulator from empty tank.
6. Remove empty tank and replace with full tank.
7. Replace old lead washer on regulator with a new one.
8. Place regulator on full tank snugly.
9. Open main valve a quarter of a turn, check for leaks with ammonia vapors.
10. You will see white smoke if you have a Cl_2 leak.
11. If you see white smoke, shut the main valve IMMEDIATELY. Vacate the building and inform maintenance.
12. If no smoke appears, close the main valve.
13. Open the valve on the other tank, make sure it is feeding Cl_2. (Check by watching the quantity being fed into the scale.)
14. Now you can open the main valve on the alternate tank. (Both valves must be open so when one tank goes empty, the alternate tank will automatically start feeding.)
15. To set your scales, all you need to do is add the two tare weights together that are marked on the tanks.
16. Log on the clipboard which tanks were taken off and which tanks were put on, the operators who changed the tanks, and the date when this was done.

NEVER USE OIL BASE PRODUCTS TO LOOSEN VALVES.

10.2.2 Handling and Storage of Chlorine

1. Always handle tanks with care. Do not drop them or allow them to strike another object.
2. The fusible plugs will soften or melt at 158-165 degrees Fahrenheit to relieve excessive pressure in case the tank becomes overheated. This will leak out Cl_2 and procedures for Cl_2 leaks should be

DRAFT

followed. In case of a fire, 911 should be informed that there are Cl_2 ton containers involved and the number of containers involved.

3. Tanks should be stored in a dry, well ventilated place, away from excessive heat, away from fire hazards, and protected from accumulation of snow and ice. The storage area floors should be well drained and made of concrete. A chlorine storage room should be fireproof.
4. The storage area should have cross ventilation, with air inlets near the ceiling and exhaust outlets near floor level. The ventilating system should provide at least four complete air changes per minute in case of Cl_2 leak and should exhaust into an area where chlorine gas will not cause injury or damage.
5. Never store containers near turpentine, ether, anhydrous ammonia, and finely divided materials that are flammable in air or could react violently with chlorine.
6. Keep full containers separate from empty containers.
7. Frequent inspections for signs of leaks should be performed.
8. Containers are stored on their sides, a few inches from the floor. Do not stack containers. Wooden stop blocks should be replaced when needed.
9. Do not make repairs or alterations to the container. Never remove or change numbers or other markings stamped on the container.

10.2.3 Returning Containers

1. Follow the instructions for returning as issued by the supplier.
2. See that all valves are closed and container is capped.
3. Check all containers for leaks.

It is unlawful to ship a leaking container. The Cl_2 supplier should be contacted in cases of leaks.

10.3 Temporary Operations

There are no temporary operations for this process.

DRAFT

10.4 Shutdowns

10.4.1 Temporary Shutdowns

1. Reduce the feed rate to zero or close the injector operating water valve.

10.4.2 Shutdown for Extended Periods

The following procedure must be carried out before any gas control unit servicing is undertaken.

1. Turn off the gas supply at each supply container valve. Allow the control unit to operate until the flowmeter float remains on the bottom stop and the vacuum gauge reads full scale.
2. Then turn off the injector operating water.
3. Shut off the vacuum regulator.

10.4.3 Winter Shutdown

If the gas feeder is to be shut down for an extended period during freezing weather, the following procedure must be followed:

1. Operate the injector with the has supply turned off at the supply container valve(s) until the vacuum supply gauge reads full scale and rotameter float settles on bottom stop.
2. Shut off the water supply and drain the line to the injector.
3. Drain the solution discharge line and prevent any water flow into discharge line.
4. Drain any water in the injector.

If the gas feeder is to be removed for storage, the gas inlet fitting and all gas lines should be sealed with rubber stoppers to prevent the entrance of atmospheric moisture during the storage period. If a pump is being used, follow pump manufacturer instructions for extended shut-down.

10.5 Emergency Operations

Emergency procedures and operations should be followed in emergency situations, when process equipment fails, or when some other event warrants the need to follow emergency procedures. However, when emergency procedures are followed, the system must be returned to its normal operating conditions as soon as possible.

In the event of a major facility emergency, the Emergency Response Plan will be followed. Section 22, "Emergency Planning and Response," of this RMP/PSM contains procedures for handling chlorine leaks, fires, and first aid. Every employee should be familiar with response, and the location of the document.

10.5.1 Piping System Emergency Operations

During an emergency situation or emergency operation, a part of the piping system may have to be removed from service in order to replace or repair. When removing the piping system from service, the following steps should be followed:

1. Never isolate a section of piping that might contain liquid chlorine; hydrostatic rupture of the line could occur.
2. Close the chlorine container valve, and allow the injector water supply to continue running for 15 minutes.
3. Wearing personal protective equipment, disconnect the supply line from the ton container.
4. Disconnect the chlorinator from the flexible piping connection.
5. Attach the zero grade nitrogen or air container.
6. Run the nitrogen or dry air through the system until the line is purged (time dependent on the section of the system tested).

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10.6 Consequence of Deviations

Standard Operating Procedures: Standard operating procedures have been developed for the chlorination system. The procedures provide the employees with the safe way of working on and around the chlorination system in order to prevent any accidental releases.

Consequence of deviation: If the operating procedures are not implemented or adhered to, an accident could occur which could result in a release of chlorine. This release could endanger the health and safety of employees working onsite or the public offsite.

Regularly Scheduled Inspections: Regularly scheduled inspections are conducted at the treatment plant. The inspections allow the operators of the chlorine system to detect any leaks, system problems, malfunctions, or deficiencies. This could in turn prevent any unwanted release of chlorine.

Consequence of deviation: If the regularly scheduled inspection schedule is not implemented or adhered to, an unwanted release or shutdown could occur. A release could endanger the health and safety of employees working onsite.

10.7 Equipment Inspections

The employees at the City of [redacted] Wastewater Treatment Facility visually inspect the chlorinators every day looking for signs of leaks and corrosion. If a problem is found, they will address it immediately.

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