McKinleyville Community Services District

California Accidental Release Prevention Program

(CalARP)

PUBLIC COPY

Reviewed October 2021

McKinleyville Community Services District

1656 Sutter Rd

McKinleyville, CA 95519

Prepared by MCSD Staff

Table of Contents

1. GENERAL FACILITY INFORMATION

The McKinleyville Community Services District (MCSD, the District) maintains and operates a Wastewater Management Facility (WWMF) that serves the community of McKinleyville in Humboldt County, California. The WWMF is located on approximately 60 acres and includes head works, 2 aeration basins, 3 polishing ponds, 2 wetland ponds, secondary clarifiers, chlorine contact chamber, control building with laboratory, blower electrical maintenance building, chlorine storage room, sulfur dioxide storage room, and dosage room. (Appendix A- Site Maps)

The MCSD collection system includes 92 miles of collection mains, five lift stations, wastewater treatment facility, and effluent disposal and land reclamation systems. The average dry weather design flow of the treatment facility is 1.37 million gallons per day (MGD) and the wet weather peak capacity is 3.08 MGD (*MCSD Wastewater NPDES Permit*).

Site address:

MCSD Wastewater Management Facility
675 Hiller Road
McKinleyville, CA 95519

Emergency Coordinator:

James Henry, Operations Director
1656 Sutter Road
McKinleyville, CA 95519
Ph: 707-839-3251

In conjunction with these facilities, the District stores liquid chlorine and sulfur dioxide at the WWMF to facilitate the disinfection of pathogenic organisms.Liquid chlorine and sulfur dioxide is stored in one-ton containers in separate rooms with transmission lines extending from each room to the dosage room for application during the disinfection process (Appendix A- Site Maps). The District, at maximum, stores 6000lbs of liquid chlorine and 4000lbs of sulfur dioxide.

2. PURPOSE & SCOPE

The purpose of the McKinleyville Community Services District (MCSD) CalARP Program is to prevent the catastrophic accidental releases of regulated substances. The California Division of Occupational Safety (Cal/OSHA) requires that the owners/operators of wastewater management facilities upon which any listed acutely hazardous material is stored/used in excess of specified quantities must develop a California Accidental Release Prevention Program (CalARP). The goal of the regulation is to reduce the risk of occupationally related injury or illness related to the accidental release of an acutely hazardous material.

The MCSD Hiller Road WWMF utilizes both Chlorine and Sulfur Dioxide gases in excess of the specified quantities and, thus, a CalARP Program is required. Stationary sources with more than a threshold quantity of a regulated substance shall be evaluated to determine the potential for and impacts of accidental releases from that covered process.
The District utilizes chlorine and sulfur dioxide to provide disinfection of treated wastewater at the Hiller Road WWMF. Both chlorine and sulfur dioxide are listed by the state and federal agencies as a regulated substance. The federal Accidental Release Prevention Program requires stationary sources with more than the threshold quantity of a regulated substance to be evaluated to determine the potential for and impacts of accidental releases from the covered process.

Under conditions specified by the state and federal agencies, the owner or operator of a stationary source which stores more than the threshold quantity is required to develop and submit a Risk Management Plan (RMP). In addition the District will be subject to the provisions of the California Accidental Release Prevention (CalARP) program. The CalARP program includes the federal Accidental Release Prevention Program with certain additions specific to the state pursuant to the state Health and Safety Code.

3. REGULATED SUBSTANCES AND THRESHOLDS

List of regulated substances and thresholds:

Chlorine: The District utilizes chlorine during the disinfection of treated wastewater at the Hiller Road Waste Water Management Facility. The District stores no more than 6000lbs of chlorine onsite at any given time. The federal threshold for chlorine is 2500lbs.

Sulfur Dioxide: The District utilizes sulfur dioxide during the disinfection of treated wastewater at the Hiller Road Waste Water Management Facility. The District stores no more than 4000lbs of chlorine onsite at any given time. The federal threshold for sulfur dioxide is 2500lbs.

4. DEFINITIONS

For the purposes of this chapter only:

- "AA" means Administering Agency, the local agency responsible to implement the CalARP Program. In most instances, the Certified Unified Program Agency (CUPA) has this responsibility. When there is no CUPA, the implementing agency is the agency designated by the Secretary for Environmental Protection pursuant to Section 25404.3(f) of HSC or the agency designated by Cal OES pursuant to 25533(f) of HSC.
- “Accidental release” means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.

- “Administrative controls” means written procedural mechanisms used for hazard control.
- “Administrator” means the administrator of the USEPA.
- “AIChE/CCPS” means the American Institute of Chemical Engineers/Center for Chemical Process Safety.
- “API” means the American Petroleum Institute.
- “Article” means a manufactured item, as defined under Section 5189 of Title 8 of the California Code of Regulations (CCR), that is formed to a specific shape or design during manufacture, that has end use functions dependent in whole or in part upon the shape or design during end use, and that does not release or otherwise result in exposure to a regulated substance under normal conditions of processing and use.
- “ASME” means the American Society of Mechanical Engineers.
- “Cal OES” means the California Governor’s Office of Emergency Services.
- “Cal OSHA” means the California Occupational Safety and Health Administration.
- “CAS” means the Chemical Abstracts Service.
- “CFR” means the Code of Federal Regulations.
- “Catastrophic release” means a major uncontrolled emission, fire, or explosion, involving one or more regulated substances that presents an imminent and substantial endangerment to public health and the environment. CalARP Program Regulations January 1, 2015 Page 3
- “Classified information,” as defined in the Classified Information Procedures Act, Appendix 3 of Section 1(a) of Title 18 of the United States Code, means “any information or material that has been determined by the United States Government pursuant to an executive order, statute, or regulation, to require protection against unauthorized disclosure for reasons of national security.”
- “Condensate” means hydrocarbon liquid separated from natural gas that condenses due to changes in temperature, pressure, or both, and remains liquid at standard conditions.
- “Covered process” means a process that has a regulated substance present in more than a threshold quantity as determined under Section 2770.2 of this chapter.
- “Crude oil” means any naturally occurring, unrefined petroleum liquid.
- “DOT” means the United States Department of Transportation.
- “Environmental receptor” means natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas, that could be exposed at any time to toxic concentrations, radiant heat, or overpressure greater than or equal to the endpoints provided in Section 2750.2(a), as a result of an accidental release and that can be identified on local United States Geological Survey maps.

- “Field gas” means gas extracted from a production well before the gas enters a natural gas processing plant.
- “Hot work” means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.
- “Injury” means any effect on a human that results either from direct exposure to toxic concentrations; radiant heat; or overpressures from accidental releases or from the direct consequences of a vapor cloud explosion (such as flying glass, debris, and other projectiles) from an accidental release and that requires medical treatment or hospitalization.
- “Interested persons” means those residents, workers, students and others who would be potentially affected by an accidental or catastrophic release.
- “Major change” means introduction of a new process, process equipment, or regulated substance, an alteration of process chemistry that results in any change to safe operating limits, or other alteration that introduces a new hazard.
- “Mechanical integrity” means the process of ensuring that process equipment is fabricated from the proper materials of construction and is properly installed, maintained, and replaced to prevent failures and accidental releases. CalARP Program Regulations January 1, 2015 Page 4
- “Medical treatment” means treatment, other than first aid, administered by a physician or registered professional personnel under standing orders from a physician.
- “Mitigation or mitigation system” means specific activities, technologies, or equipment designed or deployed to capture or control substances upon loss of containment to minimize exposure of the public or the environment. Passive mitigation means equipment, devices, or technologies that function without human, mechanical, or other energy input. Active mitigation means equipment, devices, or technologies that need human, mechanical, or other energy input to function.
- “Modified stationary source” means a stationary source which has undergone an addition or change which qualifies as a “major change” as defined in (x) of this section.
- “NAICS” means the North American Industry Classification System.
- “NFPA” means the National Fire Protection Association.
- “Natural gas processing plant” (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both, classified as North American Industrial Classification System (NAICS) code 211112 (previously Standard Industrial Classification (SIC) code 1321).
- “New stationary source” means a stationary source that now has a covered process that is not currently in the CalARP program.

- "Offsite" means areas beyond the property boundary of the stationary source, and areas within the property boundary to which the public has routine and unrestricted access during or outside business hours.
- "OSHA" means the Occupational Safety and Health Administration.
- "Owner or operator" means any person who owns, leases, operates, controls, or supervises a stationary source.
- "Part 68" means Part 68 of Subpart A of Subchapter C of Chapter I of Title 40 of CFR.
- "Petroleum refining process unit" means a process unit used in an establishment primarily engaged in petroleum refining as defined in NAICS code 32411 for petroleum refining (formerly SIC code 2911) and used for the following: (1) producing transportation fuels (such as gasoline, diesel fuels, and jet fuels), heating fuels (such as kerosene, fuel gas distillate, and fuel oils), or lubricants; (2) separating petroleum; or (3) separating, cracking, reacting, or reforming intermediate petroleum streams. Examples of such units include, but are not limited to, petroleum based solvent units, alkylation units, catalytic hydrotreating, catalytic hydrorefining, catalytic hydrocracking, catalytic reforming, catalytic cracking, crude distillation, lube oil processing, hydrogen production, CalARP Program Regulations January 1, 2015 Page 5 isomerization, polymerization, thermal processes, and blending, sweetening, and treating processes. Petroleum refining process units include sulfur plants.
- "Population" means the public.
- "Process" means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process.
- "Produced water" means water extracted from the earth from an oil or natural gas production well, or that is separated from oil or natural gas after extraction.
- "Public" means any person except employees or contractors at the stationary source.
- "Public receptor" means offsite residences, institutions (e.g., schools, hospitals), industrial, commercial, and office buildings, parks, or recreational areas inhabited or occupied by the public at any time without restriction by the stationary source where members of the public could be exposed to toxic concentrations, radiant heat, or overpressure, as a result of an accidental release.
- "Qualified person" means a person who is qualified to attest, at a minimum to: (1) the validity and appropriateness of the process hazard analyses (PHA) performed pursuant to Section 2760.2; (2) the completeness of a risk management plan; and (3) the relationship between the corrective steps taken by the owner or operator following the PHAs and those hazards which were identified in the analyses.

- "Qualified position" means a person occupying a position who is qualified to attest, at a minimum to: (1) the validity and appropriateness of the PHA performed pursuant to Section 2760.2; (2) the completeness of a risk management plan; and (3) the relationship between the corrective steps taken by the owner or operator following the PHAs and those hazards which were identified in the analyses.
- "Regulated substance" means any substance, unless otherwise indicated, listed in Section 2770.5 of this chapter.
- "Replacement in kind" means a replacement that satisfies the design specifications.
- "Retail facility" means a stationary source at which more than one-half of the income is obtained from direct sales to end users or at which more than one-half of the fuel sold, by volume, is sold through a cylinder exchange program.
- "Revalidation" means a critical review of a hazard review or a process hazard analysis (PHA) with qualified team members of the most recent hazard review or PHA studies to verify that past studies remain valid and that changes made to the covered process are CalARP Program Regulations January 1, 2015 Page 6 properly assessed. This critical review is to ensure that hazards are well understood, and existing safeguards are properly identified, past recommendations have been addressed, the overall risk ranking of each scenario is accurate, and relevant incidents and near misses at the stationary source and industry are evaluated. For situations when past studies cannot be readily revalidated, a new complete hazard review or PHA may be warranted.
- "RMP" means the risk management plan as described by the component elements identified in Article 3 of this chapter.
- "Stationary source" means any buildings, structures, equipment, installations, or substance emitting stationary activities which belong to the same industrial group, which are located on one or more contiguous properties, which are under the control of the same person (or persons under common control), and from which an accidental release may occur. The term stationary source does not apply to transportation, including storage incident to transportation, of any regulated substance or any other extremely hazardous substance under the provisions of this chapter. A stationary source includes transportation containers used for storage not incident to transportation and transportation containers connected to equipment at a stationary source for loading or unloading. Transportation includes, but is not limited to, transportation subject to oversight or regulations under Part 192, 193, or 195 of Title 49 of CFR, or a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under Section 60105 of Title 49 of USC. A stationary source does not include naturally occurring hydrocarbon reservoirs. Properties shall not be considered contiguous solely because of a railroad or pipeline right-of-way.

- "Threshold quantity" means the quantity specified for a regulated substance pursuant to Section 2770.5 and determined to be present at a stationary source as specified in Section 2770.2 of this chapter.
- "Trade secret" means trade secrets as defined in Section 6254.7 of Subdivision (d) of the Government Code and Section 1060 of the Evidence Code and includes information submitted to an administering agency which has been designated by the stationary source as trade secret and which shall not be released by the AA except to authorized officers and employees of other governmental agencies, and only in connection with the official duties of that officer or employee pursuant to any law for the protection of health and safety. Trade secret information is to be handled pursuant to Section 25538 of HSC.
- "Turnaround" means a planned process shutdown for the purpose of repair, maintenance, process modification, equipment upgrade or other significant process activity.
- "Typical meteorological conditions" means the temperature, wind speed, cloud cover, and atmospheric stability class, prevailing at the site based on data gathered at or near the site or from a local meteorological station. CalARP Program Regulations January 1, 2015 Page 7
- "Vessel" means any reactor, tank, drum, barrel, cylinder, vat, kettle, boiler, pipe, hose, or other container.
- "Worst-case release" means the release of the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest distance to an endpoint defined in Section 2750.2(a) of this chapter.

5. APPLICABILITY

The District utilizes chlorine and sulfur dioxide to provide disinfection of treated wastewater at the Hiller Road WWMF. Both chlorine and sulfur dioxide are listed by the state and federal agencies as a regulated substance, thus, the District are an operator of a stationary source with a process subject to Program 3.

6. RECORD KEEPING

The District shall maintain records supporting the implementation of the CalARP Program for five years.

Records include:

- Training records: including what training, who attended, when they attended, who instructed the training, when re-training is required.
- Maintenance records: Records concerning any maintenance or work conducted on process equipment, controls, lines, piping, etc..

- Inspection and testing records: All records involving testing and inspection of process equipment, controls, lines, piping, etc..
- Analysis/Engineer Documents: All documents developed by consultants and engineers regarding processes, equipment, procedures, and emergency operations.

Appendix A

Site Maps

Appendix B

MCSD Organizational Chart

HAZARD ASSESSMENT

Revised January 2020

By: MCSD Staff

Last Date of Revision: 2012

By: Risk Management Professionals

McKinleyville Community Services District

1656 Sutter Rd.

McKinleyville, CA 95519

Table of Contents

List of Tables

List of Figures

1. HAZARD ASSESSMENT APPLICABILITY

This technical assessment was conducted to fulfill the Offsite Consequences Analysis requirements of the California Accidental Release Prevention Program (CalARP) for the ***McKinleyville Community Services District*** (MCSD) wastewater management facility in accordance with California Code of Regulations (CCR) Title 19 Sections 2750.1 to 2750.8 under the CalARP requirements.

The offsite consequences analysis for toxic gases is applied to the chlorine and sulfonation (sulfur dioxide) storage and processes located at the MCSD Wastewater Treatment Facility. The analysis includes two release scenarios. One, based on a "worst-case" scenario wherein the largest container ruptures and the entire contents are released, unabated, over a 10-minute period. The other, an "alternate" release scenario, is based on a sustained release by a fusible plug leak at the maximum flow rate of the cylinder. This is a "more likely to occur than worst-case" scenario.

Both, worst-case and alternate scenarios are modeled using RMP*Comp Version 2.01 and EPA's ALOHA (Area Locations of Hazardous Atmosphere) Program in accordance with CalARP requirements. ALOHA is the hazard modeling program for the CAMEO software suite, which is used widely to plan for and respond to chemical emergencies. ALOHA allows you to enter details about a chemical release and then will generate threat zone estimates for various types of hazards

The worst-case and alternate case scenarios are based on the following maximum aggregate quantities and container size for the regulated substances.

Table 1. Covered Process Maximum Quantities and Largest Vessel Amounts

Covered Process	Maximum Inventory	Largest Vessel Amount
Chlorination System	6000lbs	2000lbs
Sulphonation System	4000lbs	2000lbs

2. OFFSITE CONSEQUENCE ANALYSIS PARAMETERS

Table 2 summarizes the parameters used to determine distance to toxic endpoints for the worst-case and alternate case scenarios within the RMP*Comp and ALOHA modeling programs.

RMP*Comp automatically applies meteorological conditions to the model based on the location chosen. The ALOHA model requires user input for meteorological conditions and release rates.

Table 2. Offsite Consequence Analysis Parameters by Scenario

Analysis Parameter	Worst Case Scenario	Alternate Scenario
Endpoints	Toxic endpoints are defined by chemical concentrations. Appendix A to Title 19, Div. 2, Chapter 4.5 Table Chlorine = 0.0087 mg/L (3ppm) Sulfur Dioxide = 0.0078 mg/L (3ppm)	Toxic endpoints are defined by chemical concentrations. Appendix A to Title 19, Div. 2, Chapter 4.5 Table Chlorine = 0.0087 mg/L (3ppm) Sulfur Dioxide = 0.0078 mg/L (3ppm)
Wind Speed / Atmospheric Stability Class	1.5 m/s (3.36 mph) Stability Class: F	3.0 m/s (6.7 mph) Stability Class: D
Ambient Temperature / Humidity	70-degrees F* 50% Humidity (RMP*Comp Assumes 77-degrees F)	70-degrees F* 50% Humidity (RMP*Comp Assumes 77-degrees F)
Height of Release	Ground Level Release (0 ft)	Ground Level Release (0 ft)
Surface Roughness	Urban (obstructed terrain)	Urban (obstructed terrain)
Dense or Naturally Buyout Gasses	Chlorine = Dense Sulfur Dioxide = Dense	Chlorine = Dense Sulfur Dioxide = Dense
Temperature of Released Substance	70-Degrees F*	70-Degrees F*

* 70 degrees F is the highest daily maximum temperature for the site averaged over the past three years.

Local meteorological data was used from the National Weather Service station located at the Arcata Eureka Airport 2 miles away from the facility. For the release scenarios all wind directions were considered, and therefore the maximum downwind distance from the dispersion point was applied to all directions. This method creates the largest possible circle of concern.

3. WORST-CASE RELEASE SCENARIO ANALYSIS

The worst-case release scenario is defined by California Code of Regulations Title 19, Division 2, Article 4 Section 2750.3 (c)(1) as a "release of the entire contents of the single largest vessel over a 10-minute period unless passive mitigation systems are in place" and is modeled using RMP*Comp Version 2.01 and EPA's ALOHA Program.

The worst-case scenario analysis is applied to the chlorine and sulfonation storage and processes located at the MCSD Wastewater Treatment Facility. Both the chlorine and sulfur dioxide cylinders are stored in an enclosed space. Because of this, passive mitigation measures were applied to the worst-case release analysis.

Both chlorine and sulfur dioxide cylinders are stored inside of an isolated cinderblock building. Using EPA Guidance for Offsite Consequence Analysis, this can be described as a "fully enclosed, non-airtight space that is directly adjacent to outside air" and can be credited as a passive mitigation measure.

The toxic endpoint, for toxic gases, is based on Section 2750.2 of the CalARP Program, referencing, Appendix A to Title 19, Division 2, Chapter 4.5 "Table of Toxic Endpoints".

Table 3. Worst-Case Release Scenario Results for Chlorine and Sulfur Dioxide.

Toxic Gas **Quantity of Release** **Rate of Release**	**Release Scenario / Dispersion Model**	**Release or Release Rate**	**Release Duration**	**Est. Distance to Toxic Endpoint**
Chlorine (Cl2) 1 x 2000lbs Cylinder 110lbs/min for 10-min. Worst-Case Toxic Endpoint 0.0087 mg/L or 3ppm	Worst-Case RMP*Comp	2000lbs 110lbs/min	10 min.	**0.9 miles**
	Worst-Case ALOHA	2000lbs 200lbs/min	10 min.	**1747 Yards** **1.0 miles**
Sulfur Dioxide (Anhydrous) 1 x 2000lbs Cylinder 110lbs/min for 10-min. Worst-Case Toxic Endpoint 0.0078 mg/L or 3ppm	Worst-Case RMP*Comp	2000lbs 110lbs/min	10 min.	**0.9 miles**
	Worst-Case ALOHA	2000lbs 200lbs/min	10 min.	**1463 Yards** **0.83 miles**

Figures 1-6 show the RMP*Comp and ALOHA model parameters and maps showing areas of concern and threat zones.

Figure 1. RMP*Comp Worst-Case Scenario Parameters

Chlorine

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.9 miles (1.4 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Chlorine
CAS number:	7782-50-5
Threat type:	Toxic Gas
Scenario type:	Worst-case
Quantity released:	2000 pounds
Release duration:	10 min
Release rate:	110 pounds per minute
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0087 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Sulfur Dioxide

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.9 miles (1.4 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Sulfur dioxide (anhydrous)
CAS number:	7446-09-5
Threat type:	Toxic Gas
Scenario type:	Worst-case
Quantity released:	2000 pounds
Release duration:	10 min
Release rate:	110 pounds per minute
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0078 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Figure 2. RMP*Comp Worst-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. 0.9miles

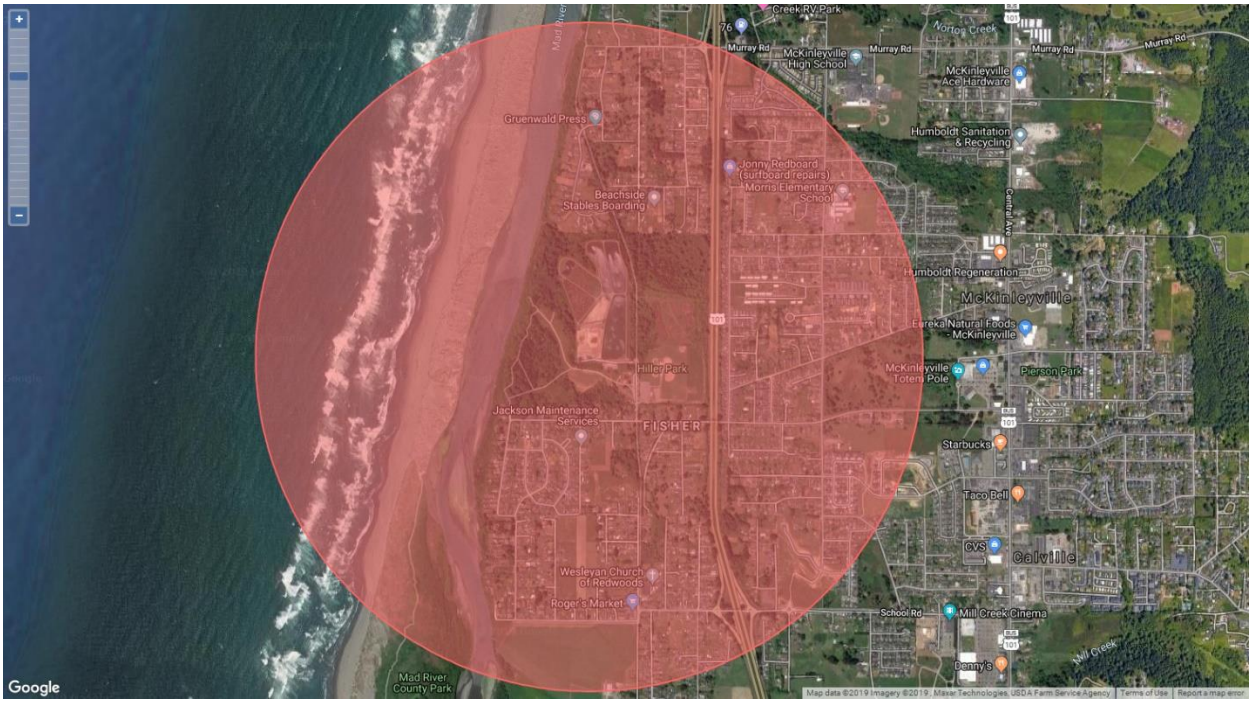
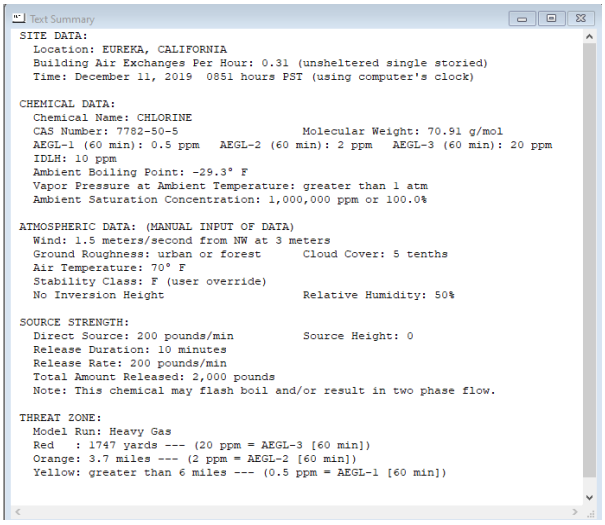


Figure 3. ALOHA Worst-Case Scenario Parameters and Threat Zone Chlorine Release



Text Summary

```
SITE DATA:
  Location: EUREKA, CALIFORNIA
  Building Air Exchanges Per Hour: 0.31 (unsheltered single storied)
  Time: December 11, 2019  0851 hours PST (using computer's clock)

CHEMICAL DATA:
  Chemical Name: CHLORINE
  CAS Number: 7782-50-5                Molecular Weight: 70.91 g/mol
  AEGL-1 (60 min): 0.5 ppm   AEGL-2 (60 min): 2 ppm   AEGL-3 (60 min): 20 ppm
  IDLH: 10 ppm
  Ambient Boiling Point: -29.3° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 1.5 meters/second from NW at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 70° F
  Stability Class: F (user override)
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Direct Source: 200 pounds/min          Source Height: 0
  Release Duration: 10 minutes
  Release Rate: 200 pounds/min
  Total Amount Released: 2,000 pounds
  Note: This chemical may flash boil and/or result in two phase flow.

THREAT ZONE:
  Model Run: Heavy Gas
  Red    : 1747 yards --- (20 ppm = AEGL-3 [60 min])
  Orange: 3.7 miles --- (2 ppm = AEGL-2 [60 min])
  Yellow: greater than 6 miles --- (0.5 ppm = AEGL-1 [60 min])
```

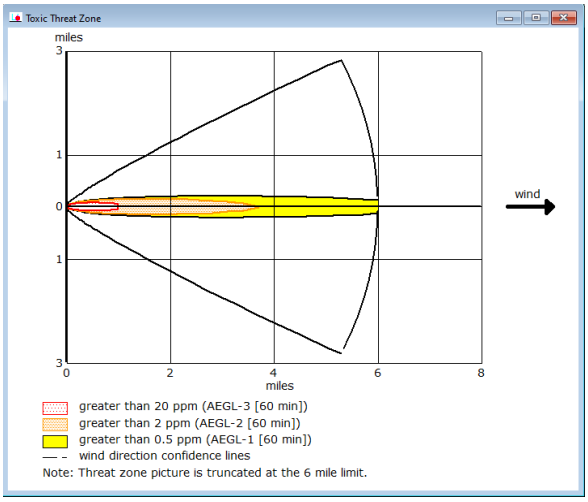


Figure 4. ALOHA Worst-Case Scenario Threat Zones Map and Circle of Concern Chlorine Release 1.0miles.

Figure 5. ALOHA Worst-Case Scenario Parameters and Threat Zones Sulfur Dioxide Release

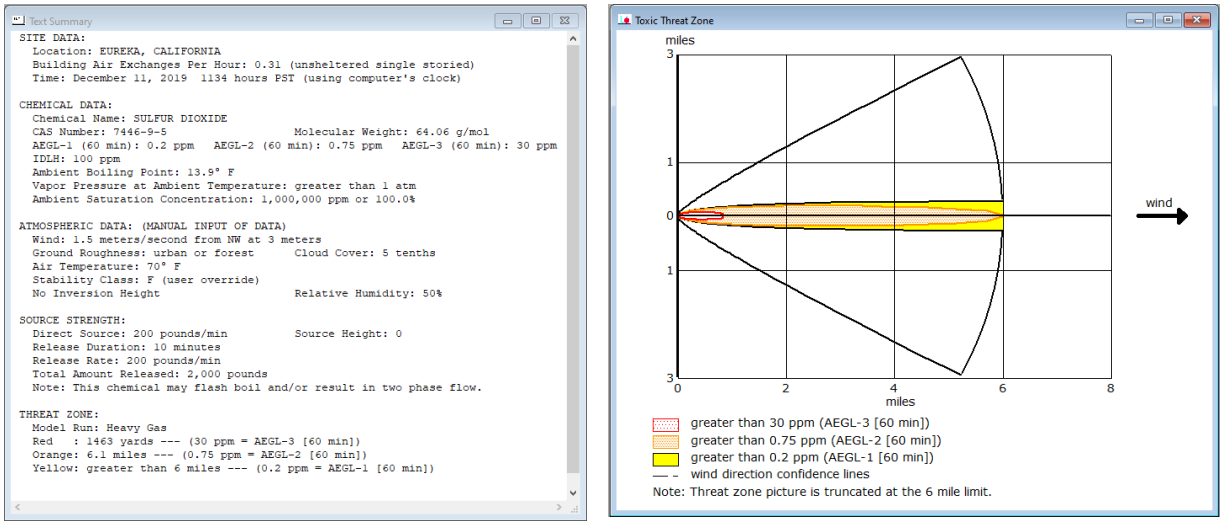


Figure 6. ALOHA Worst-Case Scenario Threat Zones Map and Circle of Concern Sulfur Dioxide 0.83 miles.

4. ALTERNATIVE RELEASE SCENARIO ANALYSIS

The alternative release scenario considers a "more likely to occur than worst-case release scenario" and reaches an offsite endpoint.

Process piping releases from failures at flanges, joints, welds, valves, valve seals, and drains or bleeds was chosen as the alternative release scenario for both the chlorination and sulphonation systems. This replicates a leak at the fusible plug which may occur when a new connection is made or while handling a new cylinder.

A fusible plug leak would not likely have a "hole" more than 1/4-inch in diameter; therefore, a 1/4-inch hole was conservatively chosen. A 60-minute time period was conservatively chosen in order to account for the fact that the system is not always manned at night.

In order to determine the release rate from a fusible plug hole, the following simplified equation was used.

$$QR = HA\ x\ P_t\ x \frac{1}{\sqrt{T_t}} x\ GF$$

Where:	QR	=	Release Rate (Pounds Per Minute)
	HA	=	Hole or Puncture Area (square inches)
	P_t	=	Tank Pressure (pounds per square inch absolute (psia))
	T_t	=	Tank Temperature (K), where K is absolute temperature in Kelvin
	GF	=	Gas Factor, incorporating discharge coefficient, ratio of specific heats, molecular weight, and conversion factor. For chlorine, this factor is 29. For sulfur dioxide, this factor is 27.

Assuming a 0.25" diameter hole at the fusible plug. To be used in the equation above the hole diameter must be converted into the Hole or Puncture Area (HA) using the following equation.

0.25-inch diameter = .125-inch radius HA = $\pi R^2 = (.125 inch)^2 = 0.049 inches^2$

Table 4. Initial Release Parameters for Chlorine and Sulfur Dioxide

Regulated Substance	HA $(inches)^2$	P_t (psia)	T_t (Kelvin)	Gas Factor	QR (lbs/min)
Chlorine	0.049	80	291	29	**6.7**
Sulfur Dioxide	0.049	80	291	27	**6.2**

This release would take place in an enclosed building therefore a passive mitigation factor of 0.55 was applied to the calculated initial release rate [5].

QR = Initial release rate in pounds per minute.

0.55 = Mitigation factor for a release that occurs in a building.

QR_{new} = Mitigated release rate.

Chlorine QR_{new} = 6.7lbs/min x 0.55 = **3.7lbs/min**

Sulfur Dioxide QR_{new} = 6.2lbs/min x 0.55 = **3.4lbs/min**

Table 5. Alternate Case Scenario Results for Chlorine and Sulphur Dioxide

Toxic Gas **Quantity of Release** **Rate of Release**	**Release Scenario / Dispersion Model**	**Release or Release Rate**	**Release Duration**	**Est. Distance to Toxic Endpoint**
Chlorine (Cl2) Alternate-Case 1 x 2000lbs Cylinder 3.7lbs/min for 60-min. Toxic Endpoint 0.0087 mg/L or 3ppm	Alternate-Case RMP*Comp	222lbs 3.7lbs/min	60 min.	**0.1 miles***
	Alternate-Case ALOHA	222lbs 3.7lbs/min	60 min.	**148 yards <0.1miles**
Sulfur Dioxide (Anhydrous) Alternate-Case 1 x 2000lbs Cylinder 3.4lbs/min for 60-min. Toxic Endpoint 0.0078 mg/L or 3ppm	Alternate-Case RMP*Comp	204lbs 3.4lbs/min	60 min.	**0.1 miles***
	Alternate-Case ALOHA	204lbs 3.4lbs/min	60 min.	**120 yards <0.1miles**

*RMP*Comp estimates the distance to endpoint as <0.1miles to be reported as 0.1miles

Figure 7. RMP*Comp Alternate-Case Scenario Parameters

Chlorine

Estimated Distance Calculation

Estimated distance to toxic endpoint: <0.1 miles (<0.16 kilometers); report as 0.1 mile

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Chlorine
CAS number:	7782-50-5
Threat type:	Toxic Gas
Scenario type:	Alternative
Release duration:	60 minutes
Release rate:	3.7 pounds per min
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0087 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	3 meters/second (6.7 miles/hour)
Stability class:	D
Air temperature:	77 degrees F (25 degrees C)

Sulphur Dioxide

Estimated Distance Calculation

Estimated distance to toxic endpoint: <0.1 miles (<0.16 kilometers); report as 0.1 mile

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Sulfur dioxide (anhydrous)
CAS number:	7446-09-5
Threat type:	Toxic Gas
Scenario type:	Alternative
Release duration:	60 minutes
Release rate:	3.4 pounds per min
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0078 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	3 meters/second (6.7 miles/hour)
Stability class:	D
Air temperature:	77 degrees F (25 degrees C)

Figure 8. RMP*Comp Alternate-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. <0.1miles

Figure 9. ALOHA Alternate-Case Scenario Parameters and Threat Zone Chlorine Release

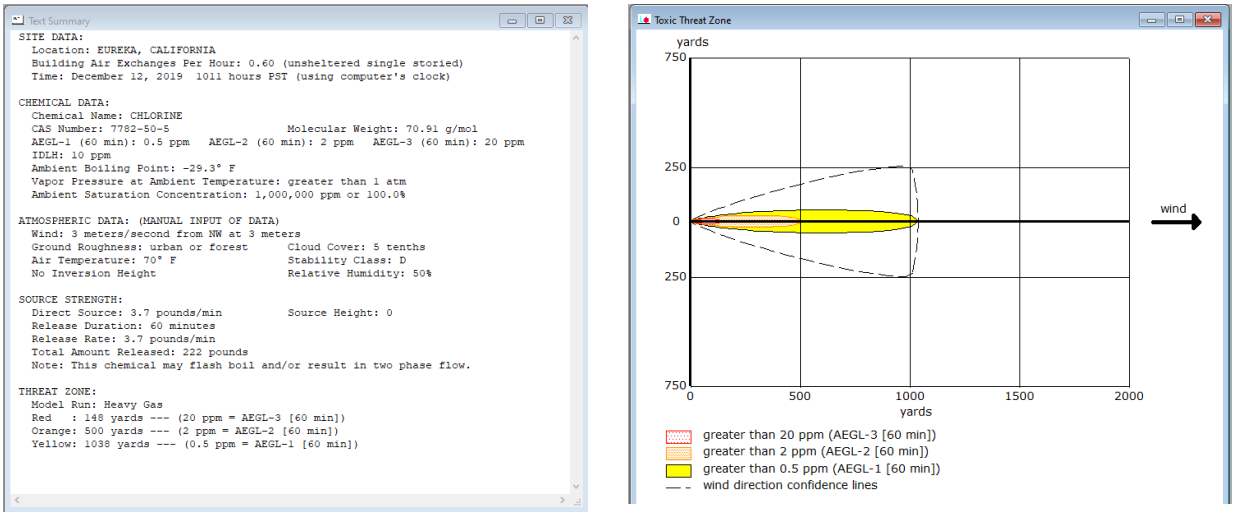
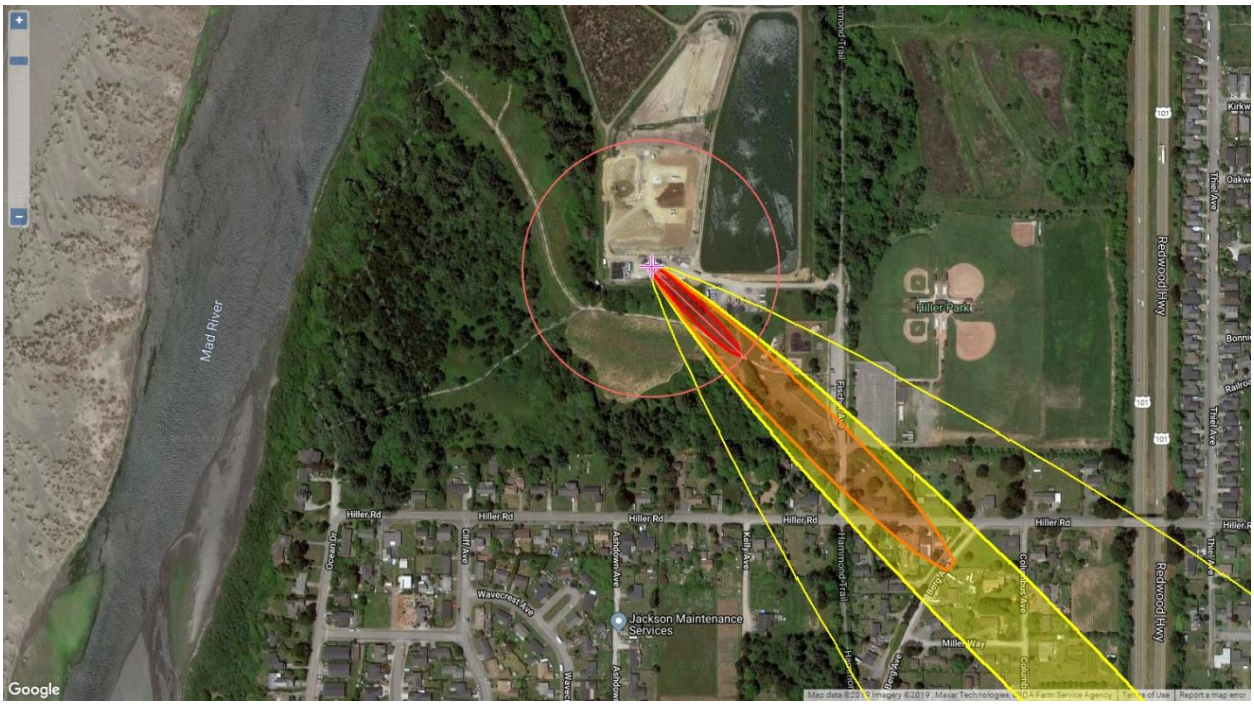
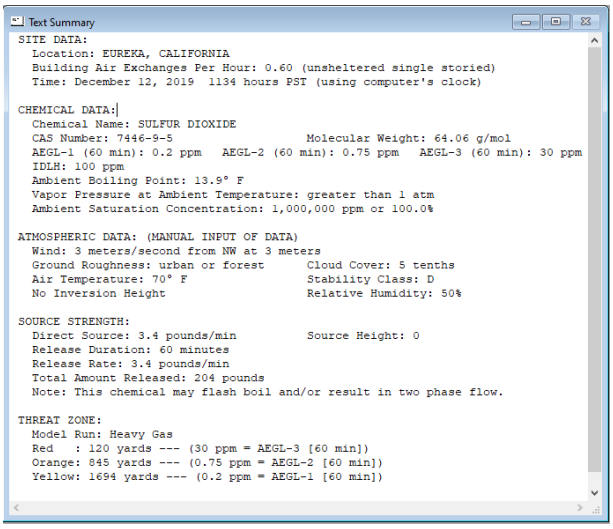


Figure 10. ALOHA Alternate-Case Scenario Threat Zones Map and Circle of Concern Chlorine Release 0.1miles.



`

Figure 11. ALOHA Alternate-Case Scenario Parameters and Threat Zone Sulfur Dioxide Release



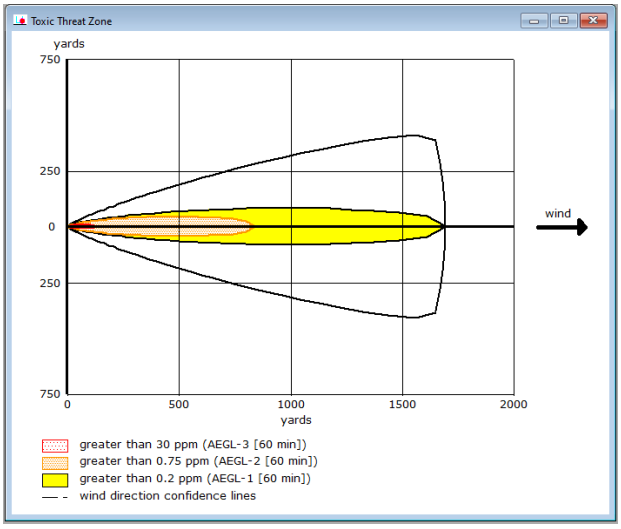


Figure 12. ALOHA Alternate-Case Scenario Threat Zones Map and Circle of Concern Sulfur Dioxide Release <0.1miles.

5. OFFSITE IMPACTS TO THE POPULATION

Offsite impacts to the population was estimated using MARPLOT, a mapping program that incorporates the most recent population data [6]. When calculating population densities for large areas that encompass many census tracts, the accuracy is rated good; however, for smaller rural areas that encompass only two or three partial census tracts, the population data may be skewed due to the unequal distribution within the tract. The use of MARPLOT is an acceptable population calculator pursuant to guidance endorsed by the United States Environmental Protection Agency (EPA). Table 6 outlines maximum distances to toxic endpoints and the populations at risk.

Table 6. Maximum Distances to Toxic Endpoints and Impacted Populations.

Release Scenario	Toxic Endpoint	Maximum Toxic Endpoints Distance	Population at Risk
Chlorine: Worst-Case Release Rate: 110 lbs/min for 10 minutes	3 ppm (0.0087 mg/L)	1 mile	5040
Chlorine: Alternative Case Release Rate: 3.7 lbs/min for 60 minutes		<0.1 miles	0
Sulfur Dioxide: Worst-Case Release Rate: 110 lbs/min for 10 minutes	3 ppm (0.0087 mg/L)	0.9 miles	4,560
Sulfur Dioxide: Alternative Case Release Rate: 3.4 lbs/min for 60 minutes		<0.1 miles	0

CalARP requirements state that sensitive populations such as schools, hospitals, daycare centers, long-term health care facilities, prisons, residential areas, public use parks/recreational areas, and major commercial facilities, located within the impacted areas must be identified. Figure 13 shows the potentially affected areas of the worst-case and alternative-case scenarios. These distances are based on specific calculations using RMP*Comp and ALOHA modeling software.

Figure 13. Circles of Concern for Worst-Case and Alternate Case Release Scenarios

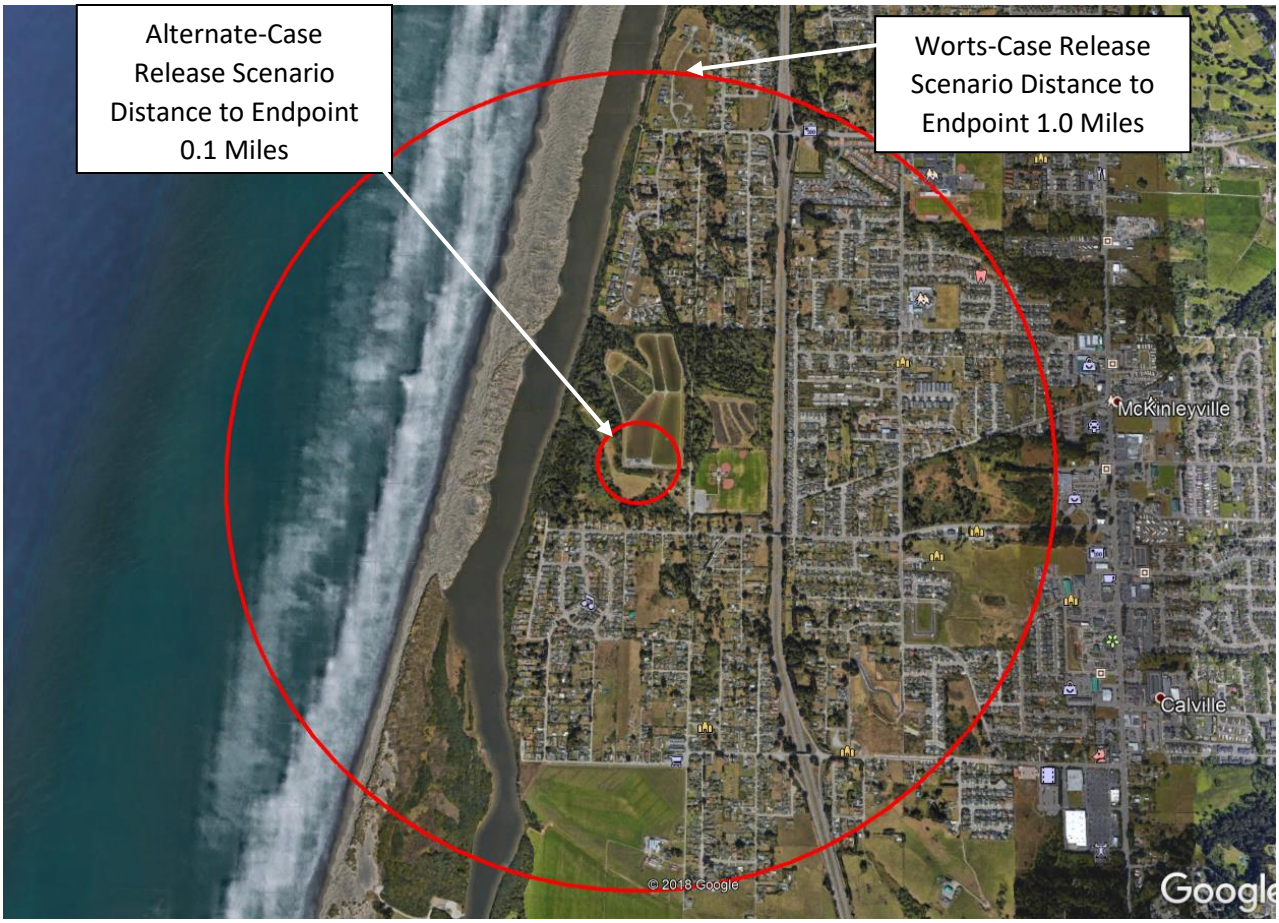


Table 7 provides a summary of sensitive receptors within the toxic endpoints for the worst-case release scenario and the alternative release scenario. These sensitive populations include individuals who could not move themselves from the exposure area without assistance. The sensitive populations also include industrial installations which may have a hazardous process that cannot be immediately left unattended.

Table 7. Sensitive Off-Site Receptors

Receptor	Worst-Case Release Scenario (0.9 mi)	Alternative Release Scenario (<0.1 mi)
Schools	**Yes**	No
Residences	**Yes**	No
Hospitals	No	No
Prisons/Correctional Facilities	No	No
Recreation Areas	**Yes**	**Yes**
Major Commercial, Office, or Industrial Areas	No	No
Child Daycare	**Yes**	**Yes**
Long-term Health Care	**Yes**	No
Other	No	No

6. OFFSITE IMPACTS TO THE ENVIRONMENT

CalARP also requires that facilities also consider "Environmental Receptors" defined as areas such as national or state parks, forests, monuments, wildlife sanctuaries, preserves, refuges, and federal wilderness areas. Table 8 presents a summary of the off-site environmental receptors.

Table 8. Environmental Off-Site Receptors

Receptor	Worst-Case Release Scenario (0.9 mi)	Alternative Release Scenario (<0.1 mi)
National or State Parks, Forests, or Monuments	**Yes***	No
Officially Designated Wildlife Sanctuaries, Preserves, or Refuges	No	No
Federal Wilderness Areas	No	No
Other (Landmarks and Indian Reservations	No	No

* Mad River Beach County Park is part of the Humboldt County Parks Facilities

Table 9 includes a list of websites and programs used to locate sensitive and environmental receptors. Some sites will perform a distance search in order to determine proximity of receptors to the facility. Other sites required map interpolation to determine weather receptors fall within the worst-case or alternative case release circles of concern.

Table 9. Websites and Programs Used

Source	Receptor the Source is Used to Identify	Method of Determining Eligibility
www.superpages.com	Used to identify hospitals, police stations, city jails, Major commercial, office or industrial businesses.	Distance search in conjunction with map interpolation
www.cclda.ca.gov	Search engine that lists all day cares and senior care facilities licensed by the state.	Map Interpolation
www.greatschools.net	Distance search to identify schools.	Distance search in conjunction with map interpolation
Google Maps	Mapping program used to locate receptors in the area. It incorporates Google search features to identify businesses and other organizations in the area.	Map Interpolation

7. OFFSITE CONSEQUENCE ANALYSIS REVIEW AND UPDATE

MCSD shall maintain records on the offsite consequences for both worst-case and alternative-case scenarios. For worst-case and alternative-case release scenarios, MCSD shall maintain a description of the vessel or pipeline and substance selected as worst-case, a description of the scenarios identified, assumptions and parameters used, and the rational for selection. Assumptions shall include the use of any administrative controls and any passive mitigations that were assumed to limit the quantity that could be released. Documentation shall include the anticipated effect of controls and mitigation on the release quantity and rate.

8. FIVE YEAR ACCIDENT HISTORY

The District has utilized chlorine and sulfur dioxide since the Wastewater Management Facility was constructed in 1983. In over 36 years of handling chlorine, the District has ***never*** experienced an accidental release. The District remains committed to maintaining this excellent accident history, and never experiencing an accidental release in the future. In recognition of this commitment, the District continues regular training of field personnel in the safe handling, and proper emergency response in the event of an accidental release. Safety meetings are conducted on a regular basis, and topics discussed and staff members attending are documented in District files. Various safety plans including the District's Hazardous Material Business Plan, the Process Safety Management Plan, and the District's Emergency Operations Plan are regularly reviewed and updated. District staff participates in CL2 and SO2 chemical training through California Water Environment CWEA in cooperation with the Arcata Fire Department. The District has contracted with the Northern California Safety Consortium to conduct training sessions and functional exercises in the implementation of these various plans.

9. REFERENCES

1. "Appendix A: Table of Toxic Endpoints," 19 CCR Division 2, Chapter 4.5, June 2004.
2. "Appendix A: Subpart B-Hazard Assessment," 40 CFR Part 68, July 2003.
3. California Accidental Release Prevention (CalARP) Program Administering Agency Guidance, January 2005.
4. RMP*Comp Version 2.01, US Environmental Protection Agency, February 2012.
5. EPA's Risk Management Program Guidance for Off-Site Consequence Analysis, March 2009.
6. CAMEO MARPLOT Mapping Software, National Oceanic and Atmospheric Administration and US Environmental Agency.
7. National Weather Service Historic Weather Data, 2019.

RISK MANAGEMENT PLAN

Initial Date of Completion: 1999

Originally Prepared By: MCSD Staff & Kevin Creed

Revised January 2020

By: MCSD Staff

McKinleyville Community Services District

1656 Sutter Rd.

McKinleyville, CA 95519

I. EXECUTIVE SUMMARY

A. Introduction

The McKinleyville Community Services District (MCSD, the District) utilizes chlorine and sulfur dioxide to provide disinfection of treated wastewater at their Wastewater Management Facility (WWMF) located at 675 Hiller Road McKinleyville, CA. This facility stores and utilizes chlorine and sulfur dioxide in excess of the listed regulatory threshold and is therefore subject to the CCR Title 19, Division 2, Chapter 4.5 – California Accidental Release Prevention (CalARP) Program as administered by the California of Emergency Services

B. Accidental Release Prevention and Emergency Policies

MCSD is committed to providing a safe environment to its employees and surrounding community. The District recognizes the potential impact of handling chlorine and sulfur dioxide in conjunction with their wastewater treatment processes and has implemented several safety programs, procedures, and policies to prevent accidental releases. Safety programs are geared towards the prevention of an accidental release at the facility while policies and procedures outline detailed steps for operation and responses to specific release scenarios. In addition, these programs incorporate emergency procedures to mitigate the effects of a release if it does occur. In the event of an emergency, coordinators will assess the situation and notify outside responding agencies as necessary.

Various programs including the District's Hazardous Material Business Plan, the Process Safety Management Plan, and the District's Emergency Operations Plan are regularly reviewed and updated. District staff participates in CL2 and SO2 chemical training through California Water Environment Association CWEA in cooperation with the Arcata Fire Department. The District has contracted with the Northern California Safety Consortium to conduct training sessions and functional exercises in the implementation of these various plans.

C. Stationary Source and Regulated Substance

Chlorine and sulfur dioxide are listed by state and federal agencies as a regulated substance. The federal Accidental Release Prevention program requires stationary sources with more than the threshold quantity of a regulated substance to be evaluated to determine the potential for and impacts of accidental releases from the covered process. Under conditions specified by the state and federal agencies, the owner or operator of a stationary source which stores more than the threshold quantity is required to develop and submit a Risk Management Plan.

Liquid chlorine and sulfur dioxide are stored separately on-site in one-ton containers. The District, at maximum, stores 6000lbs of liquid chlorine and 4000lbs of sulfur dioxide in 1-ton (2000lbs) cylinders. The federal threshold quantity for chlorine is 2,500lbs. and the state threshold for sulfur dioxide is 500lbs., therefore, MCSD is required to develop and submit an RMP to the federal Environmental Protection Agency (EPA).

Table 1. **Covered Process Maximum Quantities and Largest Vessel Amounts**

Covered Process	Maximum Inventory	Largest Vessel Amount
Chlorination System	6000lbs	2000lbs
Sulphonation System	4000lbs	2000lbs

D. Accidental Release Prevention Program

MCSD has developed an accidental release prevention program for compliance with the OES CalARP regulation. The program includes but is not limited to the following elements:

- Safety information regarding the chemical hazards, and operating and technical specifications for the equipment;
- Written procedures for operating and maintaining the processes;
- Training for employees involved with system operations and maintenance;
- Written procedures for managing system changes and startup of a modified process;
- Investigating releases and near misses and implementing measures to prevent recurrence;
- Written procedures for conducting hot work on or near the regulated processes;
- Contractor management policies to ensure contract employee safety while on facility premises; and
- Employee involvement in program development and implementation.

MCSD is committed to the prevention and minimization of accidental releases of potentially hazardous chemicals. It is the policy of McKinleyville Community Services District to adhere to all applicable federal, state, and local regulations.

Offsite consequences analysis Worst-Case and Alternative Case release parameters, scenarios, and results were analyzed using U.S. Environmental Protection Agency (EPA) approved RMP* Comp and ALOHA (Area Locations of Hazardous Atmospheres) modeling software. The scenario results are summarized in Tables 2 and 3.

Table 2. Worst-Case Release Scenario Results for Chlorine and Sulfur Dioxide.

Toxic Gas **Quantity of Release** **Rate of Release**	**Release Scenario / Dispersion Model**	**Release or Release Rate**	**Release Duration**	**Est. Distance to Toxic Endpoint**
Chlorine (Cl2) 1 x 2000lbs Cylinder 110lbs/min for 10-min. Worst-Case Toxic Endpoint 0.0087 mg/L or 3ppm	Worst-Case RMP*Comp	2000lbs 110lbs/min	10 min.	**0.9 miles**
	Worst-Case ALOHA	2000lbs 200lbs/min	10 min.	**1747 Yards** **1.0 miles**
Sulfur Dioxide (Anhydrous) 1 x 2000lbs Cylinder 110lbs/min for 10-min. Worst-Case Toxic Endpoint 0.0078 mg/L or 3ppm	Worst-Case RMP*Comp	2000lbs 110lbs/min	10 min.	**0.9 miles**
	Worst-Case ALOHA	2000lbs 200lbs/min	10 min.	**1463 Yards** **0.83 miles**

Table 3. Alternate Case Scenario Results for Chlorine and Sulphur Dioxide

Toxic Gas **Quantity of Release** **Rate of Release**	**Release Scenario / Dispersion Model**	**Release or Release Rate**	**Release Duration**	**Est. Distance to Toxic Endpoint**
Chlorine (Cl2) Alternate-Case 1 x 2000lbs Cylinder 3.7lbs/min for 60-min. Toxic Endpoint 0.0087 mg/L or 3ppm	Alternate-Case RMP*Comp	222lbs 3.7lbs/min	60 min.	**0.1 miles***
	Alternate-Case ALOHA	222lbs 3.7lbs/min	60 min.	**148 yards** **<0.1miles**
Sulfur Dioxide (Anhydrous) Alternate-Case 1 x 2000lbs Cylinder 3.4lbs/min for 60-min. Toxic Endpoint 0.0078 mg/L or 3ppm	Alternate-Case RMP*Comp	204lbs 3.4lbs/min	60 min.	**0.1 miles***
	Alternate-Case ALOHA	204lbs 3.4lbs/min	60 min.	**120 yards** **<0.1miles**

E. Five Year Accident History

The District has utilized chlorine and sulfur dioxide since the Wastewater Management Facility was constructed in 1983. In over 36 years of handling these chemicals, the District has ***never*** experienced an accidental release. The District remains committed to maintaining this excellent accident history, and never experiencing an accidental release in the future. In recognition of this commitment, the District continues regular training of field personnel in the safe handling, and proper emergency response in the event of an accidental release. Safety meetings are conducted on a regular basis, and topics discussed and staff members attending are documented in District files.

F. Emergency Response Program

The MCSD Wastewater Management Facility Emergency Response Program (ERP) includes the chemical-specific emergency response procedures for releases of chlorine, sulfur dioxide; and other extremely hazardous substances. The program identifies responsibilities of District personnel; coordination with outside agencies and emergency responders; hazardous material locations; engineering controls (e.g. alarms); the required personal protective equipment (PPE); and required emergency equipment.

The Emergency Response Plan is a section of the Emergency Response Program that outlines specific procedures for reducing the risk/impact of a release and emergency response procedures in the event of a hazardous gas, liquid, or solid release/spill at the WWMF. This document has been developed in cooperation with and has been integrated into the District's safety/emergency response documents.

G. Planned Changes to Improve Safety

The District retained the engineering consulting firm of Oscar Larson and Associates to prepare a Disinfection Alternatives Study. The purpose of the Oscar Larson and Associates study was to examine the existing practices and procedures as well as alternate disinfection methodologies to evaluate revisions to the District's current practices and procedures that might reduce the risk of accidental release and/or potential off-site consequences in the event of an accidental release. Four alternatives, in addition to the existing conditions, were identified and evaluated in the final report. Cost estimates were prepared for both capital costs and maintenance costs of each alternative.

The final report prepared by Oscar Larson and Associates recommended the District continue the current practices utilizing liquid chlorine and sulfur dioxide or adopt

administrative controls to limit the inventory of chlorine and sulfur dioxide to avoid requirements for filing the Federal RMP. District staff feels the administrative controls to limit the inventory of chlorine and sulfur dioxide below the federal regulatory threshold limits to avoid the requirement to file the Federal RMP, offers little or no real potential to reduce the risk or potential off-site consequences of an accidental release.

The final report also recommended installation of a number of safety upgrades to further improve the safety of the existing facilities, and/or improve the District's ability to respond in the event of an accidental release. The District has approved and implemented all recommended improvements.

Improvements implemented include:

- Emergency Exhaust Fan Ducts
- Additional Leak Detectors
- Emergency Shut-Offs
- Anchors to Chain Chemical Cylinders Down
- Piping Revisions
- Alarm System Modifications
- Electronic Ton Container Scales
- Wind Monitor and Telemetry

These improvements were implemented to further improve the safety and reduce the potential consequences of an accidental release of hazardous materials.

II. OFF-SITE CONSEQUENCE ANALYSIS

Both, worst-case and alternate scenarios are modeled using EPA's RMP*Comp Version 2.01 and ALOHA (Area Locations of Hazardous Atmosphere) Program in accordance with CalARP requirements. ALOHA is the hazard modeling program for the CAMEO software suite, which is used widely to plan for and respond to chemical emergencies. ALOHA allows you to enter details about a chemical release and then will generate threat zone estimates for various types of hazards

Table 4. summarizes the parameters used to determine distance to toxic endpoints for the worst-case and alternate case scenarios within the RMP*Comp and ALOHA programs.

Table 4. Offsite Consequence Analysis Parameters by Scenario

Analysis Parameter	Worst Case Scenario	Alternate Scenario
Endpoints	Toxic endpoints are defined by chemical concentrations. Appendix A to Title 19, Div. 2, Chapter 4.5 Table Chlorine = 0.0087 mg/L (3ppm) Sulfur Dioxide = 0.0078 mg/L (3ppm)	Toxic endpoints are defined by chemical concentrations. Appendix A to Title 19, Div. 2, Chapter 4.5 Table Chlorine = 0.0087 mg/L (3ppm) Sulfur Dioxide = 0.0078 mg/L (3ppm)
Wind Speed / Atmospheric Stability Class	1.5 m/s (3.36 mph) Stability Class: F	3.0 m/s (6.7 mph) Stability Class: D
Ambient Temperature / Humidity	70-degrees F* 50% Humidity (RMP*Comp Assumes 77-degrees F)	70-degrees F* 50% Humidity (RMP*Comp Assumes 77-degrees F)
Height of Release	Ground Level Release (0 ft)	Ground Level Release (0 ft)
Surface Roughness	Urban (obstructed terrain)	Urban (obstructed terrain)
Dense or Naturally Buyout Gasses	Chlorine = Dense Sulfur Dioxide = Dense	Chlorine = Dense Sulfur Dioxide = Dense
Temperature of Released Substance	70-Degrees F*	70-Degrees F*

A. Worst-Case Release Scenario

The worst-case release scenario is defined by California Code of Regulations Title 19, Division 2, Article 4 Section 2750.3 (c)(1) as a "release of the entire contents of the single largest vessel over a 10-minute period unless passive mitigation systems are in place" and is modeled using EPA's RMP*Comp Version 2.01 and ALOHA Program.

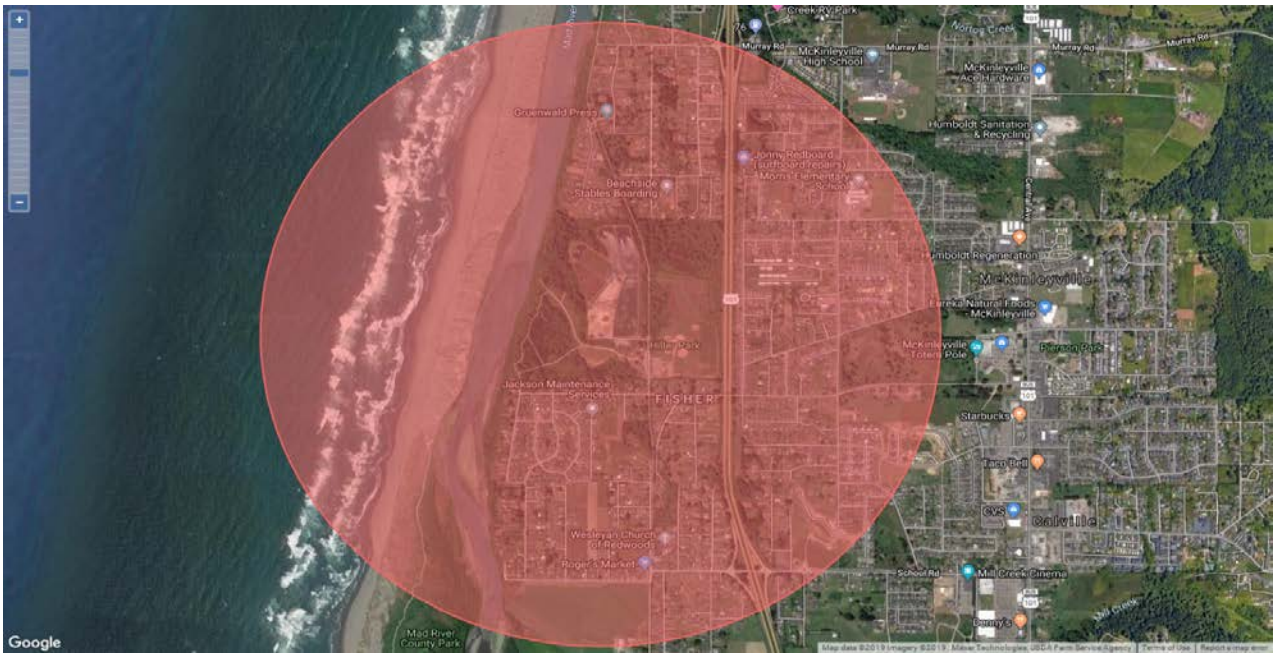
Table 5. provides a summary of the chemical information, models used, environmental parameters and offsite impacts to population and receptors for the worst-case release analysis for both chlorine and sulfur dioxide.

Table 5. Worst-Case Release Scenario Summary

Process Name	Chemical Storage	Chemical Storage
Chemical		
Chemical Name	Chlorine	Sulfur Dioxide (Anhydrous)
Percent weight of chemical	70.91	64.07
Physical State	Gas Liquified Under Pressure	Gas Liquified Under Pressure
Model Used	RMP*Comp & ALOHA	RMP*Comp & ALOHA
Scenario	Worst-Case Release	Worst-Case Release
Quantity Released (lbs)	2000lbs	2000lbs
Release Rate (lbs/min)	110lbs/min & 200lbs/min	110lbs/min & 200lbs/min
Release Duration (mins)	10 minutes	10 minutes
Wind Speed (meters/sec)	1.5 m/sec	1.5 m/sec
Atmospheric Stability Class	Stability Class F	Stability Class F
Topography	Urban Surroundings	Urban Surroundings
Distance to Endpoint (miles) (Attach maps of the impact area of the ACS release. Draw the distance to the endpoint from the facility as a radius of a circle showing distance to endpoint in all directions from the facility.)	RMP*Comp = 0.9 miles ALOHA = 1.0 miles	RMP*Comp = 0.9 miles ALOHA = 1.0 miles
Estimated residential population within distance to endpoint	5,040	5,040
Public Receptors	**Yes or No**	**Yes or No**
Schools	Yes	Yes
Residences	Yes	Yes
Hospitals	No	No
Prisons/Correctional Facilities	No	No
Recreational Areas	Yes	Yes
Major commercial, office or industrial areas	No	No
Child Daycare	Yes	Yes
Other	No	No
Environmental Receptors	**Yes or No**	**Yes or No**
National or State Parks, Forests or Monuments	Yes (Clam Beach County Park)	Yes (Clam Beach County Park)
Officially Designated Wildlife Sanctuaries, Preserves, or Refuges	No	No
Federal Wilderness Areas	No	No
Other	No	No
Passive Mitigation Considered	**Yes or No**	**Yes or No**
Dikes	No	No
Enclosures	Yes	Yes
Berms	No	No
Drains	No	No

Sumps	No	No
Other	No	No
Active Mitigation Considered	**Yes or No**	**Yes or No**
Sprinkler Systems	No	No
Deluge Systems	No	No
Water Curtain	No	No
Neutralization	No	No
Excess Flow Valve	No	No
Flares	No	No
Scrubbers	No	No
Emergency Shutdown Systems	Yes	Yes

Figure 1. RMP*Comp and ALOHA Worst-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. 1.0 miles



Hazard Assessment worst-case scenario analysis maps and model results can be found in Appendix A of this document and in the complete Hazard Assessment document within the CalARP Document.

B. Alternate Case Release Scenario

The alternative release scenario considers a "more likely to occur than worst-case release scenario" and reaches an offsite endpoint.

Based on a review of facility operating history and knowledge of industry incidents, a valve or fuse plug leak was chosen as the alternative release scenario for both the chlorination and sulphonation systems. This replicates a leak at the fuse plug or valve which may occur when a new connection is made or while handling a new cylinder.

A fusible plug leak would not likely have a "hole" more than 1/4-inch in diameter; therefore, a 1/4-inch hole was conservatively chosen. A 60-minute time period was conservatively chosen in order to account for the fact that the system is not always manned at night.

Table 6. Alternate Case Scenario Summary

Process Name	Chemical Storage	Chemical Storage
Chemical		
Chemical Name	**Chlorine**	**Sulfur Dioxide (Anhydrous)**
Percent weight of chemical	70.91	64.07
Physical State	Gas Liquified Under Pressure	Gas Liquified Under Pressure
Model Used	RMP*Comp & ALOHA	RMP*Comp & ALOHA
Scenario	Alternate Case Release	Alternate Case Release
Quantity Released (lbs)	222lbs	222lbs
Release Rate (lbs/min)	3.7lbs/min	3.7lbs/min
Release Duration (mins)	60 minutes	60 minutes
Wind Speed (meters/sec)	3meters/sec	3meters/sec
Atmospheric Stability Class	Stability Class D	Stability Class D
Topography	Urban Surroundings	Urban Surroundings
Distance to Endpoint (miles) (Attach maps of the impact area of the ACS release. Draw the distance to the endpoint from the facility as a radius of a circle showing distance to endpoint in all directions from the facility.)	RMP*Comp =< 0.1 miles ALOHA = 148 yards <0.1 miles	RMP*Comp = <0.1 miles ALOHA = 120 yards <0.1 miles
Estimated residential population within distance to endpoint	**0**	**0**
Public Receptors	**Yes or No**	**Yes or No**
Schools	No	No
Residences	No	No
Hospitals	No	No
Prisons/Correctional Facilities	No	No
Recreational Areas	Yes	Yes
Major commercial, office or industrial areas	No	No
Child Daycare	No	No
Other	No	No

Environmental Receptors	Yes or No	Yes or No
National or State Parks, Forests or Monuments	No	No
Officially Designated Wildlife Sanctuaries, Preserves, or Refuges	No	No
Federal Wilderness Areas	No	No
Other	No	No
Passive Mitigation Considered	**Yes or No**	**Yes or No**
Dikes	No	No
Enclosures	Yes	Yes
Berms	No	No
Drains	No	No
Sumps	No	No
Other	No	No
Active Mitigation Considered	**Yes or No**	**Yes or No**
Sprinkler Systems	No	No
Deluge Systems	No	No
Water Curtain	No	No
Neutralization	No	No
Excess Flow Valve	No	No
Flares	No	No
Scrubbers	No	No
Emergency Shutdown Systems	Yes	Yes

Figure 2. RMP*Comp and ALOHA Alternate-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. <0.1miles

Hazard Assessment alternate-case analysis maps and model results can be found in Appendix A of this document and in the complete Hazard Assessment document within the CalARP Document.

C. Administrative Controls and Mitigations

The District has elected to implement several mitigations of risk and the potential off-site consequences of an accidental release. In addition, the District continues to invest in training, preparation, organization, and coordination with other responding agencies. The training of staff to respect the inherent risk in handling hazardous material is likely the best investment to reduce the risk of accidental release, as the human factor is often a large contributing factor in accidents. Likewise, the preparation, training, and organization necessary to provide efficient and effective response in the event of an accidental release assures the potential off-site consequences are minimized.

III. FIVE YEAR ACCIDENT HISTORY

The District has utilized chlorine and sulfur dioxide since the Wastewater Management Facility was constructed in 1983. In over 36 years of handling chlorine, the District has ***never*** experienced an accidental release. The District remains committed to maintaining this excellent accident history, and never experiencing an accidental release in the future. In recognition of this commitment, the District continues regular training of field personnel in the safe handling, and proper emergency response in the event of an accidental release. Safety meetings are conducted on a regular basis, and topics discussed and staff members attending are documented in District files. Various safety plans including the District's Hazardous Material Business Plan, the Process Safety Management Plan, and the District's Emergency Operations Plan are regularly reviewed and updated. District staff participates in CL2 and SO2 chemical training through California Water Environment Association CWEA in cooperation with the Arcata Fire Department. The District has contracted with the Northern California Safety Consortium to conduct training sessions and functional exercises in the implementation of these various plans.

IV. PROGRAM 3 PREVENTION PROGRAM

The MCSD Process Safety Management (PSM) plan addresses the procedures and processes involving the chlorination and sulfonation of wastewater at the MCSD Hiller Road Wastewater Management Facility (WWMF) NAICS Code 221320. The purpose of the PSM Plan is to identify and characterize the hazards and potential conditions which could lead to a chemical release, and propose mitigation measures which are commensurate with the degree of hazard, or consequence of a release, and the probability of such a release occurring. Although the focus of PSM is on assessment of process hazards and corresponding operating procedures, the program also integrates the employer's injury and illness prevention program, training programs plus other elements including emergency response procedures.

MCSD's PSM is updated and revised annually and incorporates any changes in process, chemicals used and chemical storage quantities. District personnel conduct walk through inspections monthly and annually and document any safety concerns. Date of last PSM review January 2020.

The Process Hazard Analysis (PHA), updated in 2015, is a composite of several different methodologies: what-if, failure mode effects analysis, and primary hazard assessment. The objectives of the analysis were to identify possible hazard scenarios, identify what cause(s) could lead to each scenario, characterize the probable consequence of each cause, and suggest corresponding mitigation options. In identifying mitigation options, no distinction was made between those mitigation measures which are already in place and options which could be implemented at the discretion of the District at some point in the future.

Table 7. Process Hazard Analysis Details

Process Hazard Analysis Details	
Completion Date	Originally Created 1999 Reviewed Annually, revised as necessary No changes in processes, chemicals used, or chemical quantities
Major Hazards Identified	No major hazards have been identified. Several possible scenarios have been analyzed and have mitigation measures in place to prevent or reduce injury to workers or the community
Process Controls in Use	• Vacuum regulators • Critical controls and piping are protected • Back-up power supply for controls, sensors and alarms • Sensors, alarms and automatic shut-off valves • Annual completion of site inspection and walk through
Mitigation Systems in Use	Chlorine and Sulfur Dioxide Rooms are equipped with: • Inside cinderblock enclosure

Mitigation Systems in Use	• Exhaust fans • Gas leak detection sensors • Gas leak detection alarm system • Automatic Shut-off valves • Emergency shutoff • Battery back-up for sensors, alarms, and shut-off valves • Chemical cylinders chained down Administrative Mitigations • Monthly inspections • Annual training • Perform regularly scheduled maintenance
Monitoring and Detection Systems	• Gas leak detection sensors • Gas leak detection alarm system • Automatic Shut-off valves • Emergency shutoff • Battery back-up for sensors, alarms, and shut-off valves
Changes Since Last Process Hazard Assessment	No changes to chemical processes, chemical quantities, or types of chemicals. In 2019 the communication system SCADA (Supervisory Control and data Acquisition) was updated providing more reliable communications to the facilities.

Table 8. Program 3 Prevention Summary

Dates for Reviews Revisions and Inspections	
Operating Procedures	Standard Operating Procedures for CL2 and SO2 are reviewed and updated annually. Date of last review 12/12/2019.
Training	Training is conducted for all employees who work with or around chemicals. Each employee completes a 40hour classroom HAZWOPR initial training and then attends an annual refresher. Employees participates in interagency chlorine tank leak SCBA training, date of last interagency training is 12/7/2017. Employees working the treatment facility complete 2000hours as an Operator in Training Trainings are reviewed and revised based on changes in processes, chemical handing or regulatory changes. Last revision of training programs 2015.

Mechanical Integrity	Maintenance procedure revisions are based on changes in processes, chemical handing, safety incidents, or regulatory changes. No changes in maintenance procedures have been necessary since last revision 2013. Equipment inspections are conducted monthly and include Buildings, Electric panels, security systems, chlorine systems, suphonation systems, alarms and sensors, and general conditions. Date of last inspection November 2019.
Management of Change	If there is to be a change in process, procedures, and/or the introduction of a new chemical or process technology, then the District Operations Director shall reconvene a Hazard Analysis team to assess the potential change and determine the following: • Impact of change on safety and health • Modifications to and/or development of new operating and maintenance procedures • Necessary time period for the change • Authorization requirements for the change Last review of management of change procedures 2015.
Pre-Start Up Review	Date of last Pre-Start up review December 2019
Compliance Audits	Annual "in house' Compliance Audit - Dec-2019 Tri-Annual Compliance Audit – February 2018 Authorizing Agency 5-year Compliance Audit – February 2015 No changes required
Incident Investigation	No incidents to report
Employee Participation	Competent employees are included and assist in the development of the process hazard analysis. The MCSD PHA is available to all employees
Hot Work Permit	Hot Work Permit information is revised annually. Last revision December 2019
Contractors	Contractors shall be informed of toxic release hazards associated with the work to be conducted and the District's Emergency Action Plan. MCSD shall maintain a contract employee injury and illness log.

A. District Management System

The Management System of the District RMP designates the General Manager as the qualified person responsible for the overall implementation and maintenance of the Risk Management Plan. This oversight function includes ensuring that District employees remain current on applicable training, that recommendations for facility/equipment improvements are either implemented and/or brought before the Board of Directors for approval and funding, and that the periodic review and revisions of the RMP are accomplished.

The Operations Director is responsible for the routine field operations and related RMP elements such as equipment and facility safety inspections, documentation of safety hazards & corrections, oversight and evaluation of operations employees' job safety performance, and assurance that operations employees remain current on applicable training topics. In addition, the Operations Director is responsible for communicating to the District General Manager any equipment and/or facility corrections or upgrades which are necessary to maintain the functionality of the facilities as well as their overall safe condition.

B. Process Safety Management Program

The California Division of Occupational Safety (CalOSHA) requires that the owners/operators of facilities upon which any listed acutely hazardous material is stored/used in excess of specified quantities must develop a Process Safety Management (PSM) plan. The goal of the regulation is to reduce the risk of occupationally related injuries or illnesses related to the accidental release of an acutely hazardous material. The MCSD Hiller Road Wastewater Management Facility utilizes both chlorine and sulfur dioxide gases in excess of the specified quantities and, thus, a PSM Plan is required. The purpose of the PSM Plan is to identify and characterize the hazards and potential conditions which could lead to a release, and propose mitigation measures which are commensurate with the degree of hazard, or consequence of a release, and the probability of such a release occurring. Although the focus of PSM is on assessment of process hazards and corresponding operating procedures, the program also integrates the employer's injury and illness prevention program, training programs plus other elements including emergency response procedures.

In addition to the Cal/OSHA requirements, the Federal Risk Management Plan Regulation Program 3 requirements mandate that the PSM is integrated into the overall District's RMP. The development of the original hazard analysis was a collaborative effort of a Hazard Analysis Team composed of MCSD employees Bruce Buel and Omar Reeder along with Neal Carnam (Winzler & Kelly Consulting Engineers) and Kevin Creed (Northcoast Haz-mat Compliance). Information leading to the analysis was obtained by a site visit to the facility, review of engineering drawings, accessing technical references on chemical hazards, and discussions among the analysis team. Current revisions to the PSM were completed by MCSD Staff (9/27/15). The next regulatory mandated review must be completed no later than 9/20.

The District's PSM Plan is included in Appendix C.

C. OLA Disinfection Alternatives Study

Because the District is committed to identifying and assessing potential steps which can reduce the risk and/or impact of an accidental release, Oscar Larson & Associates was retained to identify alternatives to the current methods and procedures for wastewater disinfection by chlorine gas. The alternatives assessed included a change in the volumes of chlorine stored onsite and various methods of disinfection with hypochlorite solution. The study of alternatives by OLA also provided recommendations as to how the District could improve the PSM Plan; the District has assessed those recommendations and incorporated the changes applicable to District operations. The OLA study of disinfection alternatives is included in Appendix D.

V. EMERGENCY RESPONSE PROGRAM

The Emergency Response Program, as an element of the Risk Management Plan, provides an integrated response to ensure that the District effectively coordinates communicates and works with MCSD staff and local responding agencies in response to a hazardous material release. It is through this coordinated effort and preplanning that the District and applicable agencies work to reduce the risk of adverse public health impacts related to a hazardous material release.

All District field personnel have completed 40-hour HAZWOPER initial-responder training for Hazardous Waste Operations and Emergency Response training. Refresher training per the Hazardous Waste Operations & Emergency Response standard (Cal/OSHA 8- 5192) shall be provided on an annual basis to those employees who would be expected to respond to a release or threatened release of a hazardous material.

This training allows those individuals to take offensive actions to stop a release of a hazardous material including chlorine and sulfur dioxide. In addition, regular training exercises are scheduled under a training contract with the Northern California Safety Consortium. The Arcata Fire Department (anticipated primary responders to a hazardous material incident at the WWMF) has been an integral part of all training exercises. The specific release response procedures to be utilized in the event of a chlorine or sulfur dioxide release are presented in the MCSD Emergency Response Program Appendix B.

The ERP includes the chemical-specific emergency response procedures for releases of chlorine, sulfur dioxide and other extremely hazardous substances. The procedures are listed by type of release (liquid, gas, solid), and outline the steps required for Safety, Isolation, Notification, and Mitigation. The ERP identifies District staff responsibilities, outside agency coordination, engineering controls (e.g. alarms), the required personal protective equipment (PPE), first aid requirements, and required equipment.

The District has also developed and implemented a comprehensive Emergency Operations Plan. This plan utilizes the National Incident Management System (NIMS) and provides a comprehensive, national approach to incident management that is applicable at all jurisdictional levels and across functional disciplines. NIMS allows multiple entities to work together to prevent, protect against, respond to , recover from and mitigate the effects of incidents, regardless of cause, size, location or complexity, in order to reduce the loss of life and property and harm to the environment. NIMS is applicable for all types of emergencies from hazardous materials releases to natural disasters such as earthquakes.

VI. RMP REVIEW AND UPDATES

The owner operator of a stationary source which has a regulated substance in quantities greater than the corresponding threshold shall review and submit it in a method and format to a central point specified by USEPA and to the Authorizing Agency (Humboldt County Department of Health and Human Services).

The District shall revise and submit the RMP as follows:

- At least once every five years from the date of its initial submission.
- No later than three years after a newly regulated substance is first listed by the USEPA.
- No later than the date on which a new regulated substance is first present in an already covered process above a threshold quantity.
- No later than the date on which a new regulated substance is first present in an already covered process.
- Within six months of a change that requires a revised Process Hazard Analysis or hazard review.
- Within six months of a change that requires a revised offsite consequence analysis.
- Within six months of a change that alters the Program level that applied to any covered process.

VII. APPENDICES

A. **Appendix A: Hazard Assessment Dispersion Maps and Model Results**
B. **Appendix B: MCSD WWMF Emergency Response Procedures**
C. **Appendix C: Process Safety Management Plan**
D. **Appendix D: Oscar Larsen & Associates Disinfection Alternatives Study**
E. **RMP Submit**

Appendix A

Hazard Assessment Dispersion Maps and Model Results

RMP*Comp Worst-Case Scenario Parameters

Chlorine

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.9 miles (1.4 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Chlorine
CAS number:	7782-50-5
Threat type:	Toxic Gas
Scenario type:	Worst-case
Quantity released:	2000 pounds
Release duration:	10 min
Release rate:	110 pounds per minute
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0087 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Sulfur Dioxide

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.9 miles (1.4 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

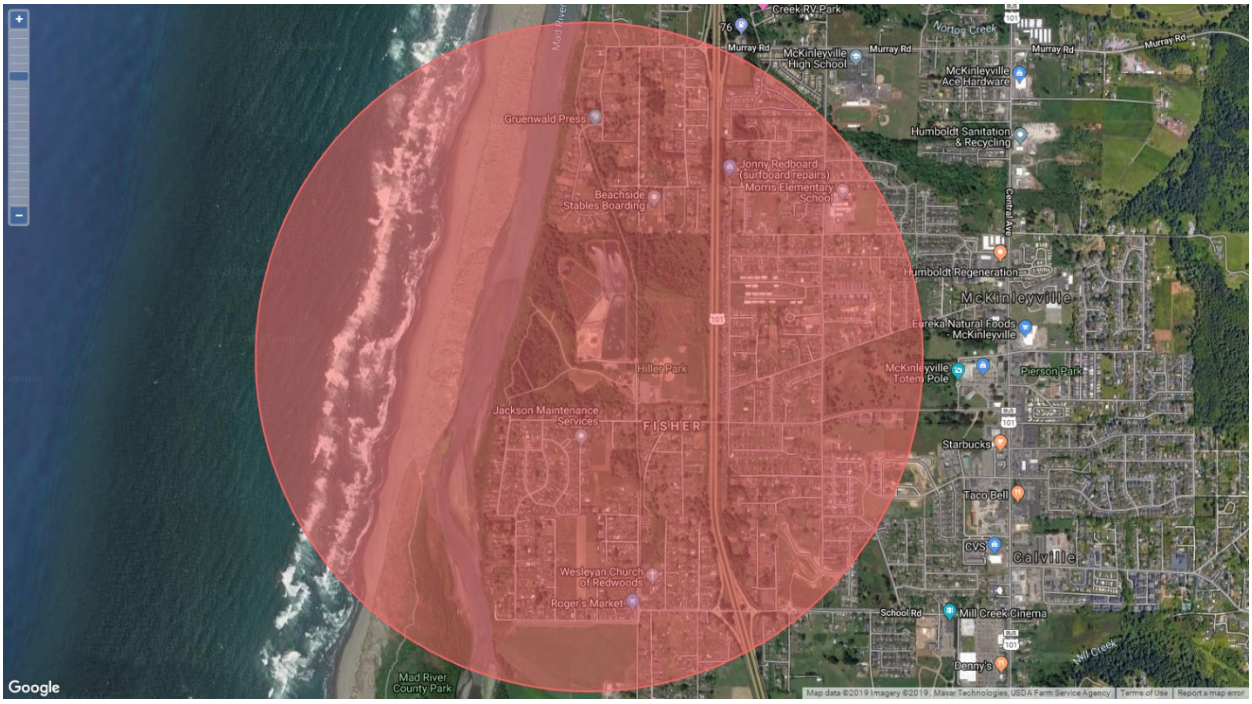
Scenario Summary

Chemical:	Sulfur dioxide (anhydrous)
CAS number:	7446-09-5
Threat type:	Toxic Gas
Scenario type:	Worst-case
Quantity released:	2000 pounds
Release duration:	10 min
Release rate:	110 pounds per minute
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0078 mg/L; basis: ERPG-2

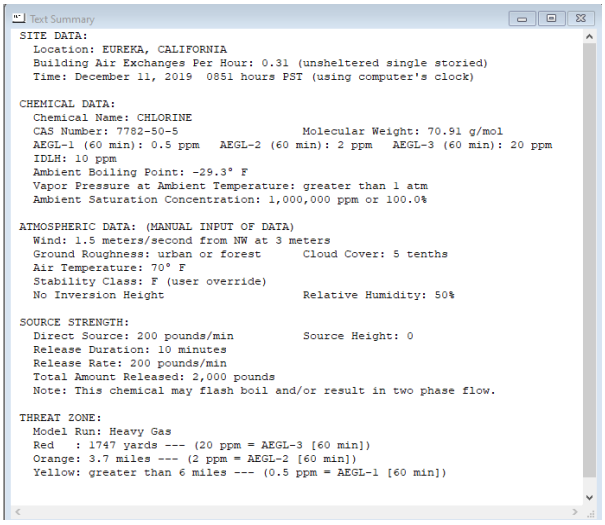
Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

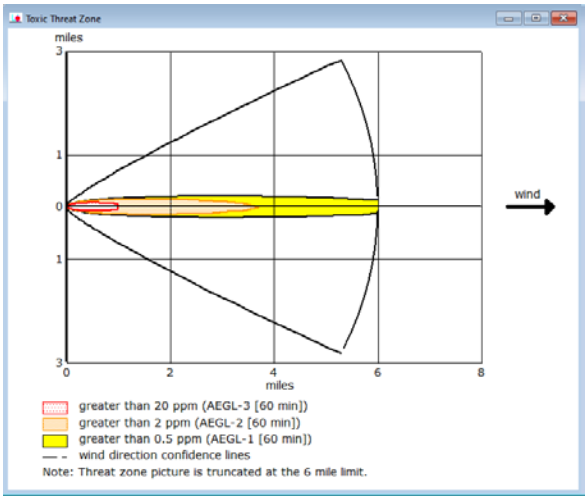
RMP*Comp Worst-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. 0.9miles



ALOHA Worst-Case Scenario Parameters and Threat Zone Chlorine Release

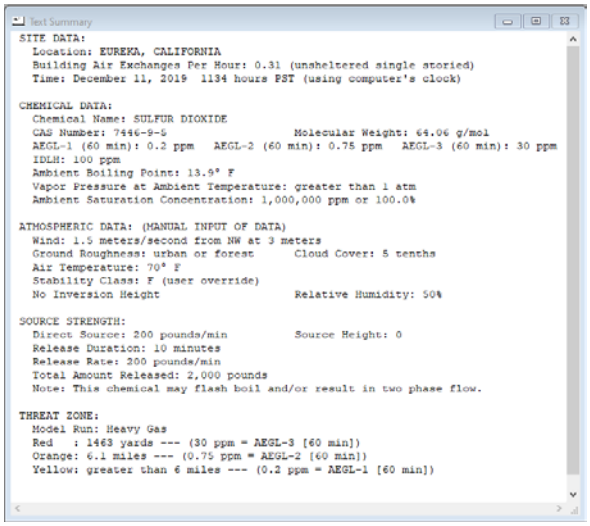


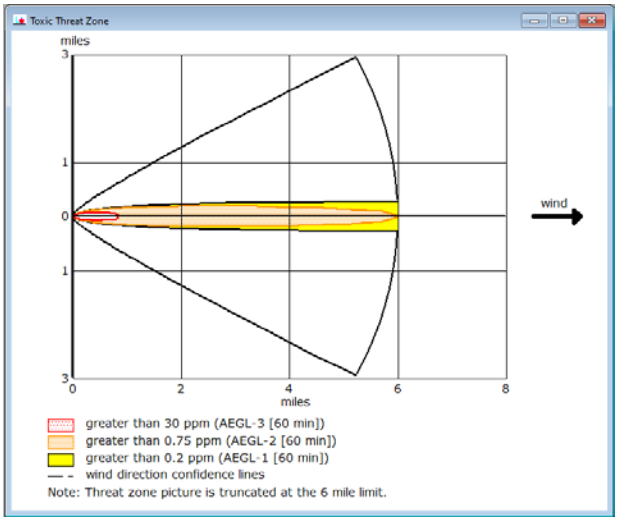
```
Text Summary
SITE DATA:
  Location: EUREKA, CALIFORNIA
  Building Air Exchanges Per Hour: 0.31 (unsheltered single storied)
  Time: December 11, 2019  0851 hours PST (using computer's clock)

CHEMICAL DATA:
  Chemical Name: CHLORINE
  CAS Number: 7782-50-5                Molecular Weight: 70.91 g/mol
  AEGL-1 (60 min): 0.5 ppm   AEGL-2 (60 min): 2 ppm   AEGL-3 (60 min): 20 ppm
  IDLH: 10 ppm
  Ambient Boiling Point: -29.3° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 1.5 meters/second from NW at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 70° F
  Stability Class: F (user override)
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Direct Source: 200 pounds/min          Source Height: 0
  Release Duration: 10 minutes
  Release Rate: 200 pounds/min
  Total Amount Released: 2,000 pounds
  Note: This chemical may flash boil and/or result in two phase flow.

THREAT ZONE:
  Model Run: Heavy Gas
  Red    : 1747 yards --- (20 ppm = AEGL-3 [60 min])
  Orange: 3.7 miles --- (2 ppm = AEGL-2 [60 min])
  Yellow: greater than 6 miles --- (0.5 ppm = AEGL-1 [60 min])
```



ALOHA Worst-Case Scenario Threat Zones Map and Circle of Concern Chlorine Release 1.0miles.

ALOHA Worst-Case Scenario Parameters and Threat Zones Sulfur Dioxide Release





ALOHA Worst-Case Scenario Threat Zones Map and Circle of Concern Sulfur Dioxide 0.83 miles.

RMP*Comp Alternate-Case Scenario Parameters

Chlorine

Estimated Distance Calculation

Estimated distance to toxic endpoint: <0.1 miles (<0.16 kilometers); report as 0.1 mile

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Chlorine
CAS number:	7782-50-5
Threat type:	Toxic Gas
Scenario type:	Alternative
Release duration:	60 minutes
Release rate:	3.7 pounds per min
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0087 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	3 meters/second (6.7 miles/hour)
Stability class:	D
Air temperature:	77 degrees F (25 degrees C)

Sulphur Dioxide

Estimated Distance Calculation

Estimated distance to toxic endpoint: <0.1 miles (<0.16 kilometers); report as 0.1 mile

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

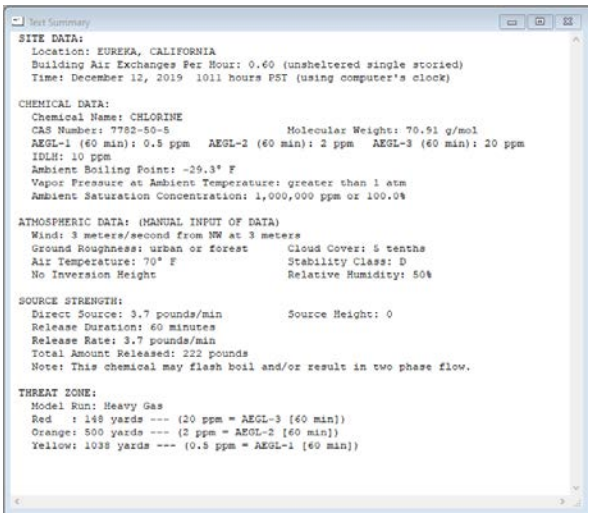
Chemical:	Sulfur dioxide (anhydrous)
CAS number:	7446-09-5
Threat type:	Toxic Gas
Scenario type:	Alternative
Release duration:	60 minutes
Release rate:	3.4 pounds per min
Mitigation measures:	Release in enclosed space, in direct contact with outside air
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.0078 mg/L; basis: ERPG-2

Assumptions about this scenario

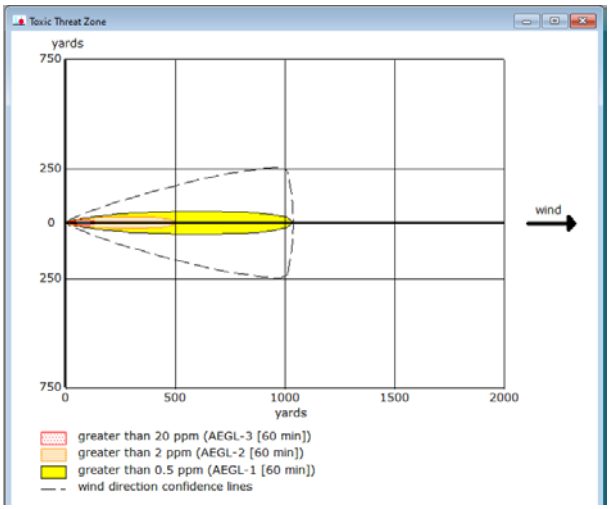
Wind speed:	3 meters/second (6.7 miles/hour)
Stability class:	D
Air temperature:	77 degrees F (25 degrees C)

RMP*Comp Alternate-Case Scenario Circle of Concern for both Chlorine and Sulfur Dioxide. <0.1miles

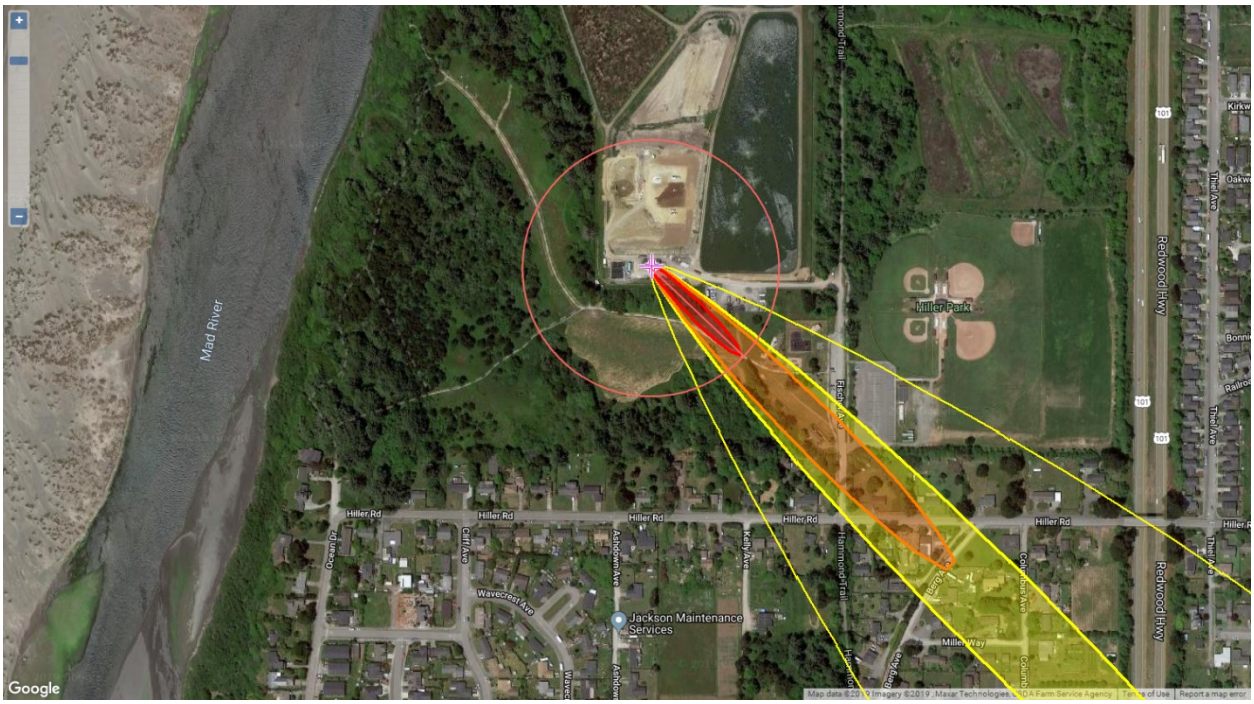
ALOHA Alternate-Case Scenario Parameters and Threat Zone Chlorine Release



```
Text Summary
SITE DATA:
  Location: EUREKA, CALIFORNIA
  Building Air Exchanges Per Hour: 0.60 (unsheltered single storied)
  Time: December 12, 2019  1011 hours PST (using computer's clock)

CHEMICAL DATA:
  Chemical Name: CHLORINE
  CAS Number: 7782-50-5                  Molecular Weight: 70.91 g/mol
  AEGL-1 (60 min): 0.5 ppm   AEGL-2 (60 min): 2 ppm   AEGL-3 (60 min): 20 ppm
  IDLH: 10 ppm
  Ambient Boiling Point: -29.3° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from NW at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 70° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Direct Source: 3.7 pounds/min          Source Height: 0
  Release Duration: 60 minutes
  Release Rate: 3.7 pounds/min
  Total Amount Released: 222 pounds
  Note: This chemical may flash boil and/or result in two phase flow.

THREAT ZONE:
  Model Run: Heavy Gas
  Red    : 148 yards --- (20 ppm = AEGL-3 [60 min])
  Orange: 500 yards --- (2 ppm = AEGL-2 [60 min])
  Yellow: 1038 yards --- (0.5 ppm = AEGL-1 [60 min])
```

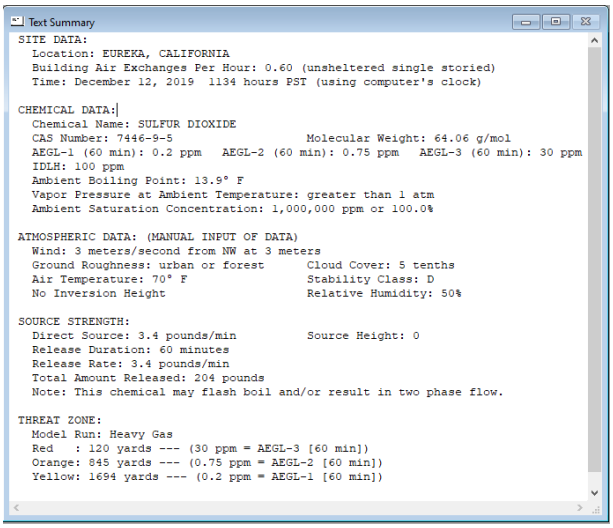


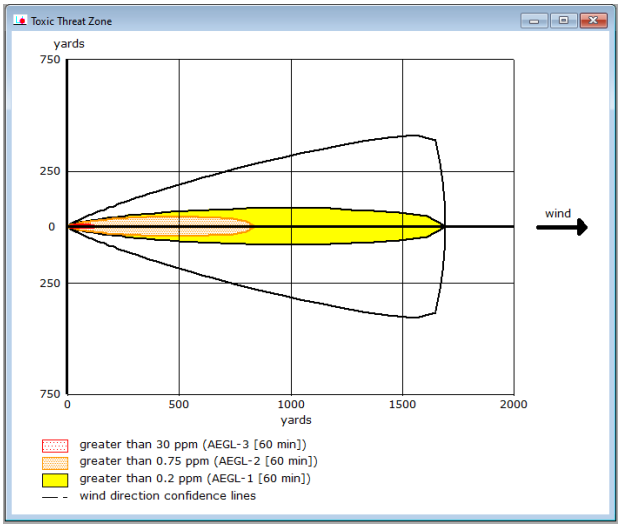
ALOHA Alternate-Case Scenario Threat Zones Map and Circle of Concern Chlorine Release 0.1miles.



`

ALOHA Alternate-Case Scenario Parameters and Threat Zone Sulfur Dioxide Release





ALOHA Alternate-Case Scenario Threat Zones Map and Circle of Concern Chlorine Release <0.1miles.

Appendix B

MCSD WWMF Emergency Response Procedures

INITIAL RESPONSE	
SAFETY	The first priority is for employees to provide for their own safety by either evacuating the immediate vicinity/location of the release, or donning the appropriate Personal Protective Equipment (PPE). This initial response is dependent upon the specific hazard, whether or not an employee is contaminated, and the material and personnel resources are immediately available.
ISOLATE DENY ENTRY	Once immediate safety is assured, for employees in the area, then the release area shall be isolated to prevent any unauthorized individuals from entering. This isolation will be accomplished by one, or a combination of the following. • Close doors or gates • Block driveways with vehicles • Post personnel to provide a verbal warning • Use law enforcement or fire personnel • Evacuate the premises
NOTIFICATION	The employee(s) who first identifies the release shall, after ensuring their own safety and isolating the area, make immediate notification to the District Main office and/or Operations Director via two-way radio or to the Arcata Fire Protection District via the 9-1-1 system. Subsequent notifications shall be made to the State OES, and as necessary, the Humboldt County Environmental Health. Employees making the notification shall supply the following information: • Nature of emergency; hazardous material release • Location of the release • Specific hazardous material involved (if known) • Approximate quantity (or potential quantity) involved • Whether or not anyone is injured • Direction for safe approach (upwind, upstream, upgrade)
ASSESSMENT &MITIGATION	Employees, in conjunction with emergency personnel, shall determine the extent of the release for the purpose of determining what resources and level of response will be necessary. From a safe location employees shall: • Determine the size of the container that is leaking; estimate the time required for the complete contents to leak. • Refer to the specific response table based on the physical state of the material released. Employees shall contain a release at a safe distance and/or stop the continued release of a hazardous material only when they can do so within the scope of their training, capabilities, and resources

	available at the time. Employees may utilize one, or some combination, of the following to contain or stop a release. • Use of absorbent dikes to stem flow • Close flow control valves • Reposition container to keep hole above liquid level • Close doors/windows to room/building • Block off storm drains, floor drains
In the event of Personal Contamination: Rinse with Running Water for a Minimum of 15 Minutes	

IF a GAS RELEASE	
SAFETY ***ISOLATE***	Evacuate the immediate vicinity/location of the release; don the appropriate PPE.
NOTIFY	MCSD Office: 839-3251 Hazardous Material Response Team 9-1-1 or 707-441-4000 Fire Department: 9-1-1, 839-2432 State EOS: (800) 852-7550 Co. Environmental Health: 445-6215 State Dept. Fish &Wildlife: 445-6493; 445-7505
ASSESS	Employees in conjunction with emergency personnel shall determine the extent of the release for the purpose of determining what resources and level of response will be necessary.
SETUP SAFETY/ SUPPORT ZONE PERIMETER	Safety perimeters shall be established and setup in coordination with emergency responders and the Emergency Response Guidebook. **Chlorine**: Isolate initially to 100-200 meters **Sulfur Dioxide**: Isolate initially to 100-200 meters **Propane**: Isolate initially to 50-100 meters

	Unknown: Isolate Immediately for 50-100 meters Portable monitoring instruments: Chlorine: 0.5 ppm Sulfur Dioxide: 2 ppm Propane: <20%LEL
MITIGATION TIMES	**a) If a gaseous release** (vs. liquefied Cl_2, SO_2, or propane) • 0.34 inch diameter hole will release at the average rate of about 20lbs/minute • 1 ton cylinder will empty in approximately 100 minutes **NOTE:** The actual release time will probably be less because not all the gas will be released; the leak will stop once the tank pressure equals atmospheric pressure. **b) If liquid gas leaks** through a 0.34 inch diameter hole • 1 ton cylinder will empty in approximately 9 minutes **NOTE:** If the release is to last less than 15 minutes, then establish a safe perimeter upwind and do not attempt mitigations.
RELEASE LASTING > 15 MINUTES	Determine what level of protection or PPE will be required if the release is expected to last longer than 15 minutes. a) EPA Level A PPE(when highest level of respiratory, skin, eye and mucous membrane protection is needed): Required if the release is in a building that cannot be aggressively ventilated or the airborne concentration in the release area exceed the following; • Chlorine – 5ppm • Sulfur Dioxide – 20ppm b) EPA Level C PPE(when the airborne substance is known, concentration measured, criteria for using air-purifying respirators met, and skin and eye exposure is unlikely. Periodic monitoring of the air must be performed)

	• Chlorine - >0.5ppm, <5ppm • Sulfur Dioxide - >2ppm, <20ppm
FOR PROPANE RELEASE	a) If the concentration of propane at the release area exceeds 20% of the Lower Explosive Limit (LEL), then vacate the area and notify the Fire Department and propane vendor. b) If the concentration of propane at the release area remains below 20% of the LEL, then don appropriate EPA Level D PPE Protection (primarily a work uniform), and continue to monitor with the Combustible Gas Indicator (CGI). Call fire department for onsite emergency stand by.
In the event of Personal Contamination: Rinse with Running Water for a Minimum of 15 Minutes	

Appendix C

Process Safety Management Plan & Program 3 Prevention Plan

(See Process Safety Management Plan Program 3 Prevention Program of the MCSD CalARP Program)

Appendix D

Oscar Larsen & Associates Disinfection Alternatives Study