CITY OF NEWTON

Process Safety Management

PSM

Wastewater Treatment Plant

29 CFR 1910.119

May, 2017

CITY OF NEWTON

Process Safety Management

PSM

INTRODUCTION

29 CFR 1910.119

March, 2017

City of Newton

Process Safety Management (PSM)

Introduction

Process Safety Management (PSM) is designed to protect employees, contractors and visitors within the fence line of the facility. The complementary program, Risk Management Planning, is designed for the protection of the neighbors, local businesses, and the environment. The RMP generally applies to activities outside the fence line. This document comprises the PSM for the City of Newton Wastewater Treatment Plant (WWTP).

The purpose of the Process Safety Management (PSM) program is to prevent or minimize the consequences of catastrophic releases of toxic, reactive, flammable or explosive chemicals. This process involves two chemicals used in water treatment: Chlorine and sulfur dioxide. The stated threshold quantity (TQ) for chlorine to be considered is 1,500 pounds (lbs.); and the threshold quantity (TQ) for sulfur dioxide is 1000 pounds (lbs.). The maximum quantity of chlorine on site at the City of Newton Wastewater Treatment Plant (WWTP) is four (4) one ton (2,000 lbs. each), or a total of 8,000 lbs. The maximum amount of sulfur dioxide is two (2) cylinders of 950 pounds each, and one (1) cylinder of 150 pounds for back up purposes; for a total of 2,050 pounds. Thus, both chemicals must be considered for PSM purposes

The City of Newton has and will involve their employees in an employee participation program. The purpose of the employee participation program is to involve them is the preparation of the Process Hazard Analysis (PHA) and acquaint them with the tenets of the PSM.

This document will reflect the outline for PSM as outlined in 29 CFR 1910.119; namely:

> Process safety information, including chlorine and sulfur dioxide Safety Data Sheets (SDS's), technology of the process (a Process Flow Diagram), equipment of the process (including a process and instrument (P&ID) diagrams, a summary of the equipment of the process including materials of construction, and a discussion of the various design codes used for construction of the facility.
>
> Process hazard analysis according to the "what-if" procedure. This step is to help define the hazards of handling the chemicals in question.
>
> Standard operating procedures
>
> Operator training and documentation
>
> Contractor safety requirements

Pre-start up review

Mechanical integrity

Hot work permit requirements

Management of Change

Incident investigation

Emergency plan and response

Compliance audits

CITY OF NEWTON

Process Safety Management

PSM

Process Safety Information

1910.119(d)

March, 2017

Introduction.

As required in 29 CFR 1910.119(d), Process Safety Information (PSI) in regard to covered processes must be prepared and presented. Process Safety Information must include Safety Data Sheets (SDS's), and details of process technology. Process technology includes a block process flow diagram, piping and instrument diagrams, other relevant process data, and raw material quality control procedures.

Other relevant process safety information which must be reviewed in this section include:

- Materials of Construction / Design Codes and Standards
- Pressure Relief System Consideration and Design
- Ventilation System Design
- Operating Interlock Safety Systems

Each of these items of PSI is presented here, and in order.

Covered Processes.

The Process Safety Management regulation, codified in 29 CFR 1910.119, contains a list of hazardous and/or flammable chemicals which must be considered for Process Safety Management (PSM) purposes. If the hazardous chemical is not on this list, then the process is considered exempt from PSM. There are also listed in each of two other tables a threshold limit for each chemical or group of chemicals.

The only chemicals handled at the City of Newton Wastewater Treatment Plant that appears on the hazardous chemical list are chlorine (CAS Number 7782-50-5), and sulfur dioxide (CAS Number 7446-09-5). The threshold quantity for chlorine is 1,500 pounds, and for sulfur dioxide is 1,000 pounds. A Safety Data Sheet (SDS) for both chlorine and sulfur dioxide are attached to the end of this section.

Process Block Diagram.

(Please see Figure 1 for Block Diagram)

Process Chemistry.

Wastewater is pumped and/or transferred to Wastewater Treatment Plant (WWTP) via sewage and drainage systems. The wastewater is screened and chopped to fine particles, then aerated and clarified. Process chemistry starts with the addition of a flocculant for clarification. The clarified wastewater. Is then disinfected with addition of chlorine, then dechlorinated with sulfur dioxide. The Piping and Instrument Diagrams (P&ID's) are attached as Figures 2, 3 and 4

Maximum Intended Inventory.

The maximum intended inventory of chlorine is comprised of a maximum of four (4) one-ton cylinders of chlorine, or 8,000 pounds. The maximum intended inventory of sulfur dioxide is two (2) 950 pound cylinders and one (1) 150 pound cylinder; or, a total of 2,050 pounds

Safe Limits.

As both chlorine and sulfur dioxide are considered toxic, the safety limits of concentration are as set out in their respective SDS's which are attached to this section.

Process Equipment.

The primary pieces of process equipment include a hoist to move one-ton cylinders from the delivery vehicle to the holding area; attachment materials to attach the cylinder to the system; the chlorine delivery system which includes a chlorine gas rotameter which measures the amount of gas being fed to the system, polyethylene tubing, polyvinyl chloride (PVC) piping, plastic valves, a chlorine water mixing system to dissolve the chlorine into water, and an injection system to inject the chlorine/water mixture into the water stream. The treated water is then processed through a chlorine contact chamber to ensure complete mixing of the chlorine and water. Next, the sulfur dioxide / water solution will be introduced to reduce the chlorine level. This mixture is also passed through a contact chamber. This typically will result in disinfected water which can then be pumped for discharge.

Pressure Relief Consideration and Design.

As both the chlorine and sulfur dioxide cylinders are typically liquefied gases under pressure, there is always the chance of depressurization which would result in a chlorine or sulfur dioxide release. Therefore, there is a pressure release control installed on each cylinder. This allows for a minimal amount of gas to escape and prevent catastrophic failure. However, even if the escape of a minimal amount of chlorine were to occur, there could be an incident involving chlorine gas. For this reason, a chlorine gas detection system has been installed. The same is also true for potential sulfur dioxide releases.

The need for pressure relief is minimal, and this is documented in the Process Hazard Analysis section following this section; and is covered by appropriate Standard Operating Procedures (SOP's).

Ventilation.

The need for ventilation has been determined because of the potential leak of chlorine or sulfur dioxide gas. General ventilation has been utilized for the area where either gas is handled.

Operating Interlock Safety Systems.

There are no sophisticated electronic systems used for the manufacture of products which are part of the covered processes. The primary "interlock" system is a system of valves which must be sequentially opened and closed during the manufacturing cycle. The operation of these valves is thoroughly covered in the Operating Procedures. These procedures are taught to employees upon employment, and reviewed on a regular basis. Both pipe and valve inspections are conducted on a regular basis.

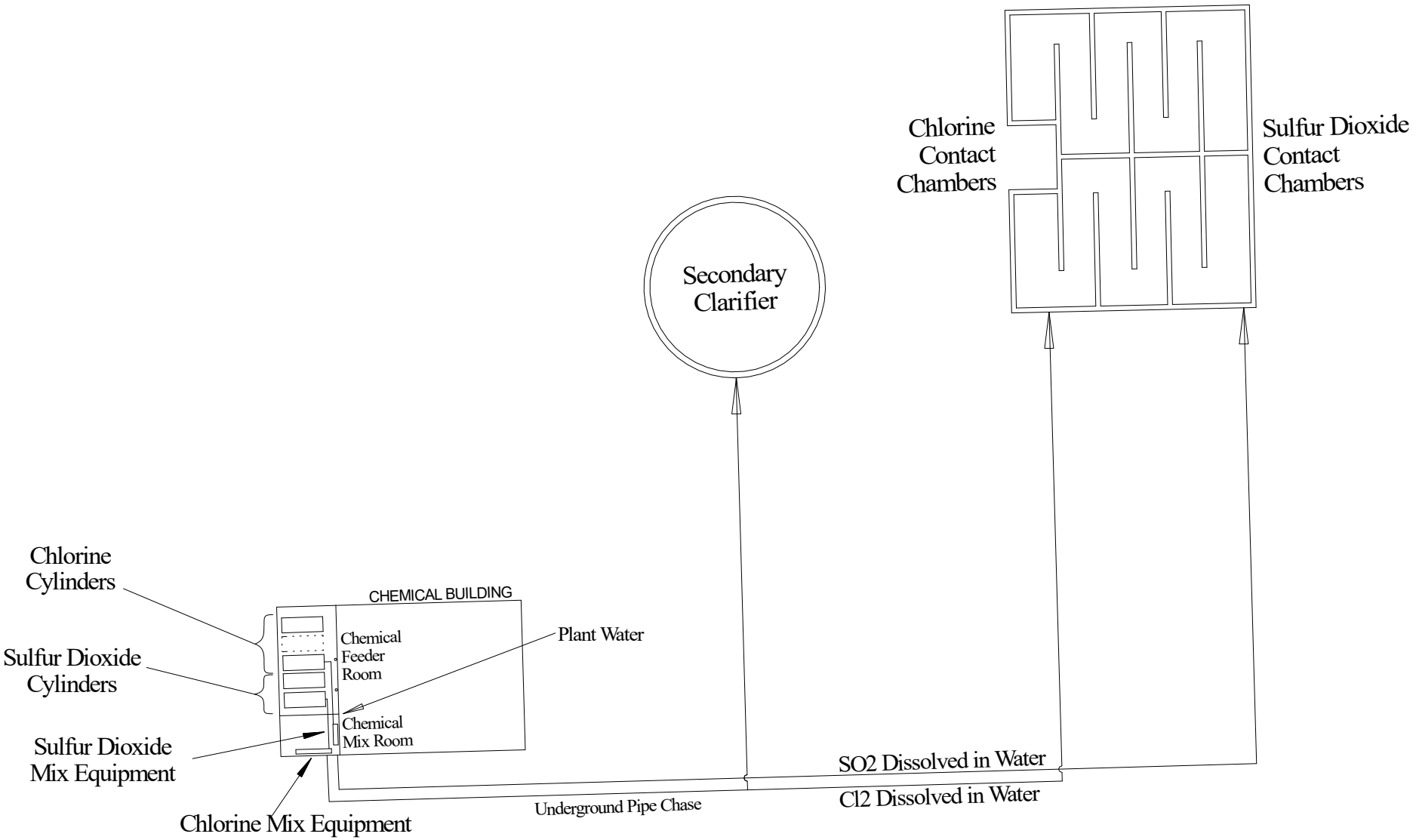
Piping and Instrument Diagram (P&ID).

The P&ID is attached to the end of this section as Figures 2, 3 and 4.

Equipment Codes.

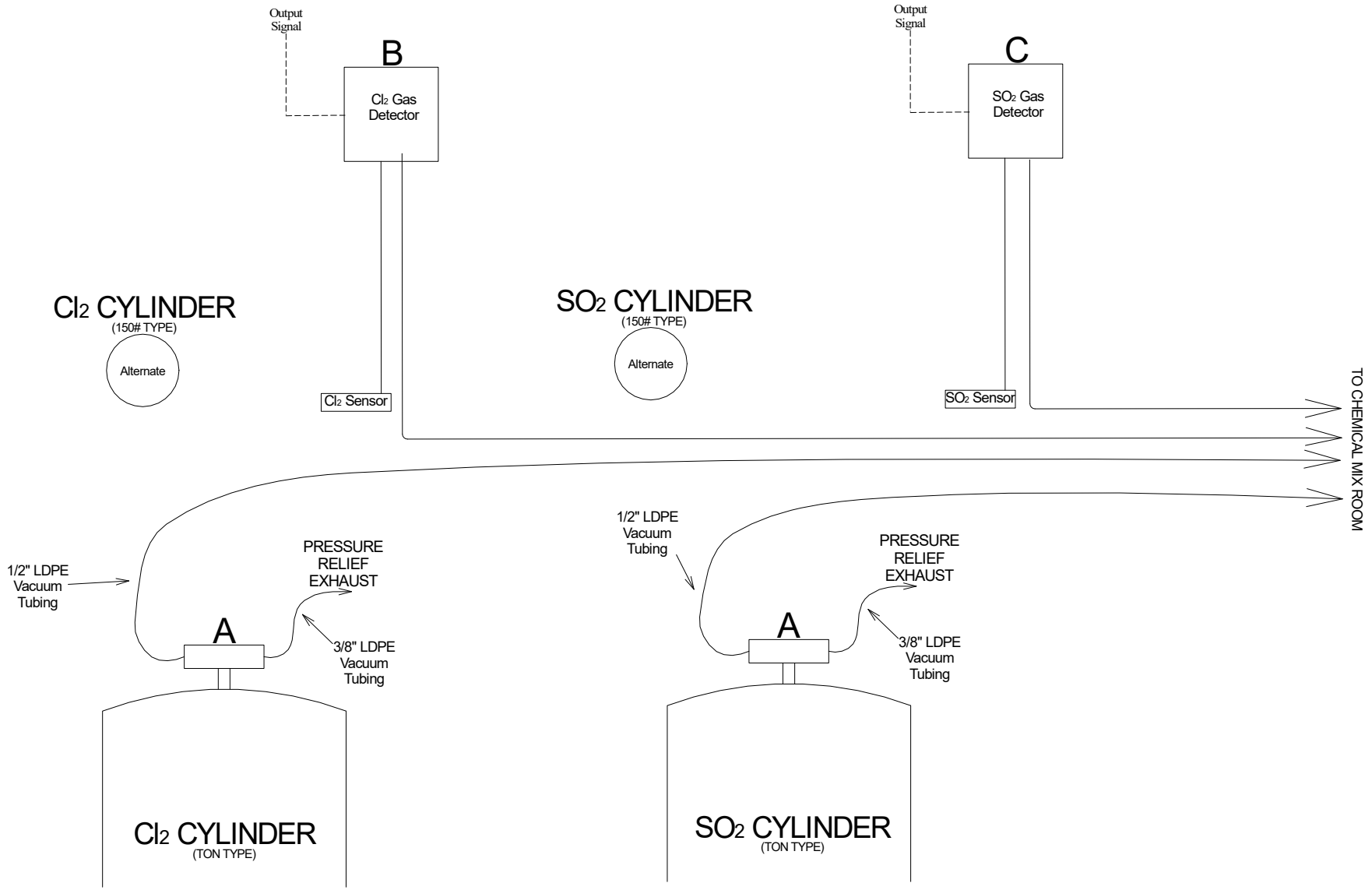
Appropriate building, construction, mechanical and electrical codes in effect during construction of this facility were followed. The building was inspected during construction, and passed all inspections.

The following sections have been added as individual sections for clarity purposes.



INENCO, Inc. 123 W. Statesville Ave. Mooresville, NC 28115	**CHEMICAL PROCESS SCHEMATIC** **WWTP PROCESS SAFETY MANAGEMENT**	02/20/2017 **City of Newton**	Scale: **NTS** **FIGURE 1**

	Ledged
A	Wallace & Tiernan Model 510 Pressure Regulator
B	Wallace & Tiernan Acutec 35 Chlorine Gas Detector w/ Sensor
C	Wallace & Tiernan Acutec 35 Sulfur Dioxide Gas Detector w/ Sensor

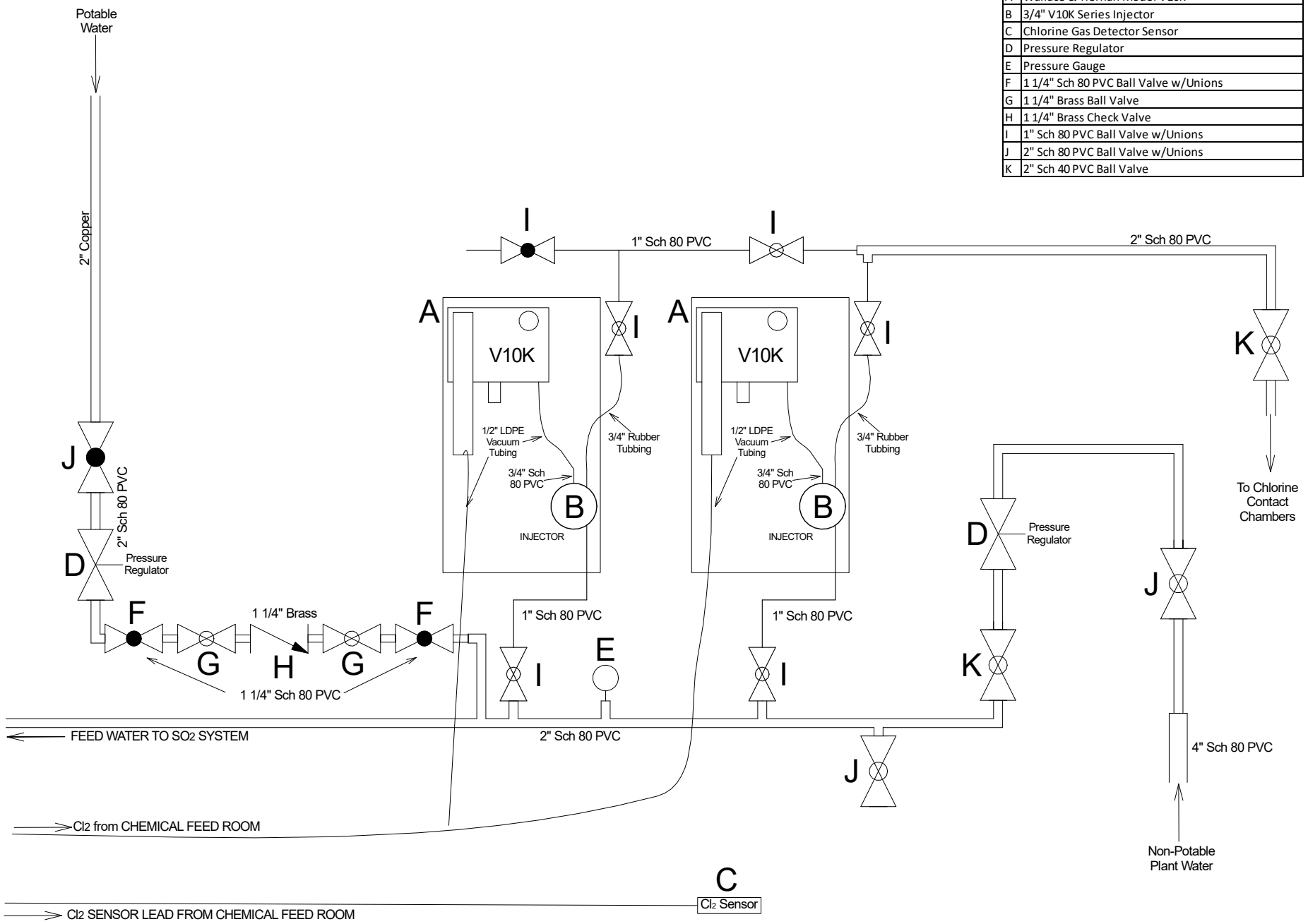


INENCO, Inc.
123 W. Statesville Ave. Mooresville, NC 28115

PIPING & INSTRUMENT DIAGRAM
CHEMICAL FEEDER ROOM
WWTP PROCESS SAFETY MANAGEMENT

02/20/2017
City of Newton

Scale: **NTS**
FIGURE 2



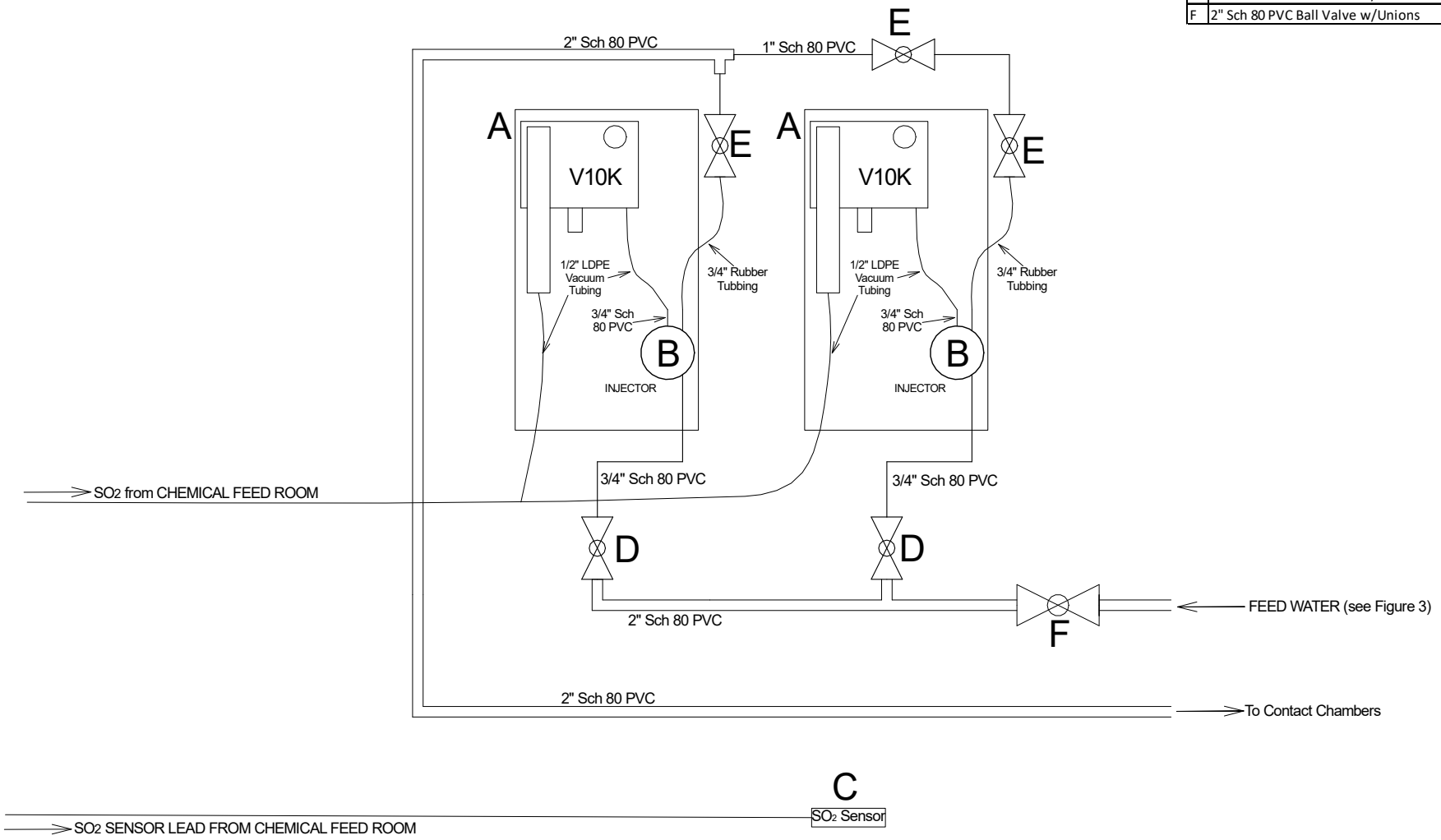
INENCO, Inc.
123 W. Statesville Ave. Mooresville, NC 28115

PIPING & INSTRUMENT DIAGRAM
CHEMICAL MIX ROOM: CHLORINE
WWTP PROCESS SAFETY MANAGEMENT

02/20/2017
City of Newton

Scale: NTS
FIGURE 3

	Ledged
A	Wallace & Tiernan Model V10K
B	3/4" V10K Series Injector
C	Sulfur Dioxide Gas Detector Sensor
D	3/4" Sch 80 PVC Ball Valve w/Unions
E	1" Sch 80 PVC Ball Valve w/Unions
F	2" Sch 80 PVC Ball Valve w/Unions



INENCO, Inc. 123 W. Statesville Ave. Mooresville, NC 28115	PIPING & INSTRUMENT DIAGRAM **CHEMICAL MIX ROOM: SULFUR DIOXIDE** **WWTP PROCESS SAFETY MANAGEMENT**	02/20/2017 **City of Newton**	Scale: **NTS** **FIGURE 4**

SAFETY DATA SHEET

Chlorine

Section 1. Identification

GHS product identifier : Chlorine

Chemical name : chlorine

Other means of identification : Cl2; Bertholite; Chloor; Chlor; Chlore; Chlorine mol.; Cloro; Molecular chlorine; UN 1017

Product use : Synthetic/Analytical chemistry.

Synonym : Cl2; Bertholite; Chloor; Chlor; Chlore; Chlorine mol.; Cloro; Molecular chlorine; UN 1017

SDS # : 001015

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : OXIDIZING GASES - Category 1
GASES UNDER PRESSURE - Compressed gas
ACUTE TOXICITY (inhalation) - Category 2
SKIN CORROSION/IRRITATION - Category 1
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
AQUATIC HAZARD (ACUTE) - Category 1
AQUATIC HAZARD (LONG-TERM) - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.
Fatal if inhaled.
Causes severe skin burns and eye damage.
Very toxic to aquatic life with long lasting effects.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Wear respiratory protection. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves, valves and fittings free from oil and grease. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe gas. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : Collect spillage. In case of fire: Stop leak if safe to do so. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage : Store locked up. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : chlorine

Other means of identification : Cl2; Bertholite; Chloor; Chlor; Chlore; Chlorine mol.; Cloro; Molecular chlorine; UN 1017

CAS number/other identifiers

CAS number : 7782-50-5

Product code : 001015

Ingredient name	%	CAS number
chlorine	100	7782-50-5

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Section 4. First aid measures

Potential acute health effects

Eye contact : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Fatal if inhaled. May cause respiratory irritation.

Skin contact : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:, pain, watering, redness

Inhalation : Adverse symptoms may include the following:, respiratory tract irritation, coughing

Skin contact : Adverse symptoms may include the following:, pain or irritation, redness, blistering may occur

Ingestion : Adverse symptoms may include the following:, stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Oxidizing material. This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire. In a fire or if heated, a pressure increase will occur and the container may burst or explode. This material is very toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Separate from acids, alkalies, reducing agents and combustibles. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
chlorine	**ACGIH TLV (United States, 3/2016).** STEL: 2.9 mg/m³ 15 minutes. STEL: 1 ppm 15 minutes. TWA: 1.5 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours. **NIOSH REL (United States, 10/2013).** CEIL: 1.45 mg/m³ 15 minutes. CEIL: 0.5 ppm 15 minutes. **OSHA PEL (United States, 6/2016).** CEIL: 3 mg/m³ CEIL: 1 ppm **OSHA PEL 1989 (United States, 3/1989).** STEL: 3 mg/m³ 15 minutes. STEL: 1 ppm 15 minutes. TWA: 1.5 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [GREENISH-YELLOW GAS WITH SUFFOCATING ODOR]

Color : Colorless. Green. Yellow.

Molecular weight : 70.9 g/mole

Molecular formula : Cl2

Boiling/condensation point : -34°C (-29.2°F)

Melting/freezing point : -101°C (-149.8°F)

Critical temperature : 143.85°C (290.9°F)

Odor : Pungent.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: reducing materials, combustible materials, organic materials and alkalis.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 85.3 (psig)

Vapor density : 2.5 (Air = 1)

Specific Volume (ft^3/lb) : 5.4054

Gas Density (lb/ft^3) : 0.185

Relative density : Not applicable.

Solubility : Very slightly soluble in the following materials: cold water.

Solubility in water : 7.41 g/l

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
contact with combustible materials
Reactions may include the following:
risk of causing fire

Conditions to avoid : No specific data.

Section 10. Stability and reactivity

Incompatible materials : Highly reactive or incompatible with the following materials:
combustible materials
reducing materials
grease
oil

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
chlorine	LC50 Inhalation Gas.	Rat	293 ppm	1 hours

IDLH : 10 ppm

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
chlorine	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Fatal if inhaled. May cause respiratory irritation.

Skin contact : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Section 11. Toxicological information

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:, pain, watering, redness

Inhalation : Adverse symptoms may include the following:, respiratory tract irritation, coughing

Skin contact : Adverse symptoms may include the following:, pain or irritation, redness, blistering may occur

Ingestion : Adverse symptoms may include the following:, stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
chlorine	Acute EC50 5.1 ppm Marine water	Algae - Macrocystis pyrifera - Young	4 days
	Acute EC50 930000 µg/l Fresh water	Aquatic plants - Lemna minor	4 days
	Acute LC50 2.03 µg/l Fresh water	Crustaceans - Asellus racovitzai	2 days
	Acute LC50 30 µg/l Fresh water	Daphnia - Daphnia pulex	48 hours
	Acute LC50 14 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Section 12. Ecological information

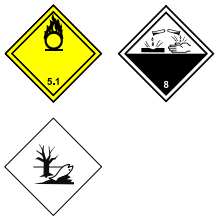
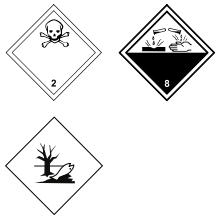
Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1017	UN1017	UN1017	UN1017	UN1017
UN proper shipping name	CHLORINE	CHLORINE	CHLORINE	CHLORINE	CHLORINE
Transport hazard class(es)	2.3 (5.1, 8) 	2.3 (5.1, 8) 	2.3 (5.1, 8) 	2.3 (8) 	2.3 (8) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	Yes.	No.
Additional information	Toxic - Inhalation hazard Zone B This product is not regulated as a marine pollutant when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes, provided the packagings meet the general provisions of §§ 173.24 and 173.24a. **Reportable quantity** 10 lbs / 4.54 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction**	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.23-2.25 (Class 5), 2.40-2.42 (Class 8), 2.7 (Marine pollutant mark). The marine pollutant mark is not required when transported by road or rail. **Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 500 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index**	-	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The environmentally hazardous substance mark may appear if required by other transportation regulations. **Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 0 Forbidden

Section 14. Transport information

	Passenger aircraft Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 2, B9, B14, T50, TP19	Forbidden			

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 311: chlorine

Clean Air Act (CAA) 112 regulated toxic substances: chlorine

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ (lbs)	SARA 302 TPQ (gallons)	SARA 304 RQ (lbs)	SARA 304 RQ (gallons)
chlorine	100	Yes.	100	-	10	-

SARA 304 RQ : 10 lbs / 4.5 kg

SARA 311/312

Classification : Sudden release of pressure
Immediate (acute) health hazard

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
chlorine	100	No.	Yes.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	chlorine	7782-50-5	100
Supplier notification	chlorine	7782-50-5	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.
New York : This material is listed.
New Jersey : This material is listed.
Pennsylvania : This material is listed.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.
Canada : This material is listed or exempted.
China : This material is listed or exempted.
Europe : This material is listed or exempted.
Japan : Not determined.
Malaysia : This material is listed or exempted.
New Zealand : This material is listed or exempted.
Philippines : This material is listed or exempted.
Republic of Korea : This material is listed or exempted.
Taiwan : This material is listed or exempted.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Hazardous Material Information System (U.S.A.)

Section 16. Other information

Physical hazards	2

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Ox. Gas 1, H270	Expert judgment
Press. Gas Comp. Gas, H280	According to package
Acute Tox. 2, H330	On basis of test data
Skin Corr. 1, H314	Expert judgment
Eye Dam. 1, H318	Expert judgment
STOT SE 3, H335	Expert judgment
Aquatic Acute 1, H400	Expert judgment
Aquatic Chronic 1, H410	On basis of test data

History

Date of printing : 3/23/2017

Date of issue/Date of revision : 3/23/2017

Date of previous issue : No previous validation

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Sulfur dioxide

Safety Data Sheet P-4655

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1979 Revision date: 10/24/2016 Supersedes: 03/20/2015

SECTION: 1. Product and company identification

1.1. Product identifier

Product form	:	Substance
Name	:	Sulfur dioxide
CAS No	:	7446-09-5
Formula	:	SO2
Other means of identification	:	Sulfur Oxide, Sulfurous acid anhydride, Sulfur oxide, Sulfurous anhydride, Sulfurous oxide, Refigerant gas R764

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	:	Industrial use. Use as directed.

1.3. Details of the supplier of the safety data sheet

Praxair, Inc.
10 Riverview Drive
Danbury, CT 06810-6268 - USA
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number

Emergency number	:	Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-US classification

Liquefied gas	H280
Acute Tox. 3 (Inhalation:gas)	H331
Skin Corr. 1B	H314
Eye Dam. 1	H318

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS04 GHS05 GHS06

Signal word (GHS-US) : DANGER

Hazard statements (GHS-US) :
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE
H331 - TOXIC IF INHALED
CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT

Precautionary statements (GHS-US) :
P202 - Do not handle until all safety precautions have been read and understood
P261 - Avoid breathing gas
P262 - Do not get in eyes, on skin, or on clothing
P271+P403 - Use and store only outdoors or in a well-ventilated place
P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection
P405 - Store locked up
P501 - Dispose of contents/container in accordance with container Supplier/owner instructions

CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug
CGA-PG06 - Close valve after each use and when empty
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

2.3. Other hazards

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance

Name	Product identifier	%
Sulfur dioxide (Main constituent)	(CAS No) 7446-09-5	100

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : Exposure to concentrations above the TLV of 2 ppm may irritate the eyes, nose, throat, and sinuses, resulting in choking, coughing, and sometimes bronchoconstriction.

Concentrations of 50-100 ppm are considered dangerous.

Exposures of 400-500 ppm are immediately life-threatening.

Exposure to high concentrations may result in pulmonary edema and paralysis.
.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Not flammable.

Reactivity : No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

Firefighting instructions : **DANGER! Toxic, corrosive, liquefied gas.**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **DANGER: Toxic. Corrosive.** Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Evacuate personnel to a safe area. Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

Safe use of the product : Do not breathe gas/vapors. Use only with adequate ventilation or respiratory protection. Do not get liquid or vapor in eyes, on skin, or on clothing. Have safety showers and eyewash fountains immediately available.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sulfur dioxide (7446-09-5)		
ACGIH	ACGIH TLV-STEL (ppm)	0.25 ppm
USA OSHA	OSHA PEL (TWA) (mg/m³)	13 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	5 ppm
USA IDLH	US IDLH (ppm)	100 ppm

8.2. Exposure controls

Appropriate engineering controls : Use only in a closed system. A corrosion-resistant, forced-draft fume hood is preferred. LOCAL EXHAUST: A corrosion-resistant system is acceptable.

In semiconductor process gas and other suitable applications, Praxair recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylider changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

Eye protection : Provide readily accessible eye wash stations and safety showers. Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas

Appearance : Colorless, non-flammable gas.

Molecular mass : 64 g/mol

Color : Colorless.

Odor	:	Pungent. choking
Odor threshold	:	No data available
pH	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	Not applicable.
Melting point	:	-75.5 °C
Freezing point	:	No data available
Boiling point	:	-10 °C
Flash point	:	Not applicable.
Critical temperature	:	157.6 °C
Auto-ignition temperature	:	Not applicable.
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapor pressure	:	330 kPa
Critical pressure	:	7884 kPa
Relative vapor density at 20 °C	:	No data available
Relative density	:	1.5
Density	:	1.39 g/cm³ (at 20 °C)
Relative gas density	:	2.3
Solubility	:	Water: Completely soluble.
Log Pow	:	Not applicable for inorganic gases.
Log Kow	:	Not applicable.
Viscosity, kinematic	:	Not applicable.
Viscosity, dynamic	:	Not applicable.
Explosive properties	:	Not applicable.
Oxidizing properties	:	None.
Explosion limits	:	Non flammable.

9.2. Other information

Gas group	:	Liquefied gas
Additional information	:	Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

Moisture. Fluorine. Chlorine trifluoride. Chlorates. Sodium Carbide. Aluminum. (powdered). Zinc and its alloys. Manganese. Alkali metals. Metal nitrates. Rubidium carbide. Metal oxides. metal acetylides. Metal hydrides, flammable, n.o.s. Stannous oxide. Sodium. Acrolein (propenal).

10.6. Hazardous decomposition products

None known.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: TOXIC IF INHALED.

Sulfur dioxide (\f)7446-09-5	
LC50 inhalation rat (ppm)	1260 ppm/4h
ATE US (gases)	1260.000 ppmV/4h

Skin corrosion/irritation : CAUSES SEVERE SKIN BURNS AND EYE DAMAGE.

Serious eye damage/irritation : CAUSES SERIOUS EYE DAMAGE.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Sulfur dioxide (7446-09-5)	
IARC group	3 - Not classifiable

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Symptoms/injuries after inhalation : Exposure to concentrations above the TLV of 2 ppm may irritate the eyes, nose, throat, and sinuses, resulting in choking, coughing, and sometimes bronchoconstriction.

Concentrations of 50-100 ppm are considered dangerous.

Exposures of 400-500 ppm are immediately life-threatening.

Exposure to high concentrations may result in pulmonary edema and paralysis.
.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

12.2. Persistence and degradability

Sulfur dioxide (7446-09-5)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Sulfur dioxide (7446-09-5)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable for inorganic gases.
Log Kow	Not applicable.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Sulfur dioxide (7446-09-5)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.

Effect on ozone layer : None

Effect on the global warming : No known effects from this product

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1079 Sulfur dioxide, 2.3

UN-No.(DOT) : UN1079

Proper Shipping Name (DOT) : Sulfur dioxide

Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115

Hazard labels (DOT) : Poison Gas
2.3 - Poison gas
8 - Corrosive

DOT Special Provisions (49 CFR 172.102) : 3 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone C (see 173.116(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter
B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet
T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter
TP19 - The calculated wall thickness must be increased by 3 mm at the time of construction. Wall thickness must be verified ultrasonically at intervals midway between periodic hydraulic tests (every 2.5 years). The portable tank must not be used if the wall thickness is less than that prescribed by the applicable T code in Column (7) of the Table for this material

Additional information

Emergency Response Guide (ERG) Number : 125

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers: - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

UN-No. (IMDG) : 1079

Proper Shipping Name (IMDG) : SULPHUR DIOXIDE

Class (IMDG) : 2 - Gases

MFAG-No : 125

Air transport

UN-No. (IATA)	:	1079
Proper Shipping Name (IATA)	:	Sulphur dioxide
Class (IATA)	:	2
Civil Aeronautics Law	:	Gases under pressure/Gases toxic under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations

Sulfur dioxide (7446-09-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on the United States SARA Section 302	
SARA Section 302 Threshold Planning Quantity (TPQ)	500 lb
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard Immediate (acute) health hazard Sudden release of pressure hazard

15.2. International regulations

CANADA

Sulfur dioxide (7446-09-5)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Sulfur dioxide (7446-09-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Sulfur dioxide (7446-09-5)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List) Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. US State regulations

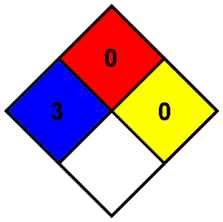
Sulfur dioxide(7446-09-5)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard

Physical : 2 Moderate Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

CITY OF NEWTON

Process Safety Management

PSM

Process Hazard Analysis

29 CFR 1910.119 (e)

March, 2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

PROCESS HAZARDS ANALYSIS (PHA)

PURPOSE:

To assure that all processes meet or exceed OSHA's standards for safe operation, the City of Newton conducts hazard analyses on all processes pertaining to the handling of highly hazardous chemicals.

POLICY:

The City of Newton reviews its processes periodically to identify, evaluate and control the hazards of the process. The method of analysis is appropriate to the complexity and the risk potential of the process being analyzed, including What-If, Checklist, Hazard and Operability Study (HAZOP), Fault Tree, or other acceptable methods.

There will be a five-year PHA schedule for the applicable process(es) containing any chemicals listed on Attachment B are outlined in Attachment A. The applicable chemical or chemicals are highlighted on Attachment C.

PROCEDURES:

1. It is the responsibility of the plant Operator of Responsible Charge (ORC) to initial the PHAs for the processes under his/her control.

2. For each PHA, a specific team of the City of Newton employees and, as required, outside resources as defined by the plant ORC, including a safety representative.

3. For each PHA, a specific plan is developed defining the method(s) to be used. The most likely alternates are Checklist, What If, and HAZOP. Information on these and other methods can be found in Attachment B.

4. The PHA is conducted and a report issued which includes the following information (when applicable):

    a. The process hazards identified
    b. Engineering and administrative controls applicable to the hazards and their interrelationships.
    c. Consequences of failure of controls.
    d. Quantitative evaluation of the possible safety and health effects of failure of engineering and administrative controls.

5. It is the responsibility of the facility ORC to take corrective measures and communicate to those whose work assignments are affected. The facility ORC shall also develop a written action plan and follows to completion all items in the report.

6. All PHAs reports are maintained in the Wastewater Treatment Plant office.

AUDIT:

This policy is reviewed on an annually basis by appropriate facility personnel.

The safety officer updates the five-year schedule.

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

PROCESS HAZARDS ANALYSIS (PHA)

ATTACHMENT A

PROCESS HAZARDS ANALYSIS

FIVE-YEAR SCHEDULE

UNIT OPERATION	**PHA UPDATES**	**REMARKS**
1. Chlorine System		Next PHA 2021
2. Sulfur Dioxide System		Next PHA 2021

ATTACHMENT B

A process hazard analysis is a systematic method for identifying the ways process equipment can malfunction or be improperly operated. Such analyses have been referred to by a variety of names, including: process reviews, hazard assessments, hazard reviews, risk assessment, and risk reviews. The need for process hazard analyses has been recognized and has become an essential tool to develop safe work environments. The types of analyses performed, their scope, results, and recommended control measures resulting from such analyses have varied from workplace to workplace. A process hazard analysis is to address the following as a minimum:

- ✓ Hazards of the process;
- ✓ Identification of previous incidents, which could have resulted in catastrophic events;
- ✓ Appropriate engineering and administrative controls;
- ✓ Consequences of controls, if they fail to operate as designed;
- ✓ Location of the facility
- ✓ Human factors;
- ✓ Qualitative evaluation of the possible safety and health effects of failure of controls on human health;
- ✓ Impact of a failure in one area upon other areas within the facility;

Various methodologies have been established for conducting hazard analyses. The methodology selected should be appropriate to the complexity of the process and be capable of identifying and evaluating the hazards. The analyses must also result in the establishment of adequate control of identified hazards.

Some of the more common methodologies and a brief description of each is listed below.

What If is used for relatively uncomplicated processes. This involves the asking of "what if" questions at each handling or process step. For example, "What if" the temperature exceeds the normal operating temperature? The answers to the "what if" questions are used to evaluate the effects of the component failures or procedural errors on the process and any associated consequences or hazards.

Checklist consists of developing an organized and comprehensive "checklist" of questions relative to the various tasks performed and equipment used in the process. Each of the items on the checklist is answered and unsatisfactory answers are investigated. The questions cover all aspects of the process including: Equipment, operating procedures, operator skills and knowledge, process chemistry, control and emergency systems, material of construction, and operating and maintenance records.

PROCESS HAZARDS ANALYSIS (PHA)

ATTACHMENT B *(continued)*

What If/Checklist consists of organizing information (process technology, equipment design, operating procedures, etc.) on a process and utilizing an interdisciplinary team to formulate "what if 'questions related to the safety of the operation. This technique is combined with a prepared "checklist" to stimulate additional discussion. The team attempts to reach a consensus on each question and answer.

Hazard and Operability Study (BAWP) is a systematic method used to identify and assess the significance of all the ways a process unit can malfunction or be improperly operated and to determine the hazards that might occur. This method is appropriate when a detailed review of the process equipment and equipment operation is necessary. This methodology utilizes a team approach to determine how deviations from the designed operations of the unit may occur and the significance of such deviations. In order to apply this method, current piping and instrumentation diagrams are essential, as each component of the system must be identified and analyzed.

Guide wards such as more, less, not enough, part of reverse, etc. are used to study variations in all parameters (flow, temperature, pressure, etc.) and failures that may occur involving each component of the process. The consequences of deviations and malfunctions and their frequency of occurrence are assessed to determine corrective actions. This methodology requires a significant amount of time to complete and must be performed by a team possessing a thorough knowledge of the process and whose members are properly trained in the use of HAZOP technique

City of Newton
Wastewater Treatment Plant

Process Hazard Analysis (PHA)
Chlorine and Sulfur Dioxide Process Systems

PHA Date:	
PHA Performed by:	
James Gilpin, Consultant	
James Gilpin, Consultant	

Task/Operation: Receiving Chlorine and Sulfur Dioxide Cylinders from a vendor.

What if?	Consequences/Hazards	Safeguards	Recommendations
1. Wrong material is delivered?	Potentially hazardous situation.	Verify material upon receipt; utilize reliable supplier(s).	Develop & follow written procedure for receiving material.
2. Leaking cylinder is delivered?	Hazardous environment created.	Inspect cylinder before accepting; utilize reliable supplier(s).	Develop & follow written procedure for receiving material.
3. Date for cylinder inspection is overdue?	Cylinder could fail resulting in major leak.	Cylinders tested every 5 years; utilize reliable supplier(s).	Develop & follow written procedure for receiving material.
4. Cylinder is dropped due to truck hoist failure/malfunction?	Possible major leak.	Utilize reliable supplier(s); proper hoist operation.	Routine hoist inspection & maintenance; proper hoist operating procedures.
5. Cylinder is dropped due to plant hoist failure/malfunction?	Possible major leak.	Routine hoist inspection; proper hoist operation.	Routine hoist inspection & maintenance; proper hoist operating procedures.
6. Cylinder is dropped due to hoist mis-operation (operator error)?	Possible major leak.	Utilize experienced personnel to operate crane; utilize more than one employee during this task.	Properly train all new personnel; refresher training provided as needed.
7. Hoist controls jam?	Could cause leak.	Shut down a breaker box.	Routine hoist inspection & Maintenance.
8. Truck engine catches on fire at unloading point?	Remotely possible: Could cause overpressure plug on cylinder to blow out causing a major leak.	Utilize reliable supplier(s) who maintain trucks well; fire extinguisher located nearby cylinder storage area.	Develop & follow written procedure for receiving material requiring truck engine to be shut down while unloading.
9. Cylinder rolls off truck?	May cause injury to personnel or result in a leak.	Cylinders secured & capped.	Develop & follow written procedure for receiving material
10. Overpressure plug releases prematurely?	Would cause major leak.	Inspect cylinder before accepting; Utilize reliable supplier(s).	Ask supplier to certify inspection & maintenance records; Develop Emergency Response Plan.
11. Simultaneous leaks of chlorine & Sulfur dioxide?	May cause injury to personnel; Hazardous environment created.	Inspect cylinder before accepting; utilize reliable supplier(s). Utilize good cylinder design; guard rail installation.	Develop & follow written procedure for receiving material.

City of Newton
Wastewater Treatment Plant

Process Hazard Analysis (PHA)
Chlorine and Sulfur Dioxide Process Systems

PHA Date:	
PHA Performed by:	
James Gilpin, Consultant	

Task/Operation: Changing Chlorine and/or Sulfur Dioxide Cylinders

What if?	Consequences/Hazards	Safeguards	Recommendations
1. Cylinder dropped during transfer?	Possible major leak.	Good hoist maintenance; Proper hoist operation.	Shutdown active cylinders when transferring other cylinders; transfer cylinder with valve guard in place.
2. Leak occurs when valve is opened?	Possible major leak.	Open carefully and leak test if necessary; utilize reliable supplier(s).	Develop & follow written procedure for changing cylinders.
3. Lead gasket not installed or not installed properly?	Possible major leak.	Include a step as part of the hookup/connection of cylinder procedure to have gasket installed.	Emphasize during personnel training; Develop & follow written procedure for hookup/ connection of cylinders.
4. Leaking chlorine or sulfur dioxide overcomes operator?	Possible fatality.	Follow written procedure for hookup/ connection of cylinders.	Consider use and/or availability of half face or escape respirators; 2 person task.
5. Vacuum regulator fails?	Possible leak of air into system.	Keep system under vacuum; utilize good system design.	Inspect regulator during each hookup; Conduct PM every quarter.
6. Chlorine or sulfur dioxide detector fails to detect a leak?	Possible major leak	Detector by odor.	Check detector per manufacturer's procedure once per quarter at a minimum.
7. Toxic gas alarm not heard or not recognized by plant personnel?	Delayed response; Possible major leak.	Alarm is audible & visual (flashing light)	Insure that alarm can be easily distinguished in over entire plant site.
8. Fire at cylinder storage area?	Remote: Could blow overpressure plug causing major leak.	Keep combustibles away from cylinder storage area.	Inspect area for good housekeeping practices. Make a fire extinguisher available in area.
9. Simultaneous leaks of chlorine & sulfur dioxide?	May cause injury to personnel; hazardous environment created.	Inspect cylinder before accepting; Cylinder design & guard rail use.	Emphasize during personnel training; Develop & follow written procedure for hookup/ connection of cylinders.

City of Newton
Wastewater Treatment Plant

Process Hazard Analysis (PHA)
Chlorine and Sulfur Dioxide Process Systems

PHA Date:	
PHA Performed by:	
James Gilpin, Consultant	

Task/Operation: Chlorine and Sulfur Dioxide Injection System situations.

What if?	Consequences/Hazard	Safeguards	Recommendations
1. Chlorinator or sulfur dioxide malfunctions and injects a high amount of gas into the system?	High level in wastewater contact chambers; possible high chlorine or sulfur dioxide level to river.	Laboratory results and/or daily usage inventory would catch.	Inspect system daily; Check chlorinator if residual is high: Perform PM quarterly.
2. Toxic gas leaks?	Possible leak into system; detector alarm should sound.	Keep gas injection systems under vacuum.	Inspect system daily; Perform PM quarterly.
3. Chlorinator malfunctions and injects a low amount of chlorine into the system?	Low chlorine level in wastewater chlorine contact chamber. Remote possibility: fecal coliforms to river.	Weekday laboratory results or daily inventory would catch.	Inspect system daily; Check chlorinator if residual is high: Perform PM quarterly.
4. Water supply fails?	Loss of vacuum.	Vacuum regulator indicator drops to zero (0) & closes toxic gas regulator.	Inspect water system frequently.
5. Water line leaks?	Possible loss of vacuum.	Dailey visual inspection performed.	Inspect water system frequently.
6. Fire in cylinder room?	Remote: Line failure; possible leak.	Keep combustibles out of cylinder room.	Inspect area for good housekeeping practices.

City of Newton
Wastewater Treatment Plant

Process Hazard Analysis (PHA)
Chlorine and Sulfur Dioxide Process Systems

PHA Date:	
PHA Performed by:	
James Gilpin, Consultant	

Task/Operation: Weather or outside activities.

What if?	Consequences/Hazards	Safeguards	Recommendations
1. Severe weather such as a tornado occurs?	Could results in serious toxic gas leak.	A strong building protects the system.	Develop an Emergency Response Plan (ERP).
2. Toxic Gas system(s) are sabotaged?	Could results in serious chlorine or sulfur dioxide leak.	Site security (fencing, limited access, etc.)	Develop an Emergency Response Plan (ERP).

Signature Section:

CITY OF NEWTON

Process Safety Management

PSM

Standard Operating Procedures

29 CFR 1910.119 (f)

May, 2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

WRITTEN OPERATING PROCEDURES

PURPOSE:

The purpose of this procedure is to insure that employees operating City of Newton WWTP facilities have the proper written instructions to perform their duties in a consistently safe manner.

POLICY:

All production facilities have written procedures that fully define the operation of the particular unit, including the necessary tasks for startup, shutdown, emergency, and normal circumstances, as well as the data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken.

PROCEDURE:

Current Written Procedures:

I) The primary written procedures in our production facilities are:
   a. Unloading & Hooking Up Chlorine.
   b. Chlorine System Startup - Chlorine System Shutdown
   c. Unloading & Hooking Up Sulfur Dioxide
   d. Sulfur Dioxide System Startup and Shutdown

2) All procedures include specific instructions on steps to be followed to carry out the stated objectives. Each procedure contains applicable safety precautions and information.

   For example, the operating procedures addressing operating parameters contain:
   a. Proper methods to start up or shut down a process
   b. Operating instructions concerning pressure limits, temperature ranges, flow rates, etc.
   c. Action taken when an upset condition occurs.
   d. Identifying alarms and instruments that are pertinent if an upset condition occurs.
   e. Other important procedure related information.

New Procedures and Procedure Management:

I) All employees receive instructions, as necessary, in the use of operating procedures. The plant Operator of Responsible Charge (ORC) coordinates this training.
2) Any employee may initiate a written procedure. He/she seeks advice from his/her supervisor/manager and writes the procedure in a standardized format.
3) Facility personnel review draft written procedures as appropriate prior to approval of the final document is distributed.
4) Written procedures are utilized for communication and training purposes to provide all employees with the proper information to perform their job duties
5) All operating procedures shall be accessible to operations personnel for use as a ready reference.
6) All changes to written operating procedures are managed through the Management of Change.

POLICY REVIEW:
This policy is to be reviewed on an annual basis by appropriate plant personnel.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Offloading of Bulk Tank Chemicals**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	04/26/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: For delivery of bulk tank chemicals (Alum, Caustic and Fluoride) to ensure safe and proper off-loading. Inform the ORC when any bulk tank chemical is low. Typically it takes 1 week for an Alum or Caustic delivery and can take as many as 3 weeks for a fluoride delivery.

	Step/Action		Step/Action
1.	Meet the driver outside the gate and give directions on where to offload. Driver's can either back in 1-2 ft. in front of containment wall where the chemical line couplings are located or can pull directly in with the cab close to the stairs by the basin, whichever is more comfortable for the driver.	8.	Watch tank to see if it is filling and watch the security camera area of bulk tanks but also do a visual check every 10-15 minutes to monitor progress. Offload usually takes between 40 and 60 minutes.
2.	Unlock the side and gate and help guide the driver back into offload position.	9.	Once the offload is complete and the driver has put up their equipment put the metal plate back over the chemical line coupling.
3.	Open the fill valve on the tank to be filled and make sure the fill valve on the other tank is closed.	10.	Sign off of the paperwork provided by the driver.
4.	Test both the eyewash and safety show and show the driver where they are located. (During the winter months you will need to turn on the water in chlorine room)	11.	Close the fill line valve
5.	Remove metal plate and allow driver to connect hose. Make sure the driver is connected to the right chemical line coupling.	12.	Wash down any spillage that may have occurred.
6.	Have the driver collect a sample for quality control testing in the lab. Take sample into the lab and test using the appropriate SOP.	13.	Winterize the safety shower and eye wash station and turn off water in chlorine room during cold months.
7.	Once the testing is complete and the product is approved let the driver know that offloading can begin.	14.	Take paperwork into ORC or place in box on door.
		15.	Document in the Bulk Chemical binder the date, operator, chemical and which bulk tank was filled. Document which chemical and tank was filled in the Operator Notes.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Unloading and Loading Chlorine or Sulfur Dioxide Cylinders**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	5/3/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: This procedure is written to assure the safe unloading of full chlorine and sulfur dioxide cylinders is performed without incident.

	Step/Action		Helpful Comments, Definitions, etc.
RECEIVING THE DELIVERY TRUCK			
1.	When the cylinder delivery truck arrives, check with the driver to make certain that the invoice is for the City of Newton and all forms are correct for the cylinders to be delivered. Also in the wake of terrorist attacks on the United States, check the driver's identification for security.	A. B.	This detailed procedure, using qualified personnel, must be strictly followed to prevent a dropped cylinder or any unusual occurrence during normal operations. Observe all applicable safety precautions along with the utilization of chemical SDS information.
2.	Show driver where the cylinders are to be unloaded.	A.	Direct driver of the delivery truck so as not to damage the building, positioning it such that the boom on the truck can easily sit cylinder under the I-beam with the hoist into the Cylinder Storage area.
3.	Once in position check with driver to make sure that he/she has set the parking brakes, turned off the truck engine, and that chocks for the truck are in place, if necessary.	A.	The cylinder hoist should be checked, maintained, and calibrated annually. Documentation should be filed.
TRANSFERRING EMPTY CYLINDERS			
4.	Check empty cylinder and replace end cap if not already in place.		
5.	Connect the crane to the empty cylinder to be transferred.		
6.	Check all connections to ensure they are tight and placed to lift the cylinder.		
7.	Check all connections again. If all is normal, then proceed to transfer the cylinder to a location where the driver's crane can reach.		
8.	If the connections are not correct or any other problem is noted after the cylinder has been lifted one foot, lower the cylinder back onto the ground. Correct the problem and start with steps 11 – 13.		

Step/Action		Helpful Comments, Definitions, etc.	
9.	The plant operator is responsible for insuring each cylinder is secure before disconnecting from the crane.		
10.	Repeat steps 4 – 9 until all empty cylinders have been transferred.		
TRANSFERRING FULL CYLINDERS			
11.	Connect the hoist to a cylinder to be transferred from the ground to storage.		
12.	Check to insure that all connections are tight and proceed to lift the cylinder one foot above the ground to test system.		
13.	Check all connections again. If all is normal, then transfer the cylinder to the full cylinder storage location.		
14.	If the connections are not correct or any other problem is noted after the cylinder has been lifted one foot, lower the cylinder back to the ground. Correct the problem and start with step 11.		
15.	Inspect each cylinder as it is transferred to the Chemical Storage area for any signs of leakage by removing the end cap to check valves for any problems.	A.	Reject any suspicious cylinder and note rejection on the shipping papers. (Return cylinder to truck using steps 4 – 9.)
16.	Repeat steps 11 – 15 until all cylinders have been approved and transferred to the Chemical Storage area.		
17.	Review, make any necessary adjustments, and approve the shipping papers.		
18.	Obtain one copy of the completed paperwork for plant records		
19.	Direct the driver out of the plant.		
20.	Take the copy of the approved shipping papers to the ORC.		

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	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Hooking Up Chlorine and Sulfur Dioxide Cylinders**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	5/3/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: This procedure is written to assure that unhooking and hooking up full chlorine or sulfur dioxide cylinders is performed in a safe manner.

Step/Action		Helpful Comments, Definitions, etc.	
1.	Obtain the following list of items for use during this procedure: ➢ Wrenches (located in cylinder storage area near cylinders) ➢ Electric Hoist ➢ Lead gaskets (stored in the top of the brown tool box located in the maintenance shop) ➢ Ammonia solution (located in cylinder storage area near cylinders)	A. B.	This procedure should only take place during a daylight shift, when two operators shall be assigned to hook up a full cylinder. This is not a one-person job. This detailed procedure, using qualified personnel, must be strictly followed to prevent a gas leak, a dropped cylinder, or any other unusual occurrence while hooking up cylinders. Observe all applicable safety precautions along with the utilization of chemical SDS information.
2.	To determine which cylinder is empty, check the Chlorine or Sulfur Dioxide Change Over Log (Attachment I).	A.	This log is maintained in the main plant office or control room.
3.	Open the water feed valve to clear chemical out of lines.	A.	The water feed valve is located in the Cylinder Room.
4.	Using the wrench close either the chlorine tank or sulfur dioxide valve.		
5.	Disconnect the yoke from empty cylinder.		
6.	Place the cap on cylinder valve.		
7.	Place cylinder hood cover over valve area.		
8.	Place empty sign inside of cylinder dome space.		
9.	Using the electric hoist, move empty cylinders to holding berth.	A.	Hook hoist to cylinder and lift the cylinder approximately one foot. Inspect hoist and cylinder. If everything is OK, continue to lift the cylinder and move it an empty outside berth.
10.	Repeat step 8 when moving a full cylinder from the holding berth to the scale.	A.	When placing a cylinder on scales, make sure the top valve is in the 12 o'clock position. THIS IS VERY IMPORTANT. Failure to do so will cause liquid chlorine or sulfur dioxide to be drawn from cylinder instead of gas and could create serious problems.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Hooking Up Chlorine and Sulfur Dioxide Cylinders**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	5/3/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Step/Action		**Helpful Comments, Definitions, etc.**	
11.	Take hood cover off full cylinder	A.	Place the hood cover dome side up along the wall for ready retrieval when it will be needed.
12.	Remove cap from top valve.	A.	Place the valve cap open side down near the cylinder for ready retrieval when capping the cylinder valve is necessary.
13.	Remove the old lead gasket from yoke and replace it with new one.	A.	Lead gaskets should never be reused.
14.	Carefully alignment the yoke with cylinder valve and secure with wrench.		
15.	Slightly open the upper chlorine cylinder valve that was closed for empty cylinder change out.	A.	Rotating the valve knob counter clockwise opens the valve.
16.	Check the connection for leaks with the ammonia solution.	A. B.	A white vapor cloud (similar to a puff of smoke) will indicate the presents of a leak when the ammonia solution is applied. If there is a leak, close cylinder valve immediately. Use respirator, if necessary. (Note: Respirators are stored in the respirator cabinet just out side of the filter control room. The respirators are equipped with 15 minutes of breathing air when full and breathing is normal.) Evacuate the area until the chlorine has dissipated. Then, repeat the hookup procedure again or identify problem. If the leak continues, use respirator. Exit area, go to plant office and initiate the emergency response procedures.
17.	If no leaks exist, open valve approximately 1 ½ turns.		
18.	Close the vacuum regulator by rotating the knob counter clockwise.	A.	This action will reset the regular pin (pull the pin out) located in the center of the regulator knob. This pin is pulled in flush with the knob to indicate the cylinder is empty.

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Step/Action		Helpful Comments, Definitions, etc.	
19.	Open the vacuum regulator by rotating the knob clockwise until it stops.	A.	This allows the 2 cylinder regulators to work together to automatically start pulling chlorine or sulfur dioxide from the full cylinder once a cylinder has become empty.
20.	Record new cylinder weight and complete the other information on the "Cylinder Change Over Log" form (Attachment I).	A.	This log is maintained in the main plant office.
21.	Using the new tare weight information from the completed "Cylinder Change Over Log," adjust the weights on the front of the gas scale to the same value.	A.	This will allow the scale to accurately show the amount of chlorine or sulfur dioxide in the cylinders.
22.	Clean and return all tools to their original location for use during the next cylinder change.	A.	Also, cleanup the Cylinder Storage area by throwing away the old lead gaskets and any debris to maintain a neat and orderly area.

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	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Chlorine/Sulfur Dioxide System Startup**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	5/3/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: This procedure is written to assure that any startup of the chlorine or sulfur dioxide system is performed without incident. This procedure is designed to cover any startup after maintenance work, equipment change, or other prolonged outage or shutdown of the chlorine or sulfur dioxide system.

Step/Action		Helpful Comments, Definitions, etc.	
1.	Locate the valve to the water supply line located in the Chemical Room on the wall opposite from the door and open it half way by rotating the valve handle counter clockwise 45 degrees (1/8 of a turn). Then go open feed valves on wall beside rotameters.	A.	This detailed procedure, using qualified personnel, must be strictly followed to prevent a gas leak or any unusual occurrence during startup of the chemical treatment system.
		B.	Before attempting to place the chorine or sulfur dioxide system into operation, become familiar with the characteristics of chlorine, sulfur dioxide, and the layout of the system. Important information on each system along with the P&IDs is located in the SDS book and the Process Safety Management (PSM) manual.
2.	Check the rotameters on the back wall and be sure they are reading what values have been set in the control room. Adjust desired ppm using the Chlorine Setting Chart.	A.	There are two chlorinators: • Pre-filter chlorine additions (labeled Pre-Chlorine); left or 2nd chlorinator • Post- filter chlorine additions (labeled Post-Chlorine); right or 1st chlorinator
		B.	There are also two sulfunators: Both are Post Treatment

3.	Check for leaks using ammonia solution at the tanks on the dock. Also, go into the Chemical room and gently squeeze ammonia solution vapor around valves and rotameters to make sure no leaks have developed inside the room.	A. B. C.	Observe all safety precautions by referring to the SDS. If the plant is started and shut down on a day-to-day basis, it is not necessary to perform the leak check every day. The City of Newton Wastewater Treatment Plant typically observes peak electrical use periods as defined by Duke Energy in order to receive a reduced cost for electricity. The City of Newton Wastewater Treatment Plant has chlorine and sulfur dioxide leak detectors installed in the Chemical Storage area and in the Chemical Room.

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	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Chlorine System Shutdown**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	04/26/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: This procedure is written to assure that shutdown of the chlorine system is performed without incident. This procedure is designed to cover any shutdown of the chlorine system prior to maintenance work, equipment change, or other prolonged outage or shutdown.

	Step/Action		**Helpful Comments, Definitions, etc.**
1.	Locate the valve to the water supply line located in the Chlorine Room on the wall opposite from the door and close it rotating the valve handle clockwise until the valve stop has been reached (45 degrees or1/8 of a turn; the valve handle will be straight up and down). As an added leak by precaution, we are now shutting the feed valves on wall nearest rear rotameters during down time.	A.	This detailed procedure, using qualified personnel, must be strictly followed to prevent a chlorine leak or any unusual occurrence during startup of the chlorine system.
		B.	Inspect chlorine system to make sure all shutdown preparations are made.
		C.	To **shutdown the system for extended periods** of time, turn off each of the upper valves on chlorine cylinders and turn off the vacuum induction pump feed supply or injector water feed supply valves.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Plant Generator Start up, Switch Over & Shutdown**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	04/26/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: These instructions will assist in starting the plant generator and switching power to run the water treatment plant in the event of a power outage.

	Step/Action		Step/Action
1.	In the event of a power outage, always make sure you turn all pumps off before going to generator power. This will prevent excessive load on the generator startup. Once on generator you can turn pumps back on you were using when the power went out.	6.	Now you will turn the kirk key and slide the metal bar sideways locking out the plant main power.
2.	The water plant generator control panel is located inside the finished pump room. When you enter the main lobby of the water plant, go through the wooden door to your left and look to your left for the main electrical panel. The generator panel is on the far right.	7.	Remove the kirk key and install it into the generator switch. Turn the key and push up on the power lever to "ON".
3.	First you want to start the generator by turning the stop/run switch to the "run" position on the panel. Note… there is no load on the generator and it is not supplying power at this time.	8.	You should hear the load transfer and might even notice the lights dim slightly. You are now on generator power.
4.	Check the gauge on the panel and see that the generator is putting out 480 volts as this is normal operation.	9.	Remember, not to overload the generator. You can run regular rate and normal pumps, but can NOT run high rate with two finished pumps and north pumps all running, it will choke down the generator and possibly damage it.. (brown out)
5.	Now you are ready to switch power over to the plant generator. If power has tripped, the large black lever (plant main) will not be up or down. It will be in the midway (tripped) position. Go ahead and push down all the way on the lever. This will reset the breaker and place it in the off position.	10.	On average you can run one raw & one finished pump & one north pump, but if you also include a backwash pump or more than one of the above pumps, this will be too much.
		11.	Also keep close monitor on your generator diesel fuel level to make sure you can run comfortably for extended period of time.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Plant Generator Start up, Switch Over & Shutdown**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	04/26/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

12.	When the time comes to shut the generator down and switch back over to Duke Energy power, you will first shut down all pumps associated with the plant generator.	C.	Also pay close attention to the plant lighting. If only some of the lights are working and some equipment will not come back on line, you may not have fully restored power to the plant.
13.	Then its time to stop the generator by turning the stop/run switch to the "stop" position on the panel. You will notice / hear that it is still running and this is perfectly normal as it has a 15 minute cool down timer.	D.	In this event you will need to go back over to generator and call "**1-800 power on**" to report that we are *single phasing* in the area and not fully restored on source power. This happens sometimes when a transformer on a pole does not send us proper voltage.
14.	Now you are going to turn the kirk key and pull down on the generator power lever. Remove kirk key, insert it into the main power breaker. Slide the bar over and then pull up on the large black lever. You are now back on Duke Energy power.		
A.	It is very important to check all GFI breakers in the plant at this time. We have chemical pumps, lab equipment and many other things plugged into these outlets. Sometimes they trip when switching over.	E.	Please keep the ORC notified on the generator fuel level after each extended generator run. It is the operator's responsibility to inform the supervisor as to prepare to reorder the diesel fuel.
B.	During your rounds and pay close attention to detail and double check that all chemical pumps, flash mixers, flocculators, sample tap pumps are back on line.	F.	Note! If you are outside anywhere near the generator, hearing protection should be worn at all times.

	City of Newton Wastewater Treatment Plant Standard Operating Procedure **Changing tube on Chemical feed pumps**	**WTP SOP #:**	
		Revision #:	0
		Revision Date:	5/3/17
		Revised By:	
		Approved By:	*ORC* *E. Jones*

Purpose: Information on how to properly replace worn or busted pump tube in any of our chemical feed pumps.

	Step/Action		Helpful Comments, Definitions, etc.
1.	Remove the clear pump head cover by unscrewing the 4 thumb screws. Pull out the pump head cover exposing the tube. (Removing the clear pump head cover with 4 thumb screws automatically puts the pump in to maintenance mode.)	6.	Continue to follow the rotation of the rotor while directing tube into the pump head. At this point you may need to pull tube installation tool to stretch tubing into position. Let the rotor spin a few rotations while pulling installation tool so the fitting can be properly installed.
2.	Rotor will rotate at a maximum of 6 rpm for your safety. Pull out the suction side of tubing assembly. Press the start button. While the rotor is rotating, pull out the old tube assembly. (Tip, let the pump do the work for you, just guide the tubing out between the two rollers on the rotor. Press the stop button at any time to stop rotor.	7.	Continue to pull tube installation tool to allow enough room to slide discharge fitting into pump head tongue and groove. Once discharge fitting is secured in the pump head, push the stop button.
3.	Thoroughly clean the rotor and head	8.	Replace the pump head cover. The pump display will ask you if the tube has been replace. Select yes. Pump will then ask if you want to reset REV counter, select yes. REV count will display for 5 seconds before resetting to zero.
4.	Now take your new tube and tube installation tool. Insert the suction fitting into pump head. Remove your fingers from the pump head. Start pump by pressing the start button. Grab hold of the tube installation tool and use it to leverage tubing into pump head.	9.	The pump is now ready for normal operation.
5.	Introduce the tubing into the pump head while the rotor is turning. Avoid using fingers to guide the tubing. Stop pump at anytime by pressing the stop button. Start by pressing the start button.	10.	For more information and how to pictures, refer to Chemical rooms & dock Maintenance binder with all of the flex pro metering pump manuals inside. Usually kept near this SOP in the operations room.

Chlorine Cylinder Change Check Sheet Date: _____

Operator changing cylinder _____ Operator Attendant _____

Initials:

_____ 1. Get the Bulk Chemical Notebook (located in the Control Room) and open to "Chlorine Cylinder Change Log". Determine which cylinder is empty from the log.

_____ 2. Each individual **MUST** be equipped with a respirator located in the main lobby beside fire extinguisher.

_____ 3. Get weight off chlorine scale.

_____ 4. Close chlorine tank valve on cylinder to be changed out. **USE ONLY 6" CHLORINE WRENCH.**

_____ **5.** Loosen and remove vacuum regulator from empty cylinder.

_____ **6.** Replace chlorine cylinder valve cap on empty cylinder.

_____ **7.** Place cylinder hood cover over valve area.

_____ **8.** Using electric hoist, move empty cylinder to holding slot. Place empty sign on it.

_____ **9.** Use the electric hoist to move full cylinder to the scale. Use the painted arrows on the cylinder to keep valves aligned properly on the scale. Arrows should be at 12 o'clock position.

_____ **10.** Take cylinder hood cover off.

_____ **11.** Check that the valve is closed and then remove top chlorine valve cap.

_____ **12.** Remove used lead washer from Vacuum Regulator. **Never reuse lead washers!**

_____ **13.** Take a new lead washer which comes with chlorine cylinder and place on Vacuum Regulator.

_____ **14.** Attach Vacuum Regulator to chlorine valve. Make sure it is seated properly.

_____ **15.** Using 6" **Chlorine Wrench** open chlorine valve one quarter turn. You should hear the lines charging.

_____ **16.** Check for leaks by gently squeezing ammonia solution vapor around valves.

_____ **17.** Reset Vacuum Regulator by turning knob on regulator counterclockwise gently and then turning back clockwise. Pin should be out.

_____ **18.** Recheck for leaks with ammonia solution

_____ **19.** Record the cylinder date stamp and cylinder tare weight in Chlorine Cylinder Change Log.

_____ **20.** Take new tare weight and add to tare weight of cylinder in service. Reset tare weight on scale

_____ **21.** Swing weight lever arm to left to take weight off and then swing back to put scale in service

_____ **22.** Record weight on scale after change out.

_____ **23.** Put a standby sign on cylinder just changed out and make sure in-use sign is on the correct cylinder.

_____ **24.** Make sure electric hoist is stored in proper place, tidy up and return respirators and Chemical Notebook

J. Gilpin 4/24/17

SO_2 CHECK LIST

Name of Person Changing SO_2 _____

Name of Person checking change _____

Time _____ Date AM/PM / /

The following steps are to be followed when changing empty SO_2 cylinders. One person will do the actual changing and one person will monitor each step checking off in order - every step of the change.

_____ 1. Close valve on the empty SO_2 cylinder.
_____ 2. Close manifold valve.
_____ 3. Crack the flexible pigtail line valve connecting the cylinder.
_____ 4. Check for leaks (WITH AMMONIA VAPOR), if there are no leaks continue.
_____ 5. Remove flexible line pigtail connection from the cylinder.
_____ 6. Apply safety cap at once.
_____ 7. Replace protective hood.
_____ 8. If cylinder is not replace at once, cap the manifold lines.
_____ 9. Remove empty SO_2 cylinder from the scales.
_____ 10. Place empty SO_2 cylinder in proper place.
_____ 11. Zero scales.
_____ 12. Remove protective hood.
_____ 13. Rotate SO_2 cylinder until it is facing the proper way and place on scale.
_____ 14. Remove safety cap. Check for leaks with AMMONIA VAPOR.
_____ 15. Remove the old lead washer.
_____ 16. Replace with new lead washer,
_____ 17. Attach pigtail and flexible line to SO_2 cylinder valve securely. MAKE SURE THE FILTER IS IN PLACE.
_____ 18. Crack open cylinder tank valve and close immediately.
_____ 19. Spray small amount of ammonia VAPOR on valve connection.
_____ 20. If you detect a leak, double check all connections and tighten them slightly.
_____ 21. Crack the valve open once again and close it. Check for leaks with AMMONIA VAPOR.
_____ 22. If there are no leaks, open manifold valve.
_____ 23. Open the SO_2 cylinder valve one quarter of a turn.

YES	NO	
☐	☐	Were there any problems? If yes, explain:

_____

_____

☐	☐	Did operator changing SO_2 follow procedures?
☐	☐	Did operator monitoring the SO_2 change have a self-containing breathing apparatus on?
☐	☐	Did operator monitoring the change provide all needed assistance?

BOTH OPERATORS SIGN BELOW AFTER COMPLETING THE SO_2 CHANGE

_____ _____

COMMENTS: _____

_____

_____

Chlorine & Sulphur Dioxide Cylinder Chain of Custody

Tank No.	Tare Weight	Date Received	Date Put in Service	Date Removed From Service	Date Returned

CITY OF NEWTON

Process Safety Management

PSM

Operator Certification

29 CFR 1910.119 (g)

March, 2017

Introduction

As required by 29 CFR 1910.119 (g), facilities subject to the Process Safety Management (PSM) standard are required to implement a training program. The purpose of this portion of the PSM program is to ensure that all employees, including maintenance and contract, involved with the covered process fully understand the safety and health hazards of the chemicals and processes with which they work. This understanding is essential for the protection of themselves, their fellow employees, and the citizens of the surrounding community.

Employees to be Trained

The rationale used to determine which City of Newton employees receive general training is simple. All non-office workers are trained. This approach is based on the fact that most all of the job functions at the facility have very similar hazards. Outside of this general training, workers whose job functions present additional hazards undergo additional training. This specific training is typically instruction based on the developed work procedures. In certain cases, training is performed based on jobs that are not necessarily part of production. In many of these cases, specific training is required by a regulatory agency and may be conducted by outside sources. Examples of the types of jobs that involve these training activities include: fork lift operator and hazardous waste management personnel. The persons involved in these activities have been chosen specifically for them, and they are trained in the respective tasks.

Training Subjects

Many subjects are covered during the training of City of Newton employees. An initial mix of training subjects is used for new employees. These items are basic, and designed for the basis of safe operation of all job functions. A training checklist of potential training subjects is included as an appendix.

Hazard Communications training takes place in accordance with the facility's HazCom Plan. This training includes the recognition of the hazards involved with the process, as well as familiarizing employees with the reading of SDSs. Also included in the HazCom training is

the labeling system based on the Globally Harmonized System (GHS). This training follows guidance provided by J. J. Keller in their Hazardous Materials training program. Personnel protective equipment (PPE) is a subject also covered during the training process. The PPE requirements are spelled out to the employee, along with training for the use of the items.

Several key employees have first aid training. Basic instruction on the seeking of first aid is included in the training of production employees. The instruction also deals with Bloodborne Pathogens, and outlines procedures necessary to reduce and/or eliminate exposure.

A Lock Out / Tag Out (LO/TO) program and Confined Space Entry Program are also in place at City of Newton. The training requirements of these provisions are included as general facility training. This instruction gives an overview of the programs, as well as describes the necessary procedures, and the authorized personnel as described in the programs. The LO/TO training stresses the recognition of energy sources, and the Confined Space Entry program explains that the employee should under no circumstances enter a confined space.

A considerable portion of the training is associated with the main hazard involved with the process at City of Newton WWTP: Chlorine and sulfur dioxide. Alarm procedures are also discussed, culminating with egress routes, and evacuation procedures.

Additional training subjects are job specific. They cover operating procedures, safe work practices, and non-routine work authorization. This training is conducted prior to the use of any process equipment, and is conducted on a job specific basis. Special attention is also paid to contract workers, and maintenance workers. Job functions of contract workers are conducted according to the Contractor Policies section of this PSM program. Job function training of maintenance personnel is a function of the Mechanical Integrity Program portion of this PSM program, and is subject to the same on-the-job training as described in a subsequent section.

Initial Training

When a person is hired, a process of new employee orientation is commenced. This process involves all of the typical paperwork, and it involves initial safety training. The general

training as described in the previous section is performed. Other activities of note include an assessment of the person's background in safe work practices, and an in-depth tour of the facility including an overview of the process, and emphasis on the hazards of the job tasks to be performed by the new employee. Also at this time, each employee is trained in the specific safety practices involved in the employee's job tasks. The written procedures developed for these activities are used as the basis of this safe work practice training. It should be noted that drug testing is also required for new employees.

On-the-Job Training

Most of the work practice training at City of Newton is through on-the-job instruction. Movement of employees through job functions is based on their experience levels. Most production workers start their work at City of Newton WWTP in the wastewater treatment area. This is because work in this area develops material handling skills while limiting the new employee exposure to hazards. As a worker is introduced to each new area, they are assigned to an experienced operator. Here the training is job specific, and most of this instruction is concentrated toward safe work practices. The new employee is trained with this approach until the experienced employee is confident of the new employees ability to perform the job and perform it safely. The majority of persons trained by the experienced operator are trained for up to four to six months. The training length is based on the learning ability and previous background of the new employee.

Refresher Training

Annual refresher training is conducted for all persons who are trained in the general training requirements. This training is conducted in-house by a corporate representative, in-house personnel, or by outside contractor. All sections described above as general training are covered. The refresher training also covers specific concerns of production areas.

Training Documentation

The City of Newton will ascertain that each employee involved in process operations has received and understood the required training. To complete the requirement of this

regulation, as well as others, all training is documented. This documentation should, as in the case of all training, include the name of the person trained, the date of the training, and the means of verification of employee understanding of the training. In the case of long term on-the-job training, the verification will come in the way of an employee evaluation by the experienced employee trainer or by a production supervisor. In addition to documenting the training of new employees, the PSM regulation requires that the City of Newton certify in writing that existing employees have the required knowledge, skills, and abilities to safely carry out the duties and responsibilities of their job tasks. The certifications for this requirement, along with all other training documentation can be obtained from the ORC.

Training Evaluation

At the completion of training, it is the policy of the City of Newton to evaluate the training conducted. This evaluation will not always take place formally. In most incidents, the training will include a feed back loop to evaluate the training process. In some cases, individuals will be placed in the training sessions for the sole purpose of evaluation. Any recommendations involving training that surface during these evaluations will be assessed by the ORC, or his/her superior. Decisions such as the elimination of a training contractor, or the alteration in training techniques may result from these evaluations.

Amendments

This Training Program portion of the PSM is also subject to continuous amendment. As training requirements and procedures are reevaluated and altered, this document should act as a coordinating point to allow for the summary of the training performed at the facility.

CITY OF NEWTON

Process Safety Management

PSM

Contractor Safety Policy

29 CFR 1910.119 (h)

May, 2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

CONTRACTORS

PURPOSE:

The purpose of this policy is to establish a program for selecting and qualifying Contractors and to provide a training/orientation program for working on City of Newton activities and projects. (NOTE: For the purpose of this document the term "Contractors" refers to individuals hired through a third party, company, or agency temporarily employed by the City of Newton for their expertise in a particular skill, trade, or craft.)

POLICY:

The City of Newton only contracts with firms that have documented safety programs in place that meet federal, state, and local regulations. Selected contractors must demonstrate compliance with said regulations.

PROCEDURE:

1. The City of Newton shall establish a list of qualified vendors and suppliers stipulating that their safety program must be in place and that qualified contractors must meet all federal and state safety regulations.

2. The City of Newton when soliciting bids, shall request each contractors' safety history and safety program. This information will be used as part of the contractor selection process. Poor performers with little or no program are not to be considered and shall be dropped from the qualified vendor/supplier list. Reinstatement of contractors to the list occurs only when the contractor can demonstrate that their programs are meeting safety requirements of the City.

3. The City of Newton reviews with the contractor the City Emergency Response Plan and applicable sections pertaining to emergency evacuation and safety rules of the City of Newton facility prior to the startup of the contract.

4. The City of Newton shall require written documentation that contractors have trained their employees in the necessary work practices to safely perform their jobs.

5. The City of Newton shall meet with contractors prior to the beginning of any contract work. The City shall inform the contractors if they are to be performing work on or near a process with any known potential fire, explosion, or toxic release hazards. The City shall provide specific safety information to the contractor relevant to the work to be performed.

Review Date: 4/28/2017

CONTRACTORS

6. The City of Newton shall require contract employees to complete "Contractor Safety Awareness Contract" (Attachment I). The completed forms are to be kept on file in the main office as long as the contractor remains on the qualified vendor/supplier list.

AUDIT:

This policy is to be reviewed on an annual basis by appropriate plant personnel.

CITY OF NEWTON
WASTE WATER TREATMENT PLANT

ATTACHMENT I

CONTRACTOR SAFETY AWARENESS CONTRACT

I, _____ employed by _____

and as such am qualified to work as a----------

The City of Newton has informed me that I am working at a facility with hazardous chemicals and has reviewed with me the list of chemicals used at this facility and their associated hazards. I have been shown the location of SDS information for chemicals in this facility and understand that it is my right to ask for information concerning those chemicals as it pertains to my work.

I have been informed of all fire, explosive, and toxic, release hazards that exist at this facility.

I understand the personal protective equipment (PPE) safety requirements may include the use of steel toe shoes, work clothes (including shirt with sleeves), hardhat, and safety glasses with side shields.

I am aware of all safety policies and procedures of the City of Newton including, but not limited to hot work permits, confined space entry permits, and area entry permits that pertain to the work I am to perform.

I understand that the City of Newton is required to account for me during an emergency and that I have been shown the proper evacuation route(s) should an emergency occur.

I have seen a copy of the City of Newton Emergency Response Plan and it is available for my review at any time.

If I have an accident or am injured or see anything that could potentially cause an incident, I will report it immediately to the Operator of Responsible Charge (ORC).

If I do not abide by this contract, I understand I will be required to leave the premises.

NAME: _____
(Print & Sign)

DATE: _____

CITY OF NEWTON

Process Safety Management

PSM

PRE-STARTUP SAFETY REVIEW

1910.119 (i)

Introduction.

As required by 29 CFR 1910.119 (i), a pre-startup safety review will be performed if the process is modified significantly enough to require a change in the PSI section of the PSM program. All new processes covered by the PSM standard are also subject to the standard. Many of the portions of this section of the requirements are already covered by the Management of Change section of the PSM program. Care will be taken to ensure that the provisions of each of these sections are followed.

Construction Review.

Prior to the startup of a process as described in the Introduction, a review of design specifications must be completed. With the knowledge of the design parameters, an inspection of the process equipment and its installation will be conducted. A determination will be made as to the conformance of the as built equipment with the design specifications. In all cases of derivation each item in question will be reviewed as to its projected health and safety consequences. A report of these findings will be made. Additionally, any alterations resulting from this review will be documented.

Procedures.

Prior to the startup of a process as described in the Introduction, all procedures pertaining to the process will be developed, reviewed, and determined adequate. Operational procedures include all facets of conducting the tasks described. Maintenance procedures required for assurance of continued mechanical integrity of the process equipment will also be developed and included in the Mechanical Integrity section of the this PSM review. Additionally necessary emergency procedures will be generated. Guidance on the creation of these procedures is found in the Emergency Response section of this PSM program.

New Operations.

Any new operation, which independently must comply with the PSM regulation, will not begin operation until the PSM program is in place. In these cases, the PHA will be performed and all recommendations resolved prior to the pre-startup portion of the program is being conducted.

Training.

Prior to the startup of a process as described in the Introduction, all training necessary for safe operation will be conducted. This training must conform with the Training section of this PSM program.

Amendments.

The procedures found in this section are also subject to amendment. Periodic checks of the workings of this section will be necessary to keep the PSM program up to date and effective. At the time of any pre-startup review, an intense analysis of these provisions of the program should be conducted jointly.

CITY OF NEWTON.

Process Safety Management

PSM

Mechanical Integrity and Preventive Maintenance

1910.119(j)

Introduction.

As required by 29 CFR 1910.119(j), facilities subject to the Process Safety Management (PSM) standard must establish a program to ensure the ongoing mechanical integrity of the process equipment. This program includes the development of written procedures designed to insure that maintenance is not concentrated on "breakdown" scenarios. For this, it is essential that preventive maintenance (PM) be utilized. As is the case with the Process Hazard Analysis (PHA) , the Mechanical Integrity program reflects the complexity of the process. Another characteristic that this section shares with PHA and the Process Safety Information (PSI) section is the fact that the reduction of hazards associated with the malfunction of equipment is mostly accomplished via maintenance.

The development of this plan has been accomplished by firstly reviewing all of the PSI information. Maintenance procedures and schedules located in equipment specifications illustrate the maintenance frequencies that the Operator in Responsible Charge (ORC) has determined is appropriate.

For PSM purposes, this Mechanical Integrity program covers only the covered process equipment. However, all areas of the facility are subject to maintenance procedures. For this reason, this section of the PSM program has been written to allow for constant additions and refinements. Also, procedures and schedules may be found here for items other than those in the covered process. This in no way implies that these components are portions of the covered process.

Applicability.

This PSM section is applicable to the following:

- Storage tanks, including process vessels.
- Piping systems and components.
- Relief Venting systems and devices.
- Emergency shutdown systems.
- Process controls.
- Pumping equipment.
- Environmental control equipment.

For the most part, and for the purposes of safe working conditions; the applicability of this portion of the PSM standard covers all equipment involved in the water purification process.

Written Maintenance Procedures and Schedules.

At the City of Newton, there are several maintenance activities that are performed on a revolving basis. As implied by the name, this preventive maintenance schedule not only provides for a safe work place, but accounts for the preservation of equipment. To ensure

that these activities are performed during their prescribed cycles, maintenance procedures and schedules have been developed and are included. Formal and informal inspections allow for detection of deterioration of process components. When wear indicators show that failure is possible, these components are replaced. Finally, as in all operations, equipment is replaced at the time of malfunction. In some cases, equipment failure may occur without any prior indication. Safety practices in place at the City of Newton account for these events. Also, as previously mentioned, there are no unaccounted for failure modes that would reasonably be expected to create an uncontrolled release, or cause injury.

The initial procedures for mechanical inspection and gauging the probable effective life of equipment were deemed inadequate by a NC DOL inspector. These procedures were expanded and refined. The result is attached to this document as an appendix.

Training.

Each individual involved in the maintaining the on-going integrity of the process equipment is/will be trained in the workings of the process, and the hazards associated with the process. Additionally, the procedures as outlined in the previous section are also part of the training maintenance personnel receive. The City of Newton (Newton) maintenance personnel are experienced in equipment maintenance. This experience stems from supervised hands-on activities at Newton, and work on similar or related equipment for previous employers. As maintenance at the facility is handled by a small number of persons, an extensive training effort allowing for many people to be trained is not necessary. All specific training involving the maintenance of process equipment will be documented and be made available for the PSM program.

Inspections and Testing.

Inspections of the operations at Newton are conducted on a scheduled basis. As the facility operates mostly on the manual power of plant employees, there are many opportunities for inspections. Copies of inspection paperwork are provided for reference.

Informal Inspections.

Initial inspections that take place are informal inspections performed by each production worker. These inspections are performed on a daily basis. As an example, a worn bearing may be detected by its change in sound. Another example is the inspection of the outside tank storage performed at the beginning and at the end of each day. During this procedure, the tanks are inspected for any equipment deficiencies or leakage. If any leaks or problems are noted, then a report will be given to the ORC.

Other informal inspections are made on a daily basis. Personnel move in and around the process areas throughout the day. Their walk through can provide for the detection of items that may be otherwise missed by operations personnel. Additionally, other facility,

corporate, and contract personnel often observe production operations. These inspections can be particularly helpful because they involve persons who are familiar with the facility and the process, but do not work in the production area on a daily basis.

In each case of informal inspection, if any problem is identified, it is noted and the information passed along to the appropriate personnel. When or if a major problem is noticed, a written record of the finding will be made. The problem will then be reported to the ORC.

Daily informal inspections are made by the ORC. The main focus of this inspection is ensure safe work practices, as well as conduct a visual assessment of several process areas. These assessments are mainly designed to check for leaks and secondary containment readiness. A monthly inspection of the facility and process equipment is also conducted by the ORC. This inspection follows guidelines provided by the insurance/loss control consultant. The inspection format is customized to the facility and involves all process areas. A record of these inspections is kept on file with the ORC.

There are also inspections conducted by outside agencies. This inspection ensures that proper operation and maintenance of the system is always current. A record of these inspections is kept on file with the ORC. An annual inspection conducted by the county fire marshal also provides for the fire safety of the employees. Fire extinguishers, exit lights, fire hoses and other emergency response equipment are checked during each inspection. Records of inspections can be found on file with the ORC.

One last inspection of the facility is conducted by a loss control consultant or insurance company professional. This annual inspection is conducted by a person who is familiar with the facility, and is also familiar with similar facilities. The focus of this inspection typically is not the process equipment, however, some important checks and balances are provided by this inspection. Records of these inspections are kept on file by the ORC.

Equipment Tests.

All equipment tests such as recurring continuity tests are documented. Test guidelines are contained in the Operating Procedures for the specific process. Records of these tests are kept on file with the ORC.

Equipment Deficiencies.

All equipment deficiencies which are found to be outside acceptable limits will be corrected. These repairs/replacements will be performed in a timely and safe manner. These activities will also be documented.

Amendments.

As mentioned in a previous section, this working PSM program is subject to amendment. Information collected during the implementation of this section of the program should be

documented, and used as the basis of an amendment; pertaining especially to the specific section of PSM.

CITY OF NEWTON

Process Safety Management

PSM

Hot Work Permit

29 CFR 1910.119 (k)

May, 2017

Hot Work Permit

Regulatory Requirement:
In accordance with OSHA's PSM requirements (20 CFR 1019.119(k)) hot work permits must be issued for any hot work (i.e. welding, cutting, etc.) performed on, in or near any processes subject to PSM coverage. This hot work permit must be completed prior to performing any hot work and kept on file until the hot work is complete and cooled.

Certification:
The Hot Work Permit certifies that the City of Newton has implemented fire prevention and protection requirements of OHSA (20 CFR 1910.252(a), (b) and (c)) before performing hot work at this facility.

Authorized Date(s) for Performance of Hot Work:

Identification of Process Area(s) Where Hot Work is to be Performed:

Identification of Equipment on Which Hot Work is to be Performed:

Before Performing any Hot Work, the Following Authorization Certifications Must be Signed:

Signature of Supervisor(s) Authorizing Hot Work Time/Date

Signature of Person(s) Performing Hot Work Time/Date

Upon Completion of Hot Work, the Following Work Completion Certifications Must be signed:

Signature of Supervisor(s) Authorizing Hot Work Time/Date

Signature of Person(s) Performing Hot Work Time/Date

HOT WORK SAFETY

Bulk Plant tank cleaning/purging procedure

1. Ascertain that all tanks are empty; if all tanks are not empty, see ORC before proceeding with tank cleaning/ purging procedure.
2. Obtain list of products last made in each tank and determine if tank last held a solvent based product.
3. Check all tanks for the presence of flammable solvents or solvent vapors:
   a. Lift the covers and use LEL meter to determine the presence of solvent vapors in the tank.
   b. Extend the LEL meter's air sampling tube into the bottom drain and determine the presence of solvent vapors at the bottom of the tank.
   c. IF vapors are present, do the following:
      1. Flush the tank with water
      2. Dry out the tank with compressed air
      3. Leave the drain valves in the open position
      4. Use the LEL meter to determine the presence of solvent vapors.
      5. Repeat as necessary until LEL meter indicates no solvent vapor present.

Precautions to take **BEFORE** welding/cutting/grinding

1. Review Hot Work Permit with contractor.
2. Post signs at area entrances: KEEP OUT / HOT WORK IN PROGRESS
3. Seal off area by closing appropriate fire doors.
4. Close all windows on same wall as exhaust fans.
5. Turn an all exhaust fans and open louvers on opposite wall.
6. Allow exhaust fans to run 6 minutes (minimum) before hot work begins.
7. Hang fire retardant curtains where necessary.
8. Move all closed containers of flammables 35 feet away from the hot work.
9. Wet down hot work area with water before starting hot work.
10. A fire watch must be maintained at each hot work area (i.e. 2 floors; 2 fire watches).
11. Hot work near sprinkler heads requires safeguarding head against accidental discharge.
12. ORC must approve area before hot work is started.

Precautions to take **DURING** welding/cutting/grinding

1. Do not allow any open containers of material to be moved through the hot work area.
2. Keep the hot work floor area WET at all times.
3. Check corners and cracks for trapped hot sparks.
4. A maintenance man must be with the hot work contractor at all times.
5. Ascertain that good hot work practices are employed.

Securing from the welding/cutting/grinding detail

1. Notify the ORC that the hot work is complete and get his OK to secure.
2. Remove all hot work equipment from the hot work area.
3. Check all cracks and corners for sparks.
4. Remove signs, open fire doors.
5. Sweep down floor.
6. Notify ORC that production can begin.

CITY OF NEWTON

Process Safety Management

PSM

MANAGEMENT OF CHANGE

1910.119 (l)

March, 2017

Introduction

As required by 29 CFR 1910.119 (l), facilities subject to the Process Safety Management (PSM) standard are required to establish and implement written procedures to manage changes. As the regulation discusses, changes in process chemicals, technology, equipment, facilities, and/or procedures that will alter the ability of this PSM to cover the process must be accounted for in the continuing update of the PSM program. It should be noted that these considerations will take place prior to the implementation of any noteworthy change. In some cases, changes in equipment or procedures will take place instantaneously spurred on by the necessity to maintain a safe work environment. In such cases, management of change procedures will coincide with the alteration.

Management of Change Procedures

The basis of the Management of Change procedures is to update of the PSM program prior to any processes changes. Each PSM section that is affected by the changes will require an amendment or revision. These revisions will allow the PSM program to compensate for the effects that will be caused by the alteration. In many cases, the safety of a process system can be drastically altered by apparently small changes. For this reason, a procedure has been written to allow for the planned changes, and to provide a basis for the compensation of the program as a result. The procedure is based on the guidance provided in the PSM regulation, the working practices at City of Newton, and safety concerns as demonstrated in the PHA. The procedure has been written to cover the following: The technical basis of the proposed change, the impact of the change on health and safety, modifications required in the operating procedures, the time period necessary to implement the change, and the authorization requirements for the change. As is the case with most commercial operations, these factors are considered by management for every proposed change. The steps added by the procedure account for the demonstration of the proper considerations. Additionally, analysis of the process hazards adds some additional concern to the consideration of changes. The procedures have been written to concisely allow for the use proper channels, without adding unnecessary burden to this simple process. As seen in the attached appendix, the Management of Change Procedure references other procedures at the facility. To aid in the documentation

of the Management of Change process, a form titled, “Management of Change Record” has been developed. A copy of this form is included as an appendix to this section. This form and other Management of Change documentation will be archived as part of the process documentation and can be obtained through the ORC..

As the PSM umbrellas most all safety programs, their updates are also required. The written management of change procedure requires these programs also be updated. In some cases, however, some portions of the updates may be required after the initialization of the change.

Training / Employee-Right-to-Know

As required by this section of the regulation, as well as the hazard communications standards promulgated in 29 CFR 1910.1200, when a change to the process affects the hazards worker are / or potentially are exposed to, training is necessary to inform the workers of these hazards. This training will involve all process workers that may come in contact with the new hazard. It will also cover all maintenance workers whose jobs include maintenance of equipment involved in the process change. Special consideration needs to be given to additional work shifts, and persons who may be asked to fill-in or replace the involved workers. Additionally, procedures that pertain to contract employees, and employed contractors need to also be added.

Process Safety Information

Changes that affect the process will also generate information that needs to be included in the PSI section of the PSM program. New equipment specifications, and codes pertaining to the use of the equipment will be gathered for evaluation during other portions of the PSM update. If the technology of the process is altered, then a complete update of the PSI section may be necessary. This update should not only add relevant information, but also allow for the removal of outdated information. All materials removed will continue to be relevant and will be stored in a dead information file.

Operating Procedures

As is the case with the PSI information, all operating procedures are subject to the management of change procedures. Alterations in the process of any kind will generate an evaluation of the procedures that cover that facet of the process. These procedures will be amended in any way necessary to ensure safe, efficient operation. Additionally, an evaluation will be conducted as to the necessity of additional operations procedures depending on the severity of the change.

Pre-Startup Safety Review

Prior to the implementation of any change that alters the process and is significant enough to require the modification of the PSI portion of the PSM program, a pre-startup review must be performed. The Pre-Start Safety Review section explains in detail the necessary steps in this undertaking.

Amendments

The procedures found in this section are also subject to amendment. Periodic checks of the efficiency of the procedures, as well as evaluations during procedure implementations will be necessary to keep this section of the PSM program up to date and effective. The changes are for the most part an increase or decrease in capacity; however, future changes may include modification of the processes. These changes will need to be monitored carefully in regard to the possible effects on this program. There may also be changes in the structure of management, and management personnel. These changes can result in alterations in the procedures associated with the Management of Change.

PROCEDURE FOR THE

Management of Change

All aspects of this procedure need to be considered prior to the implementation of any change Documentation of these tasks should be conducted with the written report filed in an appendix of this section. All information collected should be applied to revise the PSM program prior to the change. Safety and health considerations of all changes needs to take priority in the decision making process. Process changes that would require changes in the PSM program will follow a trail of authorization. All changes to the process will be coordinated through either the ORC, or the highest city official at the City of Newton WWTP facility. In many cases, the authorization will be by city executives. This procedure starts with the authorization to consider change.

{ **Collect Specifications**

All specifications that are relevant to the PSM program need to be collected for all equipment changes. Consideration needs to be given to PSI information, operations procedures, maintenance schedules and procedures, training information, and pre-startup or first time startup information. Copies of this information should be earmarked for the PSM at the time of equipment purchasing. In many cases, during the initial equipment / system design process, inquiries in the PSM type considerations should be made to the equipment representative. This information may help to guide the selection of equipment.

{ **Collect Chemical Information**

In cases where the change is the introduction of a chemical or a process that involves a new chemical, information such as physical data and exposure hazards should be collected. Comparison of the chemical with others used at Newton WWTP will help direct the need for additional training, procedures, etc. The requirements of PPE and specific handling procedures may cause reflection on the process / chemical being added. Another consideration to be taken at this time is that of regulatory requirements. Many chemicals have specific requirements associated with their use. These requirements can range from TRI reporting, to medical monitoring requirements for employees.

{ **Consider the Safety and Health Impacts**

Safety and health information collected in the previous steps is to be evaluated for the possible and potential impacts on the safety and health of workers. Refer to the PHA section of the PSM program for the types of methodologies that may be helpful in the full realization of the safety concerns. Each environmental and safety program should be considered in the attempt to explore the far-reaching effects of the change.

{ **Modify Operations Procedures**

If a change affects the health of workers, it may need to be reflected in the written operations procedures. Either through research and development, or consideration of like processes, the work activities required for the new chemical / process will be considered. Applied to these practices will be the safety considerations discovered during all previous phases of this Management of Change procedure. A written procedure allowing for safe

work practices will be developed, or an existing procedure altered. Written guidance for this procedure is provided in Appendix F-3 of the procedures section of this PSM.

{ **Consider Time Constraints**

Most changes take some time to accomplish. In these cases, coordination of the information collection and consideration of the hazards involved in the change take several months. However, some changes happen almost instantaneously. Special consideration is to be given to the timing involved in a proposed change. A time line may be a helpful tool in the management of the evolution of the change. This time line may allow the person or team working on the PSM update more flexibility in the creation of appropriate safety additions. Additionally, PHA type investigations can take a considerable amount of time. Management of the project through common techniques assures the completion of the updates prior to the implementation of the change.

{ **Update**

With all of the necessary information at hand, the update process should commence and/or continue. An important component of the documentation of change through the update is the final check on the completeness of the effort. All safety plans will again be considered as to the necessary updates.

CITY OF NEWTON

Process Safety Management

PSM

Incident Investigation

29 CFR 1910.119 (m)

April, 2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

ACCIDENT/INCIDENT INVESTIGATIONS

PURPOSE:

The purpose of the policy is to provide an outline of responsibilities for assuring the prompt reporting, documentation, and investigation of accidents, incidents, spills and releases, and near miss incidents. This effort is focused on determining the basic or root causes of incidents and identifying the temporary fixes and the permanent solutions to prevent occurrences of similar incidents in the future.

POLICY:

All personnel (regular, and temporary employees or contractors) are required to immediately report all accidents, incidents, spills or releases, and near miss incidents to the Operator of Responsible Charge (ORC).

PROCEDURES:

1. When a personal injury, accident or incidents occurs, the person involved or witnessing the event is responsible for immediately notifying the ORC of all facts, if physically able to do so. Notification and preliminary investigations are to be completed and sent to or verbally conveyed to the ORC within 12 hours of the occurrence.

2. Upon notification, the ORC will obtain the necessary assistance needed to bring the situation under control and, if necessary, obtain medical assistance for any persons requiring such assistance.

3. The ORC is responsible for initiating and completing an investigation report. **The investigation report form must be completed within 24 hours** using the following process:

   Report Completion:
   a. Complete all of page 1 and page 2 of the form down to the Investigation section
   b. Check the appropriate box to identify the type of incident.
   c. Fill in the appropriate information for personal injury or property damage incidents.
   d. Check the box(es) to identify how the accident occurred and the type of contact that led to the incident.
   e. Describe the incident fully (additional comments, sketches, photos, or videos may be needed). Remember to ask who, what, where, when, and why.
   f. · Sign the form.
   g. The form is then to be routed to the appropriate senior official.

4. Verbal notification is to be given to appropriate city official as soon as possible.

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

ACCIDENT/INCIDENT INVESTIGATIONS

NOTE: Off-the-job injuries that occur outside of regular working hours must be reported to the ORC no later than the start of the next shift. At present, there is no requirement for completion of an Accident/Incident Report Form for off-the-job injuries, but notification is required.

INVESTIGATIONS:

The size of the investigation team is determined by referring to Appendix 1. Other team members are included as necessary.

Scope of Investigations:

Investigations take place on all following incidents:

Actual Occurrence
* Fatality
* Permanent Disability
* Lost Time Accidents
* OSHA Recordable
* First Aid Injury
* Accidental Losses to
  - Equipment
  - Tools
  - Facilities
  - Company Property
  - Material Loss
  - All Fires
  - All Explosions
  - All Spills

Potential Occurrence
* Fatality
* Permanent Disability
* Lost Time Accidents
* OSHA Recordable
* Accidental Losses over $10,000 to
  - Equipment
  - Tools
  - Facilities
  - Company Property
  - Material Loss
  - Spills over $5,000

Investigation Procedure:

1. Establish an investigation team. The leader of the team is to be the senior management member. At least on hourly employee is to be included on every investigation team.

2. The investigation team is to be completed the Accident/Incident Report Form beginning with the Investigation section located on page 2. Additional information may be attached to the form depending on the severity of the incident and the nature of the information.

3. Identify rules and responsibilities (collection of evidence, taking photographs, etc.) for investigation team members.

4. Appraise the severity of the incident and the potential reoccurrence of the incident.

5. Implement immediate actions to reduce the probability of reoccurrence. This step insures that immediate measures are taken to control secondary incidents.

6. Identify and preserve evidence needed during the investigation. Arrange for photographs to be taken, make sketches of the incident site, noting critical items, and talk with potential witnesses to the incident.

7. Interview each witness, one-on-one, in a quiet place if possible. Record information. Allow the witness to make drawings of the incident site. Do not lead the witness. Obtain the witness's own version of what happened.

8. Collect other relevant information:
   - Training records
   - Maintenance records
   - Job procedures (SOPs)
   - Laboratory analysis of parts, equipment, etc.
   - Records of similar incidents

9. Investigation team analyzes information to identify causes:
   - Immediate Causes -the conditions and/or unsafe conditions contributing to the incident.
   - Basic (Root) Causes -identify why any substandard condition existed or why the employee performed an unsafe act. In all cases analysis leads the investigation team to develop a long-term action to correct problems and not just symptoms.

10. Identify remedial actions, for each cause identified, which results in reducing the potential for the incidents or similar incidents to reoccur. In proposing actions, focus on the basic cause(s) identified. The resulting actions help strengthen safety and health programs. For each action item, identify the primary person responsible (PPR) and deadline for completion and/or implementation.

11. Upon completion of the investigation, the ORC is to review the investigation report and forward it to the appropriate city official(s) for evaluation. A copy is to file at the wastewater treatment plant and the original is to be filed in the safety files.

AUDIT:

This policy is to be reviewed on an annual basis by appropriate plant personnel.

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

APPENDIX I

INCIDENT INVESTIGATION TEAM MEMBERS

Type of Incidents	Investigation Team Members
• Near Miss • Minor 1st Aid Cases • Minor Property Damage (<$1,000) • Minor Spills (<500 pounds) of Non-Hazardous Material	• Operator of Responsible Charge • Operator(s)
• 1st Aid Cases • Property Damage (>$1,000 -$10,000) • Spills (>500 -1,000 pounds) of Non-Hazardous Material • Spills (<Reportable Quantity [RQ]) of Hazardous Material	• Operator of Responsible Charge • Operator(s) • Safety Representative
• OSHA Recordable Accidents • Lost Time Accidents (LTA) • Fatalities • Major Property Damage (>$10,000) • Fires • Explosions • Spill Spills (>1,000 pounds) of Non-Hazardous Material* • Spills ($\geq$ RQ) of Hazardous Material	• Operator of Responsible Charge • Operator(s) • Safety Representative • Assistant Director of Utilities • Senior City Official

City of Newton Wastewater Treatment Plant

ACCIDENT/INCIDENT REPORT FORM

For Injuries, Accidents, Spills and Near Miss Incidents

Department:_____ Location: _____

Date of Accident/Incident: _____ Time of incident: _____

( ) PERSONAL INJURY ( ) First Aid ( ) Recordable ( ) Lost Time ( ) Fatality
( ) PROPERTY DAMAGE ( ) Equipment ( ) Building ( ) Tools ( ) Vehicles
( ) PRODUCT LOSS Spill/Release: ( ) to ground ( ) to open valve ( ) to atmosphere
( ) OTHER INCIDENT ( ) Near Miss Incident ( ) other (specify): _____

PERSONAL INJURY OR PROPERTY DAMAGE (Circle One)

Name of Employee: _____ Job Title: _____

Equipment I.D.:_____ Experience: _____

Employee Address:_____ Phone Number: _____

Age of Employee:_____ Hours worked per day:_____

Date & time supervisor heard of this injury: _____

Was this on employer's premises? Yes; _ No

Body Part: _____ Equipment Part : _____

Was safety equipment provided? Yes; ___ No; Was it being used? Yes; ___ No

If not, why (explain)?_____

CONTACT WITH/BY:

( ) Body Motion	( ) Electrical	( ) Heat/Cold
( ) Chemicals-Acid/Caustic/Toxic	( ) Vehicles	( ) Fire/Smoke
( ) Engineered Structure	( ) Falling/Flying Objects	( ) Hand/Power Tools
( ) Heavy Equipment	( ) Material Handling	( ) Rain/Sleet/Ice/Snow
( ) Stairs/Ladders	( ) Noise	

DESCRIPTION OF ACCIDENT/INCIDENT ( ) Check if comments, sketches, photographs, videos, or other information is attached.

_____

_____

_____

_____

_____

_____

City of Newton Water Treatment Plant

ACCIDENT/INCIDENT REPORT FORM

For Injuries, Accidents, Spills and Near Miss Incidents

Name and Address of Physician_____

Name and Address of Medical Facility_____

Did employee return to work day of injury?_____Yes; ___No; If not, why?_____

Date of this report_/_____/____Employee signature:_____

Supervisor: _____ Division Head: _____

Reported prepared by

INVESTIGATION Date: _/_/_____Team members: ----------

SUB-STANDARD ACTION SUBSTANDARD CONDITIONS BASIC CAUSES

A) _____ _____ _____

B) _____ _____ _____

C)_____ _____ _____

PROBABILITY OF OCCURRENCE:

( ) Frequent (<30 Day) ( ) Occasional (<6 Months) ( ) Seldom (>1 Year)

LOSS SEVERITY POTENTIAL:

( ) Minor (First Aid and/or <$500) ESTIMATED COST $_____

( ) Serious (Recordable Injury and/or >$501 to $5000) ACTUAL COST $_____

( ) Major (Lost Time Injury and/or >$5000) ACTUAL COST _____

ACTION PLAN ( ) Check if added

	WHAT	WHEN	BY WHOM
1)	_____	_____	
2)	_____	_____	_____
3)	_____	_____	
4)	_____	_____	_____
5)	_____	_____	_____

Routing: ORC, safety representative, bulletin board in main office building..

CITY OF NEWTON

Process Safety Management

PSM

Emergency Planning and Response

29 CFR 1910.119(n)

April, 2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT

EMERGENCY PLANNING AND RESPONSE

PURPOSE:

The City of Newton believes that it must be prepared to handle a wide number of emergencies at all times. This preparedness allows the City to quickly respond to incidents, controlling them and minimizing their impact on personnel and facilities in the community.

POLICY:

The City of Newton takes the following steps to achieve this state of preparedness:

- An analysis of potential hazard is performed.
- An Emergency Response Plan (ERP) is prepared addressing these hazards.
- Emergency response education and training is provided to all impacted employees with additional training for employee's having specific duties under the plan.

PROCEDURES:

Analysis of Potential Hazards: An analysis of Potential Hazards has been performed and is incorporated into the City's "Emergency Response Plan."

Emergency Response Plan: The City has a current Emergency Response Plan, which covers the following topics:

1) Emergency escapes routes and procedures
2) Procedures followed by employees who remain to operate critical plant operations before they evacuate.
3) A procedure to account for all employees after emergency evacuation is completed.
4) Rescue and medical duties for assigned employees.
5) Preferred means of reporting fires and other emergencies.
6) Persons who are contacted for further information.

Distribution of this response plan is made to key City employees and key officials in the City. The locations are the main office at the Wastewater Treatment Plant (WWTP) and the City of Newton Fire Department.

Emergency Response Training: The primary method of training is by periodic safety meetings and training classes. In addition specific training is given to select employees for the control and cleanup of hazardous material spills and releases.

AUDIT:

This policy is to be reviewed between April 1 and July 1 on an annual basis by the Operator of Responsible Charge (ORC), the operators, and applicable maintenance personnel of the WWTP.

Review Date: 4/28/2017

CITY OF NEWTON
WASTEWATER TREATMENT PLANT (WWTP)
EMERGENCY RESPONSE PLAN
CONTACT PERSON: MR. ERIC JONES

PURPOSE

This Emergency Response Plan (ERP) is in place to ensure employee safety from fire and other emergencies. It provides a written document detailing the actions and procedures to be followed in case of emergency.

At the time of an emergency, employees should know what type of evacuation is necessary and what their role is in carrying out the plan. In some cases where the emergency is very grave, total and immediate evacuation of all employees is necessary. In other emergencies, a partial evacuation of nonessential employees with a delayed evacuation of others may be appropriate. Employees must be sure that they know what is expected of them in all such emergency situations. This plan contains the information each employee needs to know.

EMERGENCY ESCAPE PROCEDURES AND ASSIGNMENTS

1. Employees are to proceed to the nearest available, safe exit and leave the building as quickly as possible in the event of fire or other emergency requiring evacuation. To safely achieve a safe exit use either the door leading out of the Chemical Feed Room or the front main door of the facility. These doors are the only quick means of ingress or egress to the control building.

2. All employees are trained in safe evacuation procedures. Refresher training is conducted when an employee's responsibilities or designated actions under the plan change or when the plan itself is changed. In addition, the supervisor reviews with employees, upon assignment, the parts of the plan that the employee must know to protect him or her in the event of an emergency.

3. The training includes knowledge of the areas of ingress and egress at the plant.

4. No employee is permitted to re-enter the building after an evacuation until advised that such re-entry is safe.

5. Personnel operating moving equipment are to park the equipment out of emergency traffic paths and to turn the equipment off before evacuation.

6. The Administration Building has been designated as the assembly area for all WWTP personnel, should a building evacuation become necessary.

7. The ORC will be responsible for “nose counting” to account for all personnel.

CRITICAL PLANT OPERATIONS

Operations should be shut down in an orderly manner. However, in no case should an employee expose himself or herself to danger. If the emergency is imminent all employees are to evacuate the building immediately.

CITY OF NEWTON

Process Safety Management

PSM

Compliance Audits

29 CFR 1910.119 (o)

March, 2017

City of Newton Wastewater Treatment Plant
Process Safety Management (PSM)
Requirements & Compliance Document

Application: Facilities that process (use, store, handle, etc.) highly hazardous chemicals (HHS) in threshold quantities (TQ's).

Chemicals Affected: List shown as Appendix A to 1910.119. For the City of Newton Waste Water Treatment Plant (WWTP) the chemicals include:

- ✓ Chlorine (TQ = 1500 pounds)
- ✓ Sulfur Dioxide (TQ = 1000 pounds)

Flammable liquids are not covered as long as they are stored and handled below their normal boiling points at atmospheric pressure.

NOTE: A process can be any group of containers that are inter-connected such that a HHS could be release in TQ quantities.

List of Required Elements:

1. Employee Participation
2. Process Safety Information
3. Process Hazard Analysis (PHA)
4. Written Operating Procedures
5. Employee Training & Documentation
6. Contractor Involvement
7. Pre-Startup Safety Review
8. Mechanical Integrity/Preventative Maintenance
9. Hot Work Permits
10. Management of Change (MOC)
11. Incident Investigation
12. Emergency Planning & Response
13. Compliance Audits

Compliance Steps: The purpose of this OSHA rule is to develop and Implement a system to prevent or minimize release of HHS materials. In order to accomplish this, a series of logical steps and requirements are followed, documented, and repeated at specified intervals. A PSM compliance record is included for use and application of its sections will be marked with the bullet (>) for each point listed below:

City of Newton Wastewater Treatment Plant
Process Safety Management (PSM)
Requirements & Compliance Document

Requirements:

Compliance:

1. Employee Participation is required by:
   - ./ Developing a plan of action for employee participation in PSM;
   - ./ Consulting employees during the PHA; and
   - ./ Providing access to all PSM and other required information.

   -);;> This guidance document will serve as the plan of action for the City of Mount Holly WWTP.
   - ./ All PSM data will be available to employees; and
   - ./ all SDS are available per OSHA & other informational documents.

2. Process Safety Information is compilation of all written process safety information and hazards of products involved, technology, & equipment associated with the process.
   - ./ Material handling description;
   - ./ Safe operating data for material handling;
   - ./ Safety & health precautions;
   - ./ Equipment compilation & Description; &
   - ./ Container standards.

   -);;> Raw material & product SDS information;
   -);;> Process: Chlorine Addition to Water document.
   -);;> Chlorine Institute document on Chlorine: Effects on Health and The Environment;
   -);;> Process: Sulfur Dioxide properties document.
   -);;> Document on Sulfur Dioxide Health and Environmental Effects

3. Process Hazard Analysis (PHA) is a formal action to set up a team with expertise in the process and to perform an evaluation of hazards on "What If ' methodology to include:
   - ./ Potential for catastrophic Consequences;
   - ./ Engineering & administrative controls;
   - ./ Detection & alarms;
   - ./ Failure of controls with effects on personnel safety & health;
   - ./ A system to promptly address team findings & recommendations with documentation of actions, schedules, who may be affected, communications & completions, & primary person responsible for completing action items; &
   - ./ An update/re-evaluation by a team every five (5) years with all documentation retained for life of process.

   -);; PHA "What If ' document & action form;
   -);; WWTP Risk Management Plan;
   -);;> Detector & Alarm manuals;
   -);;> P & ID's for Chlorine & Sulfur Dioxide processes.

City of Newton Wastewater Treatment Plant
Process Safety Management (PSM)
Requirements & Compliance Document

Requirements:	Compliance:
4. Written Operating Procedures must include: ./ Clear instructions for safe operation of process; ./ Steps for each phase of process: a Start-up; and a Normal and temporary operation; a Shutdown; and a Emergency shutdown and operation, if different from normal operation and shutdown step(s); ./ Operating limits, with results of deviation and how to avoid deviation; ./ Safety d health precautions & controls; ./ Safety systems & controls; & ./ Safe work practices.	> Book containing the Written Programs for The City of Newton, NC including: ./ Lockout Tagout Program ./ Emergency Action Plan
5. Employee Training & Documentation for each employee involved in a HHS process is required for: ./ An overview of the process & operating procedures specified above (Current WWTP personnel involved with process work on or before 5/26/1992 may be certified as trained in the requirements of the process.) ./ Refresher training at 3 years minimum; & ./ Assurance that employees receive & understand training requirements.	> Hazard Communication Training > Emergency Response Plan Training > Personal Protective Equipment Training > Lockout/Tag out Training > Associated training documentation
6. Contractor Involvement requires that contractors working in or near a HHS process be selected and evaluated for safety and be informed of hazards, emergency response plans, and safe work practices for all contractor personnel involved in the process. ./ Results of contractor work will be tracked by evaluation of performance. ./ Contractor injury/illness log.	> Contractor Work Agreement(s) > Emergency Response Plan > Contractor OSHA 300 Logs > Contractor Evaluation Forms

Requirements:	**Compliance:**
7. Pre-Startup Safety Review is to be performed on new or significantly modified processes to include: ./ Check for specifications for construction & equipment; ./ Presence & adequacy of: a Safety requirements; CJ Operating procedures; CJ Maintenance procedures; & a Emergency procedures. ./ New Facilities to have completed PHA prior to startup; ./ Existing or modified facilities are to meet the requirements of item 10 (MOC). ./ Training for operations personnel to be complete.	> New facility startup checklist, with required items listed above available during review.
8. Mechanical Integrity inspection procedures are required for pressure related components of a HHS process, such as compressed gas systems utilizing pressure vessels, piping, relief/vent systems, emergency shut-offs, controls, alarms, and pumps. Inspections and procedures must include: ./ Written mechanical integrity/ preventative maintenance (PM) procedures; ./ Training for maintenance personnel; ./ Certification documentation (certificates); ./ Correction of deficiencies & quality assurance by: CJ Checks; CJ Maintenance materials; & CJ Spare parts availability.	> Preventative Maintenance is performed by Piedmont Chlorinators on a contract basis.

Requirements:	Compliance:
9. Hot Work Permits are to be issued to control all hot work (welding, brazing, cutting, etc.) on or near a HHS process, and must include: ./ Documentation requiring fire protection/prevention steps to be in place or completed prior to the performance of any hot work; ./ A permit with dates, area/ objects subject to the work and authorization to perform the hot work. ./ The authorized permit must be located at the site of the hot work. ./ Employees in the area must be informed the hot work permit authorization. ./ The permit must remain on file at the facility of a minimum of 1 year from the completion date of the permit.	> Hot Work Permit
10. Management of Change (MOC) is a required written procedure to manage any change in an HHS process, except for equipment or part replacements of the same kind. This procedure must cover changes in chemicals, technology, equipment, facilities, and operating practices and must include: ./ The technical bases of the change & the impact on safety & health, ./ Modifications to operating procedures & time period changes; ./ Authorization, communication to & training for affected employees, including contractor personnel; & ./ Necessary updates to safety & operating instructions (SOPs).	> Management of Change (MOC) Form; > Hazard Communication Program; & > Contractor Work Agreement.

City of Newton Wastewater Treatment Plant
Process Safety Management (PSM)
Requirements & Compliance Document

Requirements:	Compliance:
11. Incident Investigation is required for each incident resulting in a catastrophic release or any incident that could have resulted in a catastrophic release of HHS chemicals in the workplace and must include: ./ Investigation within 48 hours by an appropriate team including a person knowledgeable in the process & contractor personnel if such are involved in the incident. ./ A report to detail dates, findings, description of incident, contributing factors, & recommendations. ./ A system to address & track recommendations & action items. ./ A review of the report with all affected personnel & retention of the report for a minimum of 5 years.	> Accident/Incident Report Form > Associated regulatory forms
12. Emergency Planning & Response is an action plan for responding to all facility emergencies & releases of HHS substances.	> Book containing the Written Programs for The City of Newton, NC containing the Emergency Action Plan & any site-specific procedures.
13. Compliance Audits are required to evaluate compliance with the provisions of this rule per the above steps and must include: . ./ Being performed at least every 3 years; ./ Being conducted by a person have knowledge about the process; ./ Document findings & responses/ corrective actions; & ./ Document & record retention of last 2 audits.	> Compliance Safety Audits Document Checklist > Compliance Safety Audits - Written Report Outline > Process Safety Management Audit Record form