



Risk Management Plan

Zoning Administrator Permit Support Report

**Neuralink
7400 Paseo Padre
Fremont, CA 94555**

**Project Number: PR-000725
Revision: D**

Date Prepared: March 14, 2018

Prepared by:



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Section One

Preface

EXP and Otis Institute, Inc. prepared this Risk Management Plan (RMP) for Neuralink, for their planned lab and office facility located at 7400 Paseo Padre Parkway, Fremont, CA 94555. This RMP was developed in response to a request from the City of Fremont.

The following Risk Management Plan (RMP) has been prepared to address increased storage and use of hazardous production materials (HPM) at the facility in support of the Conditional Use Permit (CUP) application. Neuralink has been required to go through the Conditional Use Permit (CUP) process for the proposed facility retrofit due to increase in the quantities of hazardous materials which shall exceed the existing quantity ranges for zoning purposes.

Although Neuralink quantities are below the California Accidental Release Prevention (CalARP) Program threshold limits the release scenarios provided within this document were developed per the following regulatory requirements:

- The California Accidental Release Prevention (CalARP) Program, Pursuant of Title 19, Division 2, Chapter 4.5.

This RMP will cover the release of the following hazardous production materials and quantities:

- Silane (10% in N₂) Gaseous (133 ft³)
- Chlorine Liquefied Gas (30 lbs.)
- Hydrogen Gaseous (213 ft³)
- Boron Trichloride Liquefied Gas (40 lbs.)
- Hydrogen Bromide Liquefied Gas (30 lbs.)

Section Two

Executive Summary

Neuralink is located at 7400 Paseo Padre Parkway, Fremont, CA 94555; and they design, develop, test and manufacture medical devices. Neuralink plans to retrofit an existing building and construct new exterior gas pad and chemical storage units to expand the current facility.

As a new Neuralink facility, no previous incidents or accidents have occurred.

The following Risk Management Plan (RMP) has been prepared to address increased storage and use of hazardous production materials (HPM) at the facility in support of the Conditional Use Permit (CUP) application. Neuralink has been required to go through the Conditional Use Permit (CUP) process for the proposed facility retrofit due to increase in the quantities of hazardous materials which shall exceed the existing quantity ranges for zoning purposes.

The project also includes various hazardous materials. Although the quantities of these materials would not typically trigger a RMP, the City of Fremont has requested a limited RMP be prepared, with the potential offsite consequences presented, in conjunction with the CUP application to meet the City of Fremont Planning Department's requirements for the increased quantity range of all materials.

As outlined in this RMP, the types and quantities of hazardous materials proposed to be stored and used in the processes at the site shall not impact public or environmental receptors as defined by CalARP regulations.

Regardless, Neuralink shall implement various administrative procedures to prevent an accidental release and shall provide extensive automatic and passive engineering controls to mitigate and abate any accidental release. In addition, Neuralink shall develop and implement an emergency response plan that shall enable them to respond to a release by a trained onsite emergency response team (ERT).

Planned Mitigation Measures

Mitigation measures for all hazardous gases shall include gas cabinets, an exhaust system, restrictive flow orifices (RFO), fire sprinklers, emergency alarm system and emergency shutdown control valves. The gas supplier shall deliver gas cylinders equipped with RFO's, so the cylinders cannot physically release the entire contents within the 10-minutes used in the "worst-case" release scenario. In addition, the gas cabinets shall be continuously exhausted to a treatment/dilution system capable of reducing the concentration of such a release to less than 50% IDLH at the point of discharge to the atmosphere in accordance with the 2016 California Fire Code Chapter 60, let alone at the property line or public receptors referenced by CCR Title 19, Division 2, Article 4 Section 2750(c)(2) for the RMP.

The exhaust shall also be equipped with gas detection that shall continuously monitor for leaks and automatically shut off the gas cylinder supply upon gas detection. The gas cylinder supply shall also be shut off in the event of seismic activity, loss of power, loss of exhaust or upon activation of a manual emergency shut off control.

The following table documents the % IDLH concentration at discharge out of the exhaust point on the roof utilizing the RFO listed for each cylinder.

Table 1: 50% IDLH Calculation Verification



**Neuralink
7400 Paseo Padre
Fremont, CA 94555**

Toxic Gas/Dilutant Gas	Chlorine	Boron Trichloride	Hydrogen Bromide
IDLH	10	100	30
% Concentration	100%	100%	100%
Mol. Wt. Mix	70.9	117.17	80.9
Pressure (PSIG)	113.4	40	320
RFO (in.)	0.005	0.01	0.005
RFO Radius ² (28.96/Mol Wt) ^{1/2}	0.0000625	0.000025	0.0000625
Pi	0.639110807	0.497154144	0.598308287
Gas Flow (scfh)	3.141592654	3.141592654	3.141592654
Gas Flow (scfm)	1.1	1.2	2.9
Gas Flow per Cylinder (scfm)	0.018	0.020	0.048
Gas Flow per Cylinder (slm)	0.515	0.565	1.361
# of Cylinders	1	1	1
Total Gas Flow (scfm)	0.0	0.0	0.0
Total Gas Flow (slm)	0.52	0.57	1.36
Exhaust Flow (cfm)	6,000	6,000	6,000
Conc Before Scrubber (ppm)	3.0	3.3	8.0
% Scrubber Efficiency	0%	0%	0%
Concentration @ Discharge to Atm (ppm)	3.0	3.3	8.0
Concentration @ Discharge to Atm (%IDLH)	30.3%	3.3%	26.7%

Signature of Preparer and Date:

Name & Title

Troy Christensen 3/13/18

**Troy Christensen, PE,
Managing Principal
Otis Institute, Inc.
399 Fremont Street #1101 • San Francisco, CA 94105**



The Department of Transportation requires extensive drop testing for each cylinder to determine the cylinder's integrity from impact. These tests determine how the cylinder will handle traffic accidents or simple dropping. Each cylinder is capped so the valves are not exposed, and it's very difficult to rupture the cylinder during transportation or handling. Each cylinder meets or exceeds the drop testing requirements before they are placed in service, therefore a cylinder rupture should never occur. Each flammable and toxic gas cylinder has an RFO installed by the supplier and therefore the worst-case scenarios documented on the next page will not occur.

Section Three

Offsite Consequence Analysis Component

Summary of Release Scenarios — Toxic and Flammable Gases

The offsite consequences analysis for gases includes three release scenarios. One is based on a "worst-case" scenario wherein the largest container ruptures and the entire contents are released, unabated, over a 10-minute period. This is modeled using RMP*Comp in accordance with CALARP requirements. One "alternate" scenario is also presented based on a sustained release at the maximum flow rate from the cylinder (using RMP*Comp).

Maximum Aggregate Quantities and Container Sizes — Hazardous Gases

The worst-case release scenarios are based on the following Maximum Aggregate Quantities and Container Sizes:

Chemical	Federal Threshold Quantities lbs.	State Threshold Quantity lbs.	Maximum Aggregate Quantity lbs.	Maximum Container Size (lbs.)	Maximum Amount per Process (lbs.)
Silane (10% in N2)	10,000	N/A	3.33	1.11 ^a	1.11 ^a
Chlorine	10,000	100	30	30	30
Hydrogen	10,000	10,000	2.38	1.19	1.19
Hydrogen Bromide	NA	NA	30	30	30
Boron Trichloride (BCl3)	5,000	500	40	40	40

N/A — Not Applicable

^a Quantity (lbs.) of silane in cylinder containing 10% SiH₄ in balance of Nitrogen

Worst-Case Release Scenario — Toxic and Flammable Gases

The worst-case release scenario is defined by California Code of Regulations Title 19, Division 2, Article 4 Section 2750.3(c)(1) based on "a release of the entire contents of the single largest vessel over a 10-minute period unless passive mitigations systems are in place" and is modeled using RMP*Comp and EPA's ALOHA Program. 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 real or potential chemical release, and then it will generate threat zone estimates for various types of hazards. ALOHA can model toxic gas clouds, flammable gas clouds, BLEVEs (Boiling Liquid Expanding Vapor Explosions), jet fires, pool fires, and vapor cloud explosions. The threat zone estimates are shown on a grid in ALOHA.

At Neuralink, all hazardous gases in use shall be located within gas cabinets meeting the criteria for passive mitigation systems in accordance with CCR Title 19 Article 4 Section

2735.3 where once installed, the cylinders are regulated as stationary sources under CalARP regulation.

For all gases, the largest single vessel is based on standard cylinder volumes and the number of cylinders connected to one process. For gas mixtures, the quantity released, and the resulting endpoints are calculated based on the mass of the component within the system.

For Toxic gases, the Toxic endpoint (TE) is based on Section 2750.2 of this chapter referencing, Appendix A to Title 19, Division 2, Chapter 4.5 "Table of Toxic Endpoints" of the CalARP Program. Hydrogen bromide was not listed in CalARP, so the toxic endpoint was calculated as 1/3 of IDLH or 10 ppm.

The endpoint for flammable gases is the distance to an overpressure of 1 psi based on a vapor cloud explosion assuming a yield factor of 10% of the available energy released in accordance with RMP guidelines.

Alternative Release Scenario – Hazardous Gases

The "alternate" scenario is based on a sustained release at the maximum flow rate from the cylinder at the full cylinder pressure without taking into consideration decreases in cylinder pressure, adiabatic cooling affects or any engineering controls. Where the cylinders are equipped with a reduced flow orifice the release rate is based on the maximum flow rate through the RFO.

Alternate release scenario #1 is modeled using RMP*Comp's alternative release program and EPA's ALOHA program. The duration is based on the entire contents being released at the maximum flow rate.

Hazard Assessment – Toxic and Flammable Gases

The offsite consequence analyses are presented in the following tables. Table-1 identifies the Results of Consequence Analysis for a Flammable Gas Vapor Cloud Explosion and the Estimated Distance to Significant Overpressure (1 psi). Table 2 identifies the Results of Consequence Analysis for Toxic Gases at the toxic end point defined by Appendix A.

Table 2 – RMP* Comp Results – Flammable Gases

GAS Total Quantity of Release, Maximum Rate of Release	Release Scenario / Dispersion Model	Release or Release Rate	Release Duration	Est. Distance to 1 psi overpressure
10% SILANE (SiH4) in N2 1 x 133 ft ³ cylinder (mix) (1.11 lbs. of SiH4), 0.06" RFO @ 1,650 psig (7.784 CFM or 0.537 lbs./min)	Worst-Case RMP*Comp	1.11 lbs. of Silane.	10 min	0.008 miles
	Alternate- 1 RMP*Comp	0.537 lbs./min	2.07 min	0.006 miles
HYDROGEN (H2) 1 x 213 ft ³ cylinder (1.19 lbs.), 0.06" RFO @ 2,200 psig (302.6 CFM or 20.879 lbs./min)	Worst-Case RMP*Comp	1.19 lbs.	10 min	0.010 miles
	Alternate- 1 RMP*Comp	20.879 lbs./min	0.057min	0.008miles

Table 3 – RMP* Comp Results – Toxic Gases

GAS Total Quantity of Release, Maximum Rate of Release	Release Scenario / Dispersion Model	Release or Release Rate	Release Duration	Est. Distance to Toxic End Point
<p>CHLORINE (Cl₂)</p> <p>1 x 30 lbs. cylinder, 0.005" RFO @ 113.4 psig (0.018 CFM or 0.00365 lbs./min) Toxic End Point 0.0087 mg/l or 3 PPM</p>	Worst-Case-I RMP*Comp	30 lbs. (Calculated by RMP Comp 1.65 lbs./min)	10 min.	0.1 miles
	Worst-Case-II ALOHA	1.65 lbs./min	10 min.	293 yards 0.17 miles
	Alternate-I RMP*Comp	0.00365 lbs./min	8223 min.	<0.1 miles
	Alternate-II ALOHA	0.00365 lbs./min	8223 min.	<10.9 yards <0.006 miles
<p>Hydrogen Bromide (HBr)</p> <p>1 x 30 lbs. cylinder 0.005" RFO @ 320 psig (0.048 CFM or 0.00992 lbs./min) Toxic End Point Not Listed in CalARP used 1/3 IDLH = 10 PPM</p>	Worst-Case-I ALOHA	30 lbs. 3 lbs./min	10 min.	199 yards 0.11 miles
	Alternate-I ALOHA	0.00992 lbs./min	3022 min.	<10.9 yards <0.006 miles
<p>Boron Trichloride (BCl₃)</p> <p>1 x 852 ft³ cylinder (40 lbs.), 0.01" RFO @ 40 psig (0.02 CFM or 0.00166 lbs./min) Toxic End Point 0.01 mg/l or 2.1 PPM</p>	Worst-Case-I RMP*Comp	40 lbs. (Calculated by RMP Comp 2.2 lbs./min)	10 min.	0.3 miles
	Worst-Case-II ALOHA	2.2 lbs./min	10 min.	313 yards 0.18 miles
	Alternate-I RMP*Comp	0.00166 lbs./min	24140 min.	<0.1 miles
	Alternate-II ALOHA	0.00166 lbs./min	24140 min.	<10.9 yards <0.006 miles

Note: that RMP*Comp for toxic gases no matter the quantity or flow rate released will show <0.1 miles in the results. Copies of the RMP*Comp and ALOHA results are provided in Attachment One.

The following Figures 1-7 show the maps of the worst-case scenarios and Figures 8-11 show the maps of the alternative worst-case scenarios.

MARPLOT Maps - Worse Case Release Scenarios

Figure 1: RMP*Comp - 10% Silane (SiH4) in N2

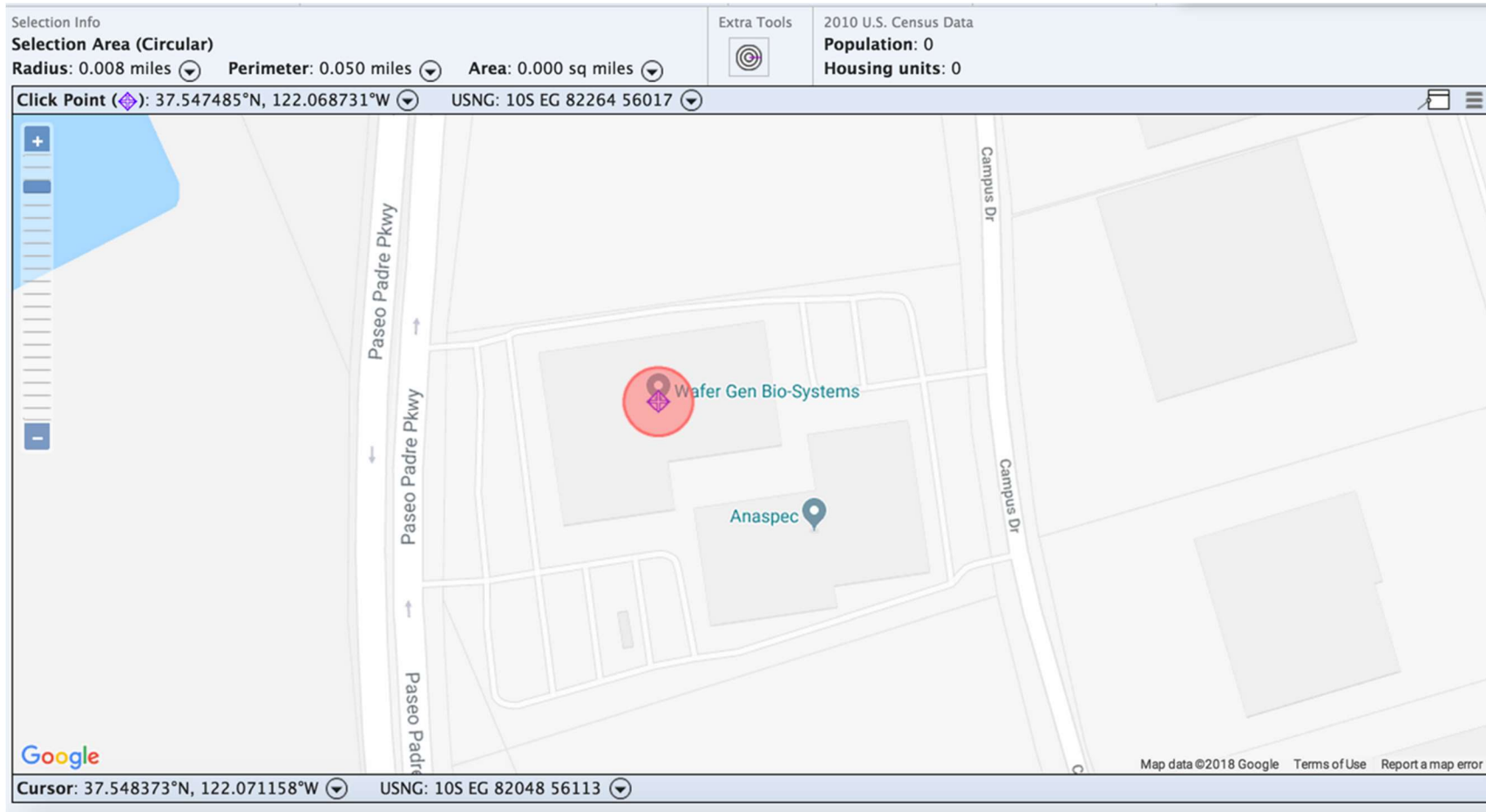


Figure 2: RMP*Comp - Hydrogen (H2)

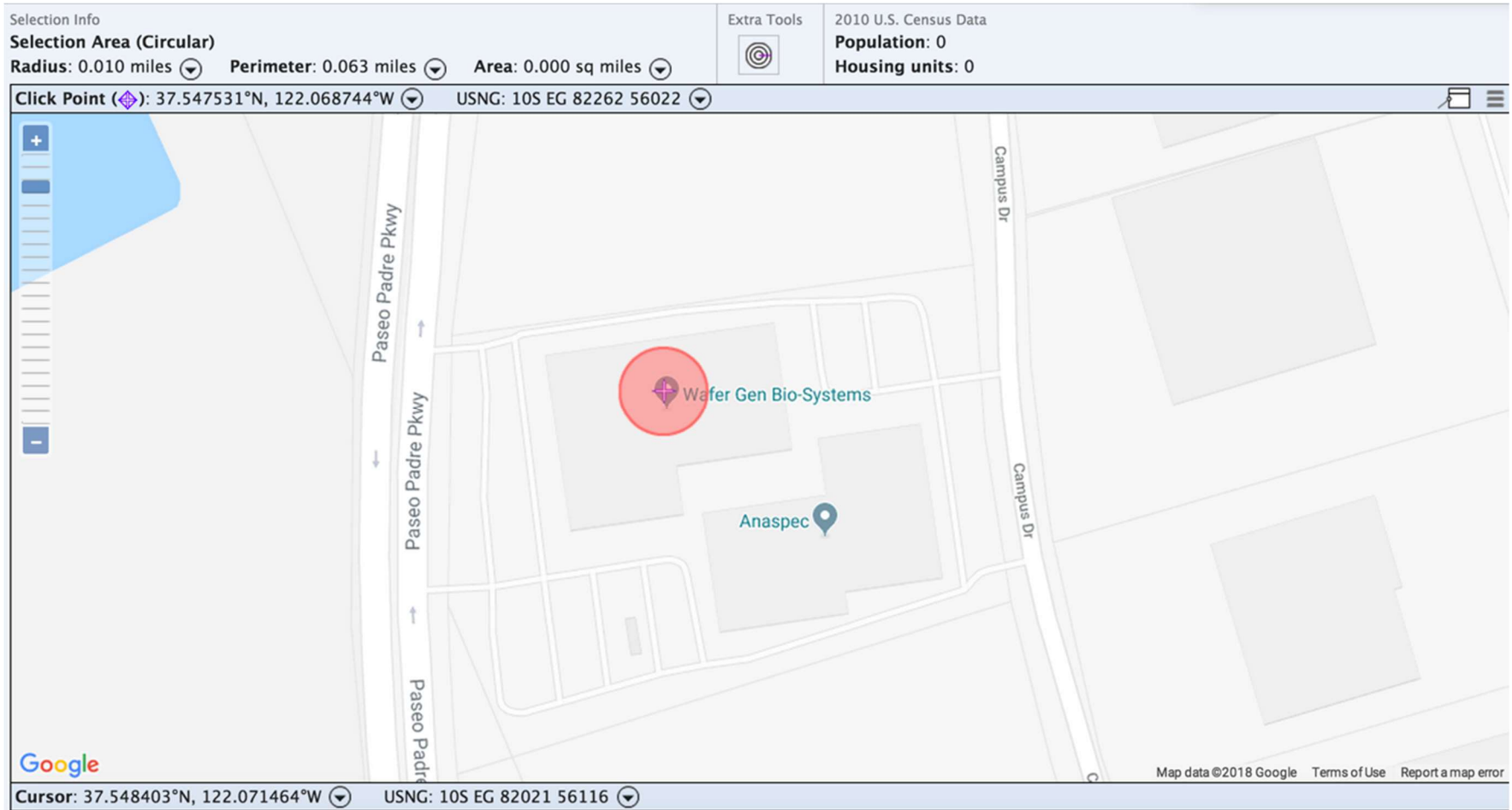


Figure 3: RMP*Comp - Chorine (Cl2)

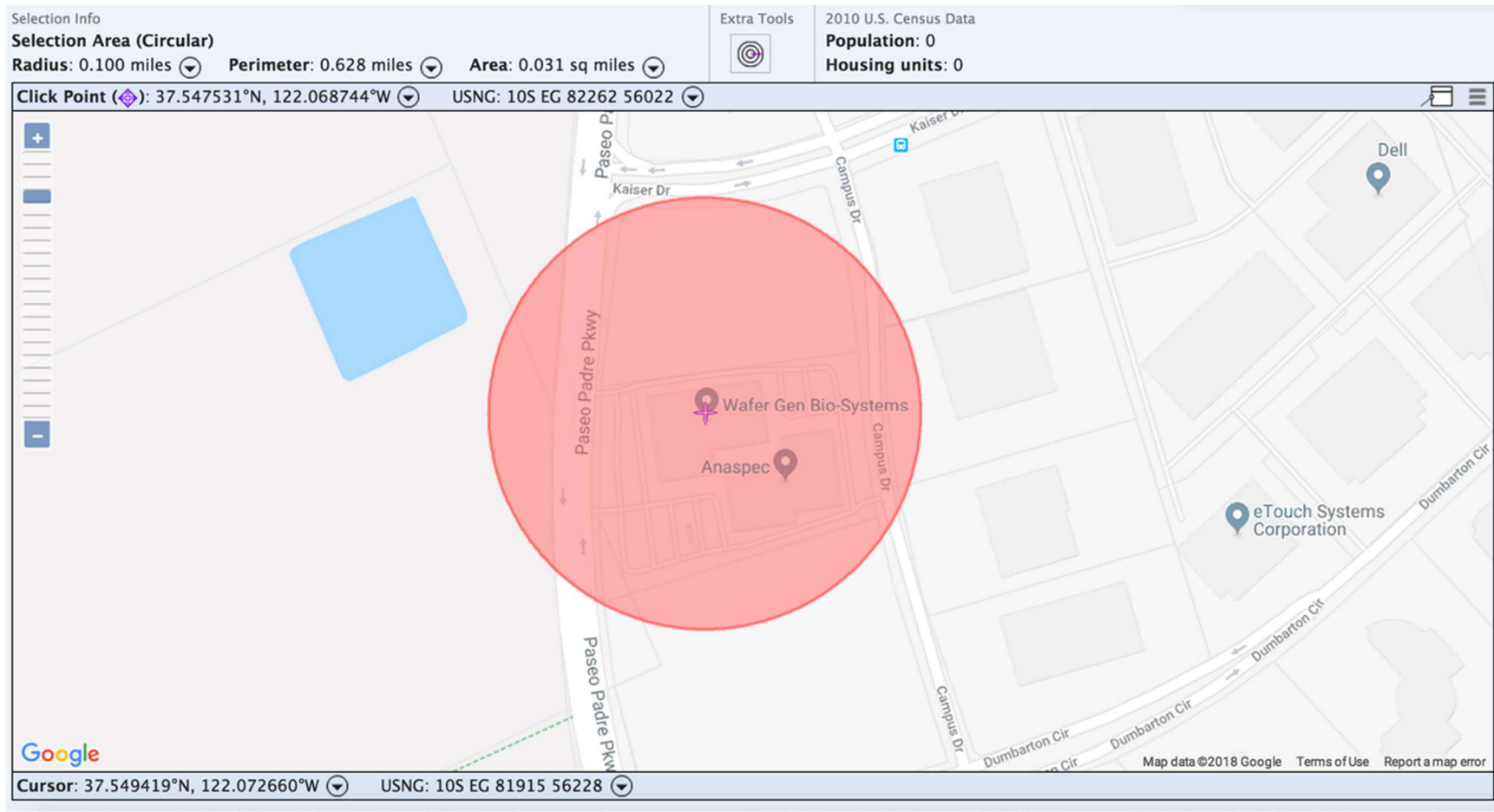


Figure 4: ALOHA - Chlorine (Cl2)

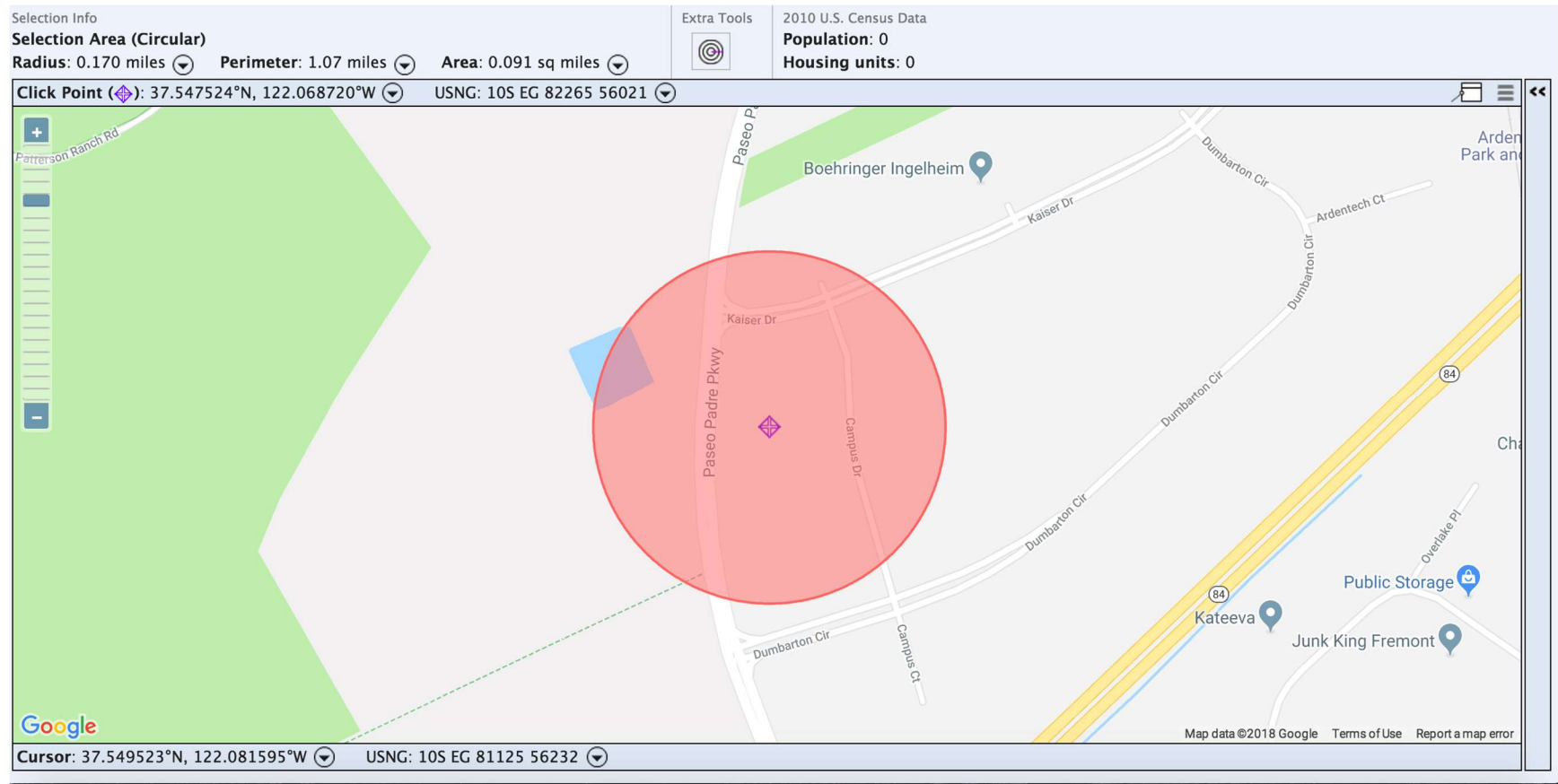


Figure 5: RMP*Comp - Boron Trichloride (BCI3)

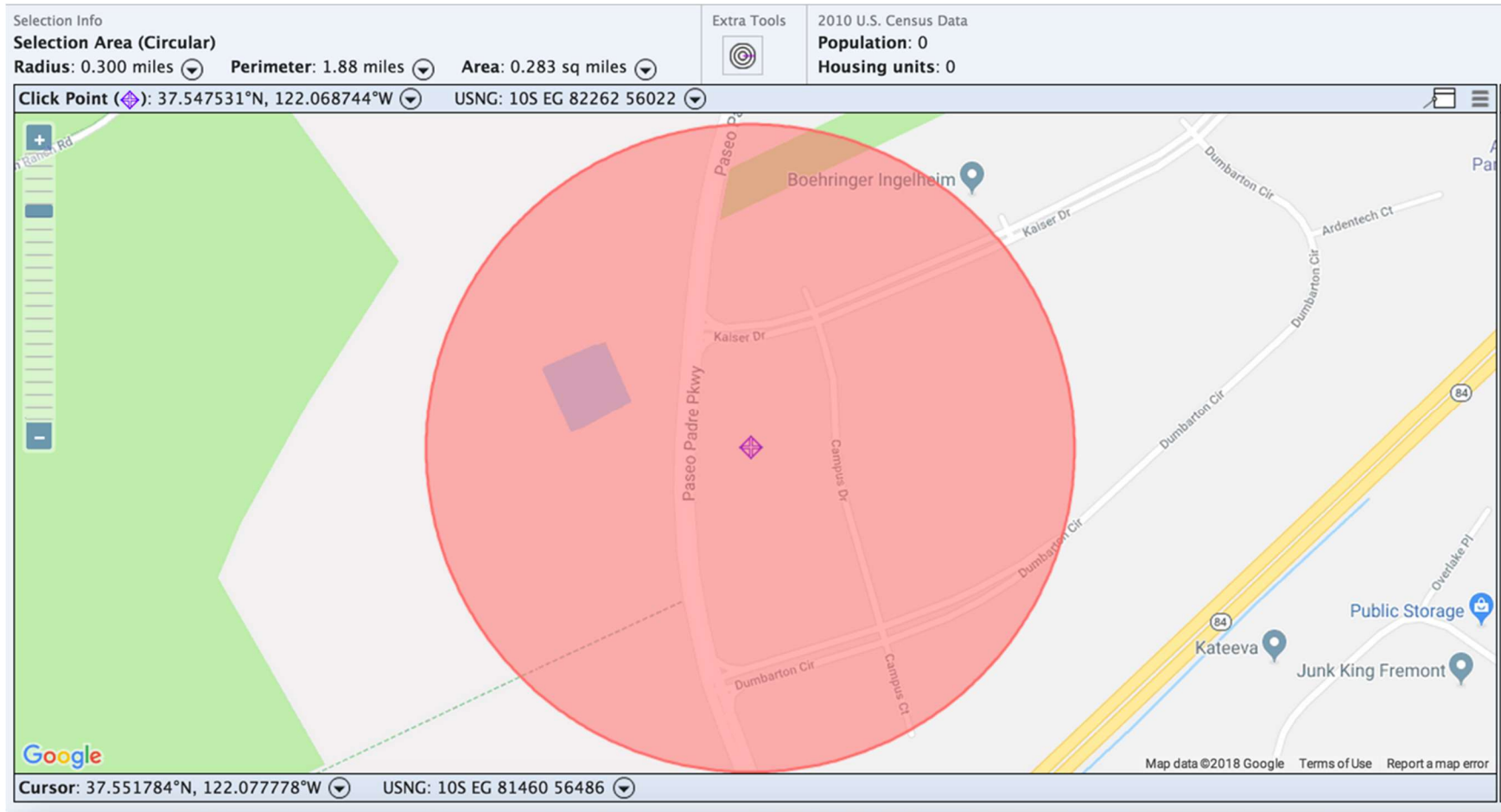


Figure 6: ALOHA - Boron Trichloride (BCI3)

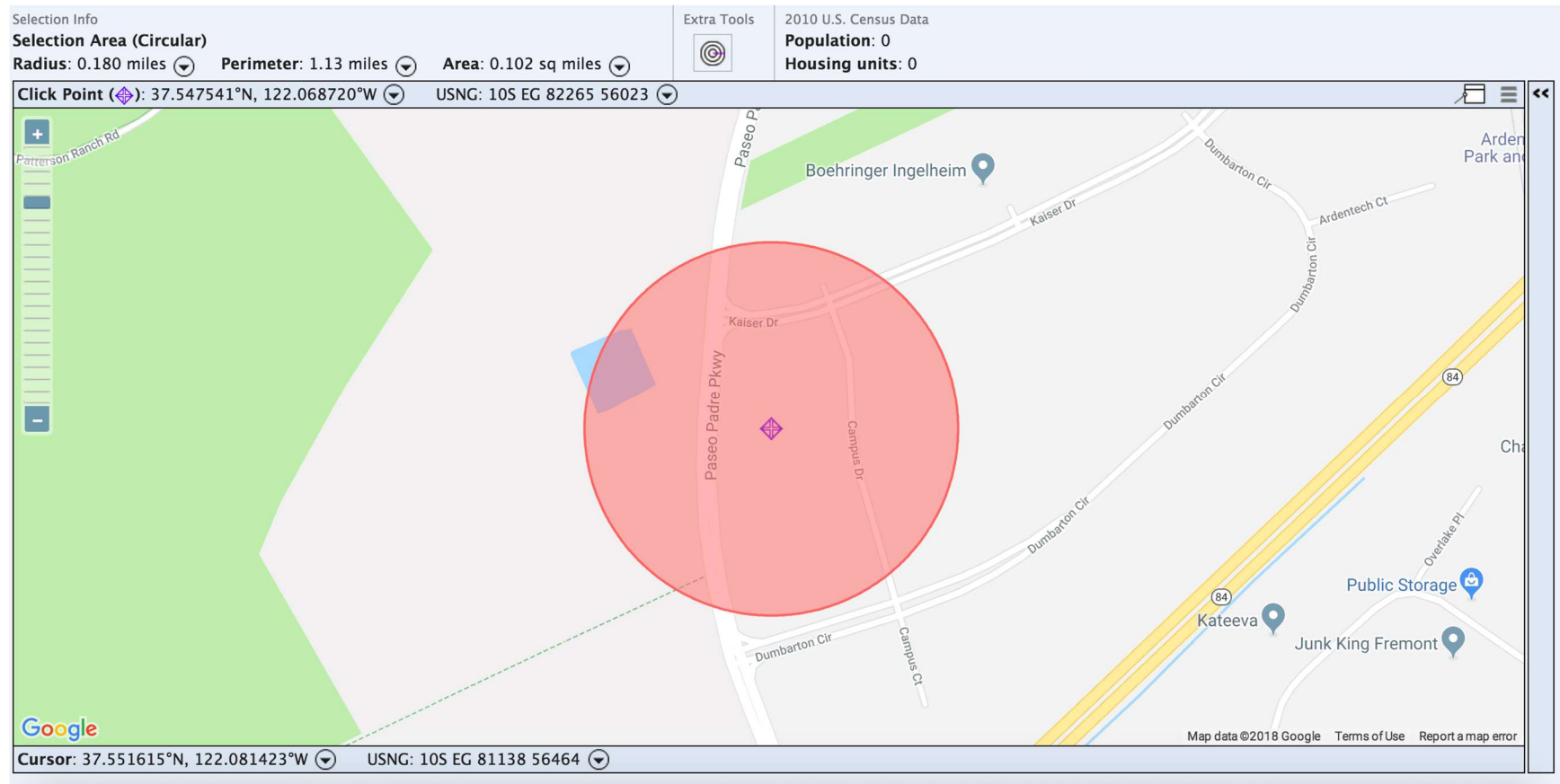
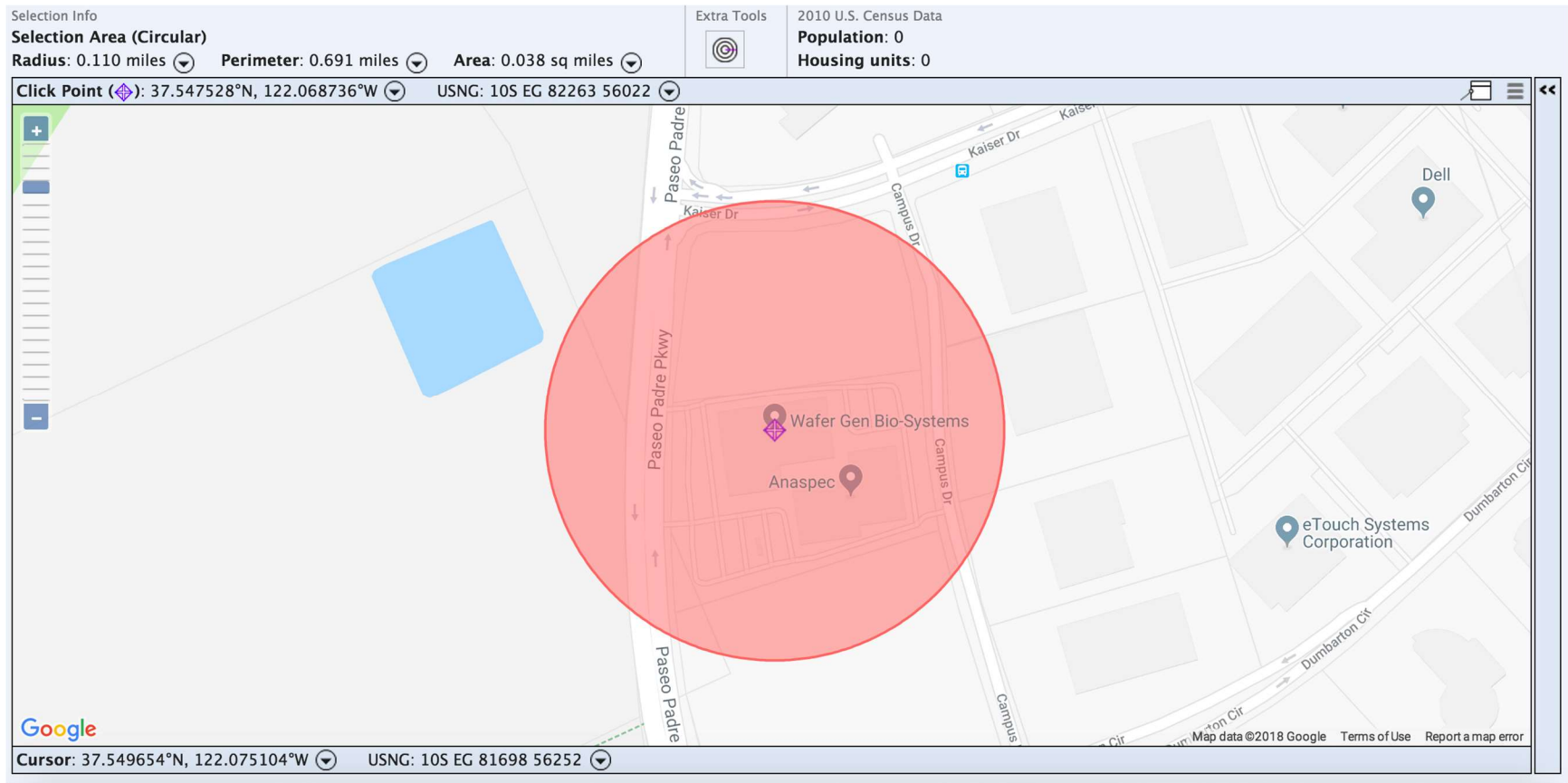


Figure 7: ALOHA - Hydrogen Bromide (HBr)



MARPLOT Maps - Alternative Case Release Scenarios

Figure 8: RMP*Comp - 10% Silane (SiH4) in N2

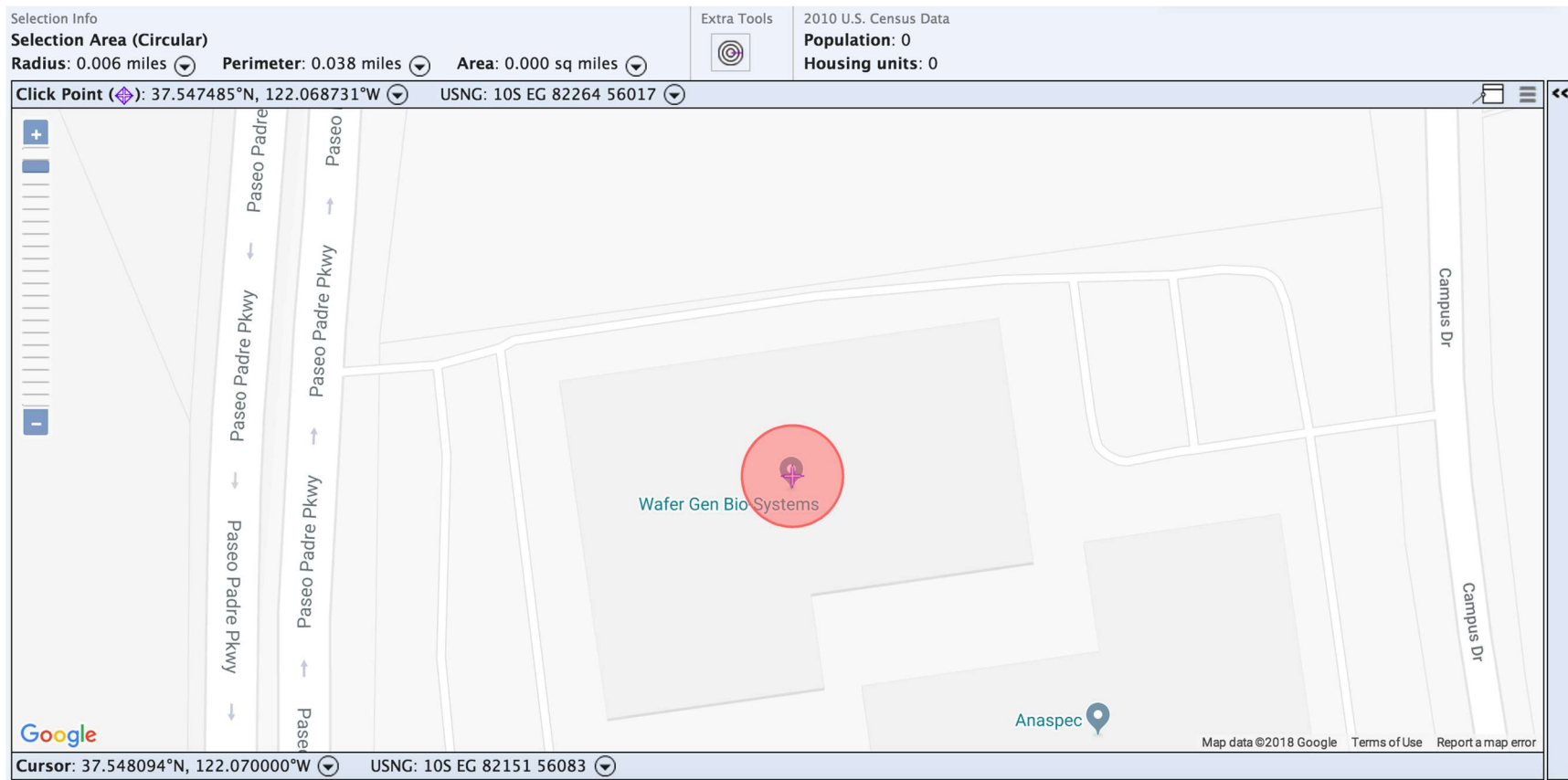


Figure 9: RMP*Comp - Hydrogen (H2)

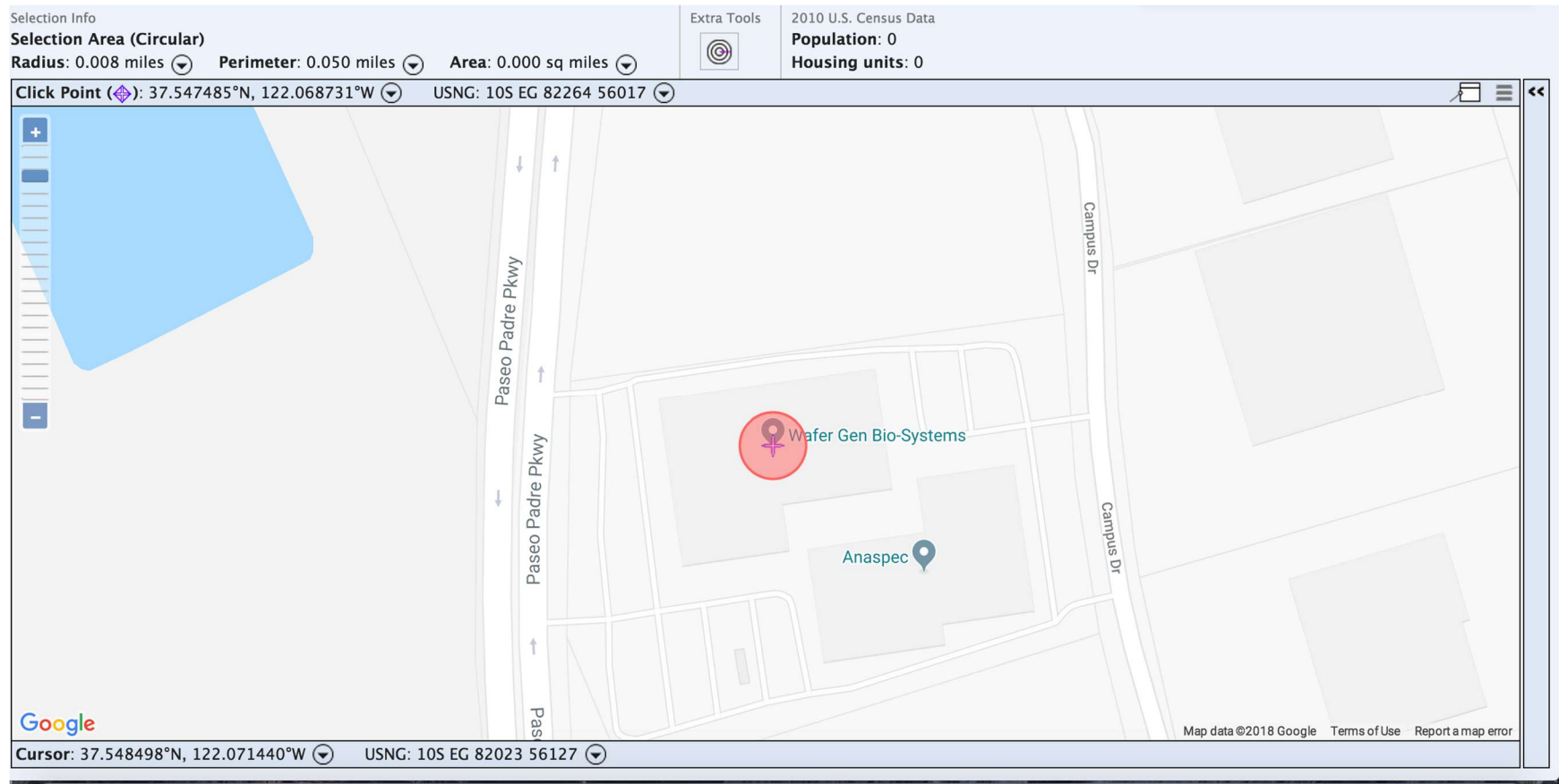


Figure 10: RMP*Comp - Chlorine (Cl2) - Boron Trichloride (BCl3)

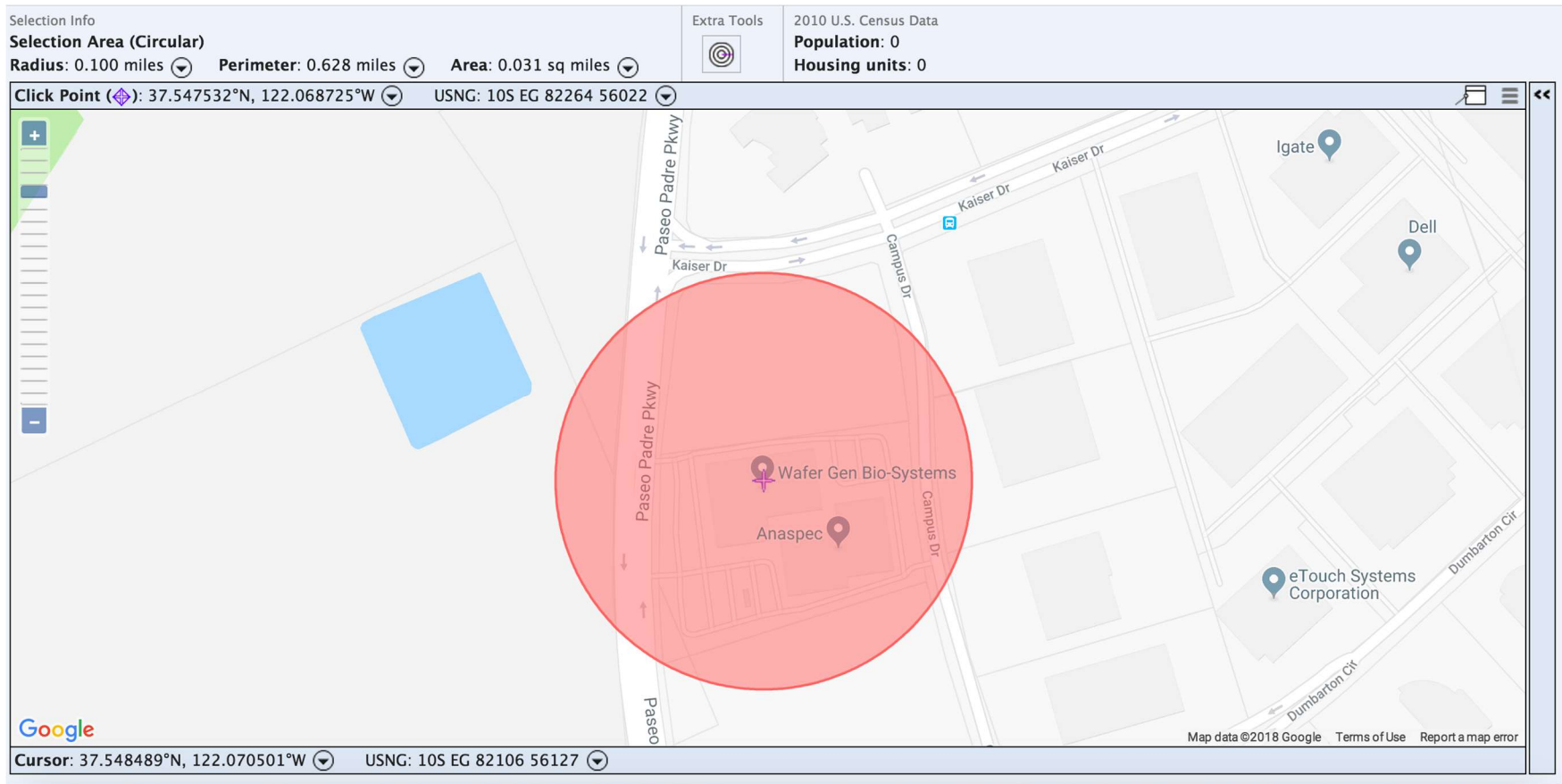
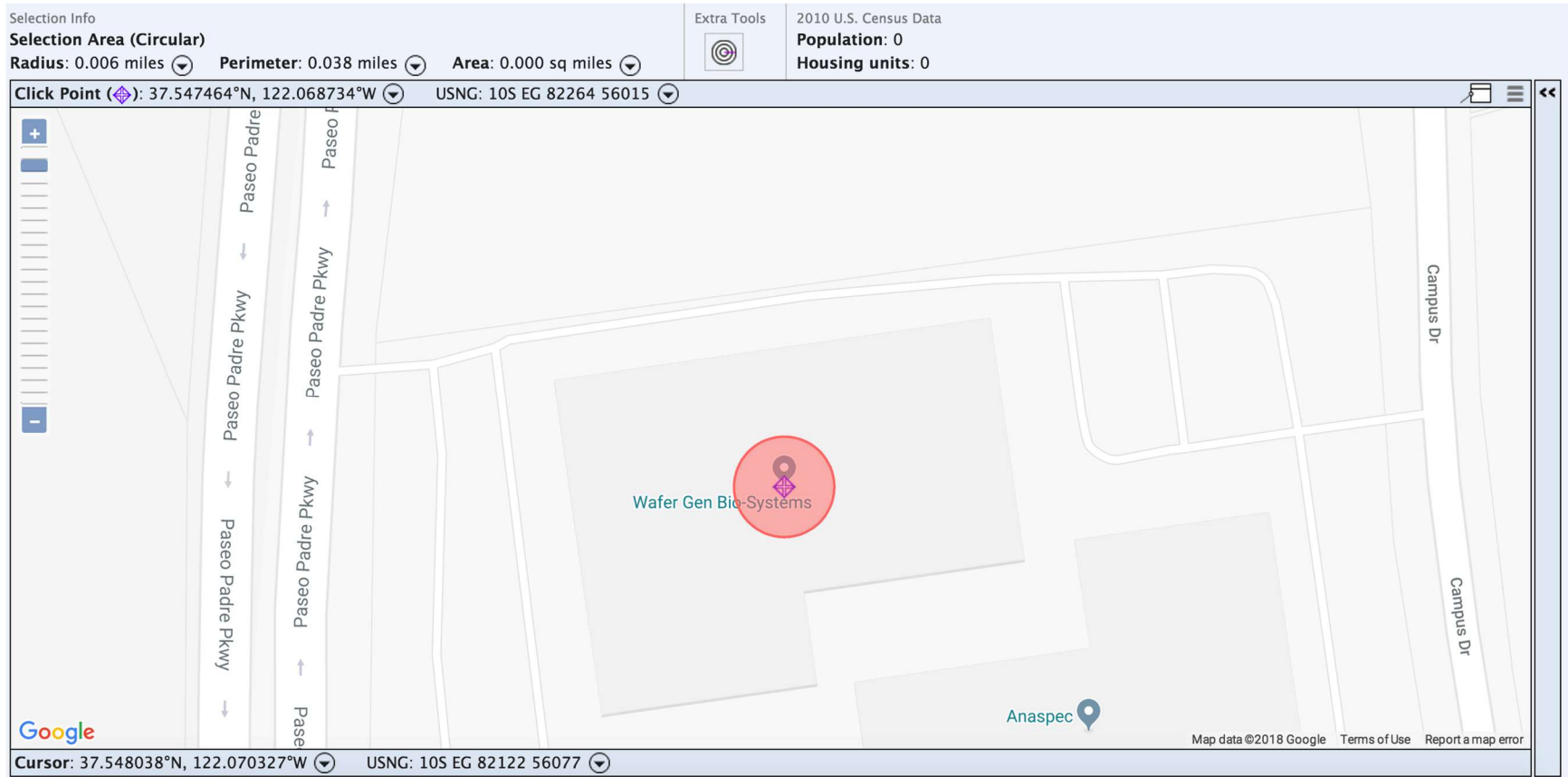


Figure 11: ALOHA - Chlorine (Cl₂) - Boron Trichloride (BCl₃) – Hydrogen Bromide (HBr)



Section Four

Offsite Impacts on Population — Hazardous Gases

Population includes residential populations, institutions (such as schools, hospitals, long term health care facilities, child day care facilities, prisons), parks and recreational areas, and major commercial, office, and industrial buildings.

The offsite impacts include the industrial and warehousing buildings located in close proximity to the Neuralink site as shown on the enclosed MARPLOT maps. However, the potentially affected population does not include any residential populations, institutions, parks and recreational areas, or major commercial, office, and industrial buildings with significant occupant loads.

Regardless, Neuralink shall install extensive automatic and passive engineering controls and administrative procedures to prevent an accidental release from occurring. In addition, Neuralink shall implement an emergency response plan to enable them to respond to any release in a timely manner, which shall be executed by a trained onsite emergency response team (ERT).

Offsite Impacts on Environmental Receptors — Toxic Gases

There are no environmental receptors within the worst-case release zone.

Section Five

Summary of Release Scenarios — Toxic Liquids

All incoming hazardous liquid chemicals are expected to be delivered and stored in vessels no larger than 5-gallon with the vast majority of chemicals stored in 1-gallon or 1-liter containers. Based on a worst-case where the largest container ruptures and the entire contents are released, the spill is not expected to extend beyond the immediate spill area and have no off-site impact. Note that all outdoor chemical storage containers will have secondary spill containment in compliance with local and federal codes. A review of the planned chemical inventory resulted in only the following being listed in Table 3 of the CalARP regulations:

- 37% Formaldehyde Solution – 1 Liter Container

Based on the small quantity RMP*Comp would not be accurate. As with the toxic gas evaluated the minimum radius is 0.1 miles for RMP*Comp and therefore Worst-Case Scenario was not calculated using RMP*Comp and engineering judgement was used.

Spent outgoing hazardous liquid waste will be collected in 55-gal (or smaller) drums for removal by a licensed hazardous waste hauler. These drums will be stored in specialty designed containers with built-in secondary containment. Again, based on a worst-case where the largest container ruptures and the entire contents are released, the spill is not expected to extend beyond the immediate spill area and have no off-site impact. The 37% Formaldehyde Solution will be disposed of with other solvent waste and be verify dilute and therefore is not considered a toxic liquid and a release scenario is not required.

Worst-Case Release Scenario — Toxic Liquids

At Neuralink liquids shall be controlled by secondary containment berms, dikes or trenches as passive mitigation control in accordance with CCR Title 19 Article 4 Section 2735.3.

Based on the small quantity RMP*Comp would not be accurate. As with the toxic gas evaluated the minimum radius is 0.1 miles for RMP*Comp and therefore Worst-Case Scenario was not calculated using RMP*Comp and engineering judgement was used.

Offsite Impacts on Population — Toxic Liquids

Population includes residential populations, institutions (such as schools, hospitals, long term health care facilities, child day care facilities, prisons), parks and recreational areas, and major commercial, office, and industrial buildings.

There are no offsite impacts based on the container size and maximum spill of 1 liter.

Regardless, Neuralink shall install automatic and passive engineering controls and administrative procedures to prevent an accidental release from occurring to the population. In addition, Neuralink shall implement an emergency response plan to enable them to respond to any release in a timely manner, which shall be executed by a trained onsite emergency response team (ERT).

Offsite Impacts on Environmental Receptors — Toxic Liquids

There are no environmental receptors based on the container size and maximum spill size of 1 liter.

Section Six

Five-year Accident History

The stationary sources listed herein will not be in operation until 2018. Consequently, no data of incidents and accidents has been documented.

RMP Emergency Response Program

Neuralink will establish a written emergency response program, and it will provide the guidelines for employees to safely control and mitigate an accidental release of hazardous materials. This emergency response plan shall be submitted to the Administering Agency (AA) for approval before implementation. The emergency response plan shall be reviewed annually for updates and significant changes, and it'll be updated and resubmitted to the AA.

The Emergency response program shall include the information as follows:

- Protocol regarding the release of stationary sources listed herein.
- Procedures for public and emergency management services notification
- Protocol for specialized emergency health care for exposed people.

Plan Summary

During a release, Neuralink shall activate the emergency response team and local EMS to contain hazardous materials, evacuate employees and the public, provide rescue operations, and provide a command center.

During a release, Neuralink's ERT shall notify EMS to respond concurrently to facility rescue operations and containment.

Neuralink plans to review and practice evacuation procedures and training annually. During facility evacuation training, employees will understand to evacuate upwind from hazardous materials releases. Employees shall meet and train with ERT members, so employees have confidence in the ERT during a worst-case event. Also, employees will be introduced to Safety Data Sheets, so they understand the hazards associated with chemical handling.

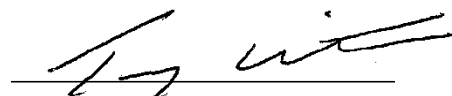
Section Seven

Certification

This is an engineering report of our opinions and conclusions based on the data provided by Neuralink to EPI and Otis Institute, Inc. By this certification, I, Troy Christensen, PE attest that:

- We have reviewed the proposed chemical inventory and have included release scenarios and discussions on all toxic gas and liquids that are listed in Table 3 of the CalARP regulations.
- There is no offsite impact to public receptors or environmental receptors.

It is understood that this certification in no way relieves the owner or operator of this facility to update, track and maintain an accurate inventory and if there is a required increase in the CUP approved inventory range that a new conditional use permit application be submitted for city approval before bringing additional chemicals onsite.



Troy A. Christensen, PE March 14, 2018
Date
California Registered Professional Engineer
C64870



Attachment One

RMP*Comp and ALOHA Results

Toxic Threat Zone

ALOHA® 5.4.7



Time: March 13, 2018 1200 hours PDT (user specified)

Chemical Name: BORON TRICHLORIDE

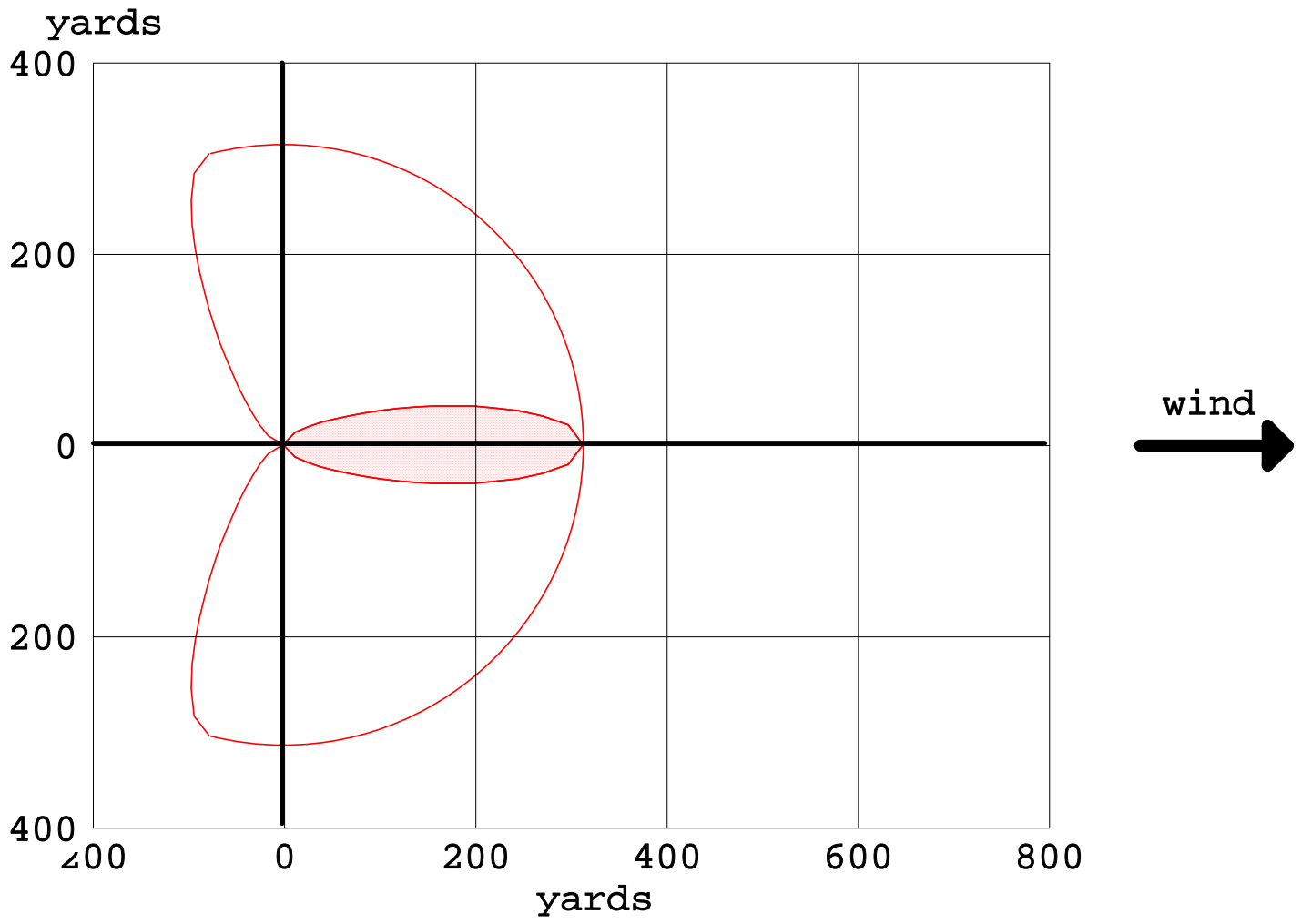
Warning: BORON TRICHLORIDE can react with water and/or water vapor to produce hydrochloric acid and heat. ALOHA cannot accurately predict the air hazard if a reaction occurs.



Wind: 1.5 meters/second from W at 3 meters

THREAT ZONE:

Model Run: Heavy Gas

Red : 313 yards --- (2.1 ppm = PAC-2)



-  greater than 2.1 ppm (PAC-2)
-  wind direction confidence lines

SITE DATA:

Location: FREMONT, CALIFORNIA
Building Air Exchanges Per Hour: 0.28 (sheltered single storied)
Time: March 13, 2018 1200 hours PDT (user specified)

CHEMICAL DATA:

Warning: BORON TRICHLORIDE can react with water and/or water vapor to produce hydrochloric acid and heat. ALOHA cannot accurately predict the air hazard if a reaction occurs.
Chemical Name: BORON TRICHLORIDE
CAS Number: 10294-34-5 Molecular Weight: 117.17 g/mol
PAC-1: 0.19 ppm PAC-2: 2.1 ppm PAC-3: 71 ppm
Ambient Boiling Point: 54.5° 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 W at 3 meters
Ground Roughness: open country Cloud Cover: 5 tenths
Air Temperature: 72° F Stability Class: B
No Inversion Height Relative Humidity: 50%

SOURCE STRENGTH:

Direct Source: 2.2 pounds/min Source Height: 0
Release Duration: 10 minutes
Release Rate: 2.2 pounds/min
Total Amount Released: 22.0 pounds
Note: This chemical may flash boil and/or result in two phase flow.

THREAT ZONE:

Model Run: Heavy Gas
Red : 313 yards --- (2.1 ppm = PAC-2)

Toxic Threat Zone

ALOHA® 5.4.7



Time: March 12, 2018 1200 hours PDT (user specified)

Chemical Name: BORON TRICHLORIDE

Warning: BORON TRICHLORIDE can react with water and/or water vapor to produce hydrochloric acid and heat. ALOHA cannot accurately predict the air hazard if a reaction occurs.

Wind: 3 meters/second from W at 3 meters

THREAT ZONE:

Model Run: Gaussian

Red : less than 10 meters(10.9 yards) --- (2.1 ppm = PAC-2)

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Model Run: Gaussian

Red : less than 10 meters(10.9 yards) --- (2.1 ppm = PAC-2)

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

SITE DATA:

Location: FREMONT, CALIFORNIA
Building Air Exchanges Per Hour: 0.47 (sheltered single storied)
Time: March 12, 2018 1200 hours PDT (user specified)

CHEMICAL DATA:

Warning: BORON TRICHLORIDE can react with water and/or water vapor to produce hydrochloric acid and heat. ALOHA cannot accurately predict the air hazard if a reaction occurs.
Chemical Name: BORON TRICHLORIDE
CAS Number: 10294-34-5 Molecular Weight: 117.17 g/mol
PAC-1: 0.19 ppm PAC-2: 2.1 ppm PAC-3: 71 ppm
Ambient Boiling Point: 54.5° 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 W at 3 meters
Ground Roughness: urban or forest Cloud Cover: 5 tenths
Air Temperature: 72° F Stability Class: D
No Inversion Height Relative Humidity: 50%

SOURCE STRENGTH:

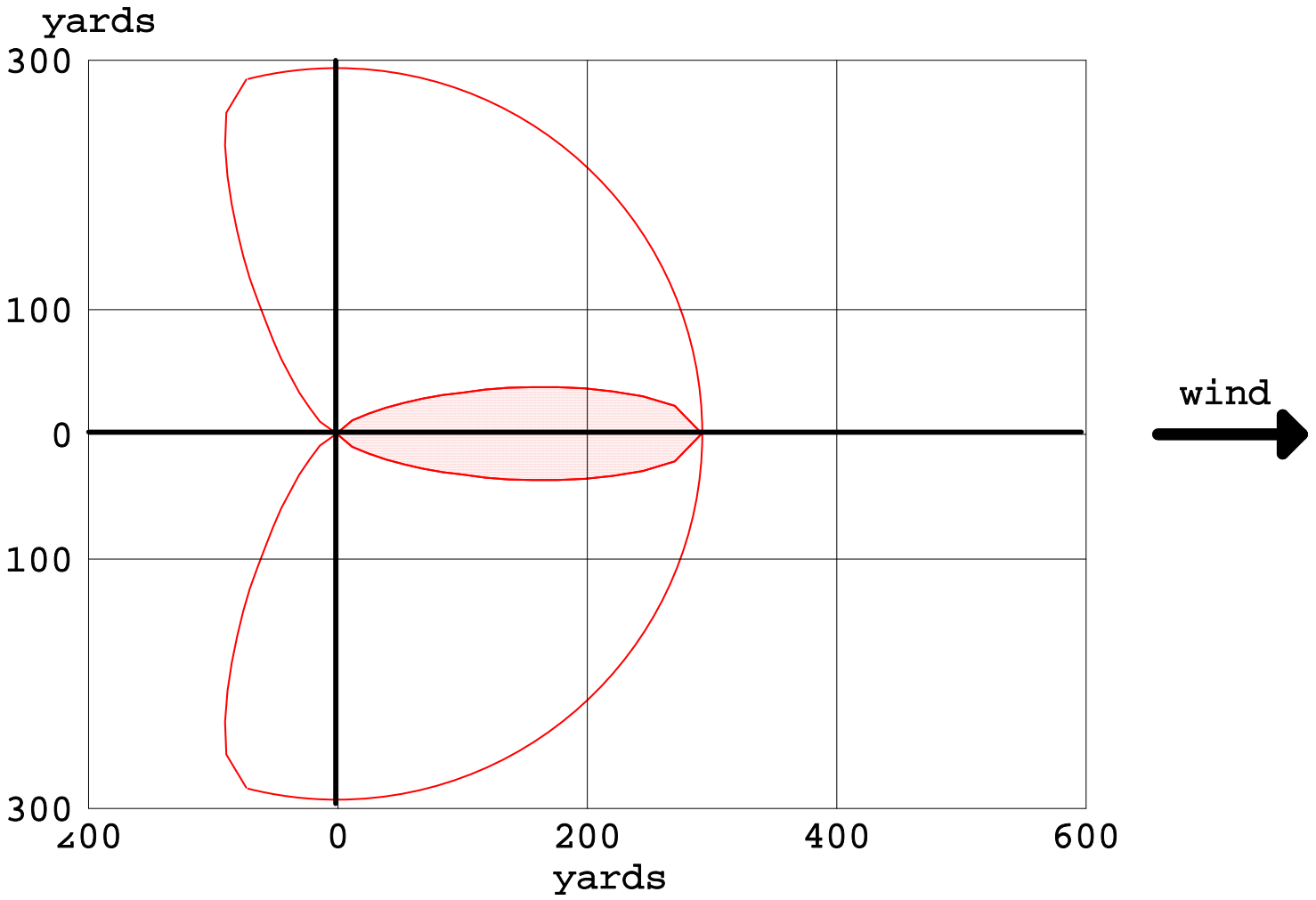
Direct Source: 0.00166 pounds/min Source Height: 0
Release Duration: 60 minutes
Release Rate: 0.00166 pounds/min
Total Amount Released: 0.100 pounds
Note: This chemical may flash boil and/or result in two phase flow.



THREAT ZONE:

Model Run: Gaussian
Red : less than 10 meters(10.9 yards) --- (2.1 ppm = PAC-2)
Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Toxic Threat Zone

Time: March 13, 2018 1200 hours PDT (user specified)
Chemical Name: CHLORINE
Wind: 1.5 meters/second from W at 3 meters
THREAT ZONE:
Model Run: Heavy Gas
Red : 293 yards --- (3 ppm = ERPG-2)



-  greater than 3 ppm (ERPG-2)
-  wind direction confidence lines

Toxic Threat Zone

ALOHA® 5.4.7



Time: March 13, 2018 1200 hours PDT (user specified)

Chemical Name: CHLORINE

Wind: 3 meters/second from W at 3 meters

THREAT ZONE:

Model Run: Gaussian

Red : less than 10 meters(10.9 yards) --- (3 ppm = ERPG-2)

Note: Threat zone was not drawn because effects of near-field patchiness
make dispersion predictions less reliable for short distances.

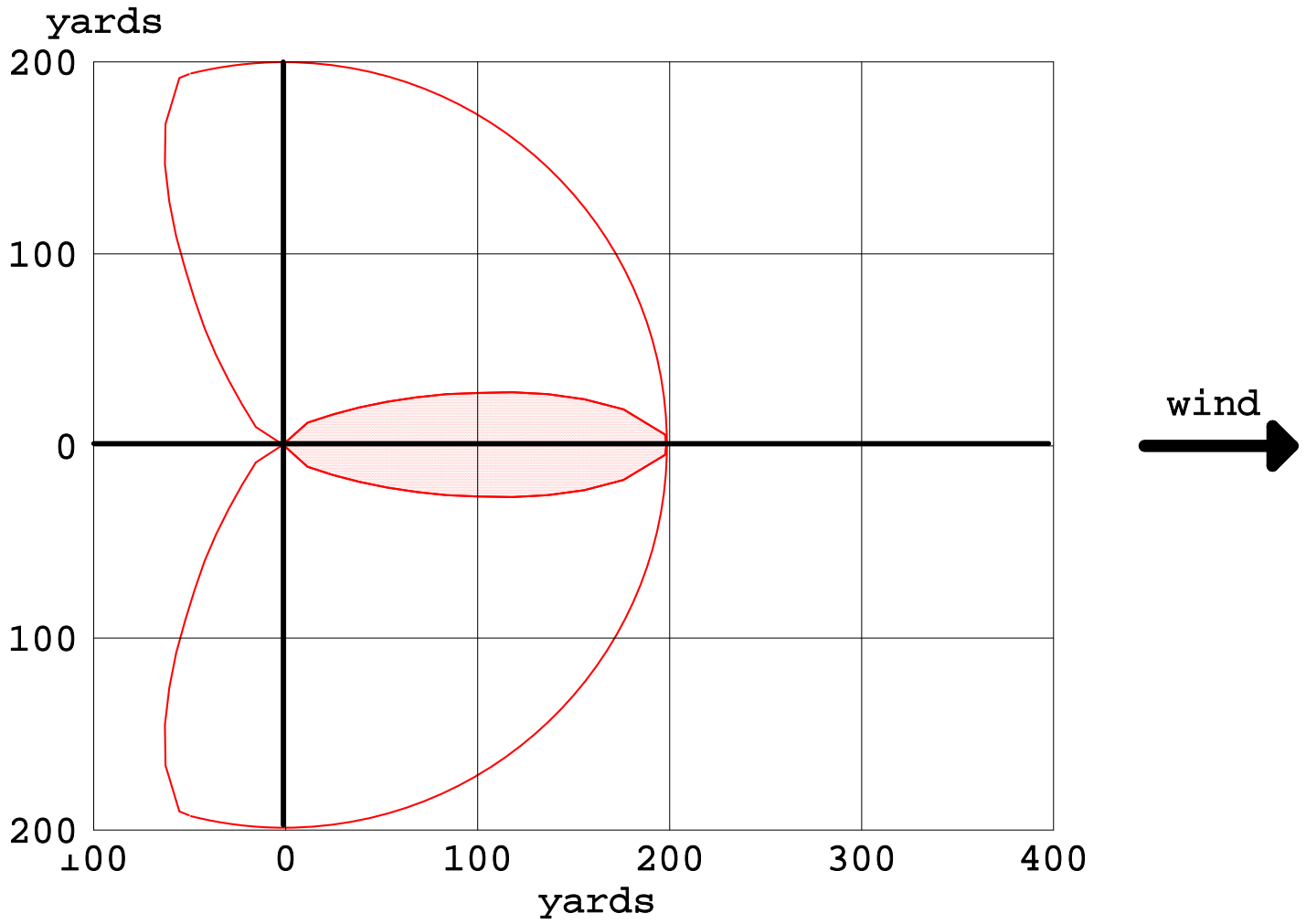
Model Run: Gaussian



Red : less than 10 meters(10.9 yards) --- (3 ppm = ERPG-2)

Note: Threat zone was not drawn because effects of near-field patchiness
make dispersion predictions less reliable for short distances.

Toxic Threat Zone

Time: March 13, 2018 1200 hours PDT (user specified)
Chemical Name: HYDROGEN BROMIDE
Wind: 1.5 meters/second from W at 3 meters
THREAT ZONE:
Model Run: Heavy Gas
Red : 199 yards --- (10 ppm)



-  greater than 10 ppm
-  wind direction confidence lines

Toxic Threat Zone

ALOHA® 5.4.7



Time: March 13, 2018 1200 hours PDT (user specified)

Chemical Name: HYDROGEN BROMIDE

Wind: 3 meters/second from W at 3 meters

THREAT ZONE:

Model Run: Gaussian

Red : less than 10 meters(10.9 yards) --- (10 ppm)


Note: Threat zone was not drawn because effects of near-field patchiness
make dispersion predictions less reliable for short distances.

Model Run: Gaussian

Red : less than 10 meters(10.9 yards) --- (10 ppm)

Note: Threat zone was not drawn because effects of near-field patchiness
make dispersion predictions less reliable for short distances.

**RMP*Comp**
RMP*Comp[Back](#)**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: Boron trichloride

CAS number: 10294-34-5

Threat type: Toxic Gas

Scenario type: Alternative

Physical state: Liquefied under pressure

Release duration: 24140 minutes

Release rate: 0.00166 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: 0.01 mg/L; basis: EHS-LOC; LOC is based on IDLH-equivalent level estimated from toxicity data.

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**
RMP*Comp[Back](#)**Estimated Distance Calculation**

 **Estimated distance to toxic endpoint:** 0.4 miles (0.6 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: Boron trichloride

CAS number: 10294-34-5

Threat type: Toxic Gas

Scenario type: Worst-case

Physical state: Liquefied under pressure

Quantity released: 40 pounds

Release duration: 10 min

Release rate: 2.2 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: 0.01 mg/L; basis: EHS-LOC; LOC is based on IDLH-equivalent level estimated from toxicity data.

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**
RMP*Comp[Back](#)

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

Physical state: Liquefied under pressure

Release duration: 8222.948556 minutes

Release rate: 0.00365 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)

**RMP*Comp**
RMP*Comp[Back](#)**Estimated Distance Calculation**

 **Estimated distance to toxic endpoint:** 0.1 miles (0.2 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

Physical state: Liquefied under pressure

Quantity released: 30 pounds

Release duration: 10 min

Release rate: 1.65 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)

