

Crisis Management: Handling EHS Crisis Situations and Major Incidents

April 11, 2018

MECC Conference – Kansas City, Missouri



GLOBAL
PRAIRIE



SpencerFane®

EHS Crisis Situation Hypothetical



EHS Crisis Situation Hypothetical

- **Overview**

- Chemical manufacturing plant that manufactures polymers
- Company is publicly-traded entity with HQ in Ohio
- Incident occurs at one of company's largest polymer manufacturing plants in Region 7 EPA
- 250 employees (including Union represented employees) and 20 contractors on site at time of incident
- Facility situated on major navigable waterway
- Town of 45,000 individuals, including major highway interstate



EHS Crisis Situation Hypothetical

- **Day-of Activity**

- Routine maintenance occurring on Tuesday morning at 9:30 am
- Vinyl chloride tank taken out of service and contract welders are conducting hot work to replace a corroded inlet valve identified in inspection
- Vinyl chloride tank located near rail car unloading
- Rail car filled with chlorine within general vicinity of vinyl chloride tank and in process of unloading and chemical transfer

EHS Crisis Situation Hypothetical

- **Incident Escalation**

- Vapors from vinyl chloride tank ignite from hot work causing catastrophic explosion, killing two welders instantaneously
- Explosion heard and seen up to one-half mile away
- Blast impacts transfer hose and coupling device from chlorine rail car causing leak from transfer hose
- Chlorine gas begins to leak from rail car
- Chlorine exposure injures ten employees and vapor cloud drifts offsite into town
- Ongoing fire

Graniteville



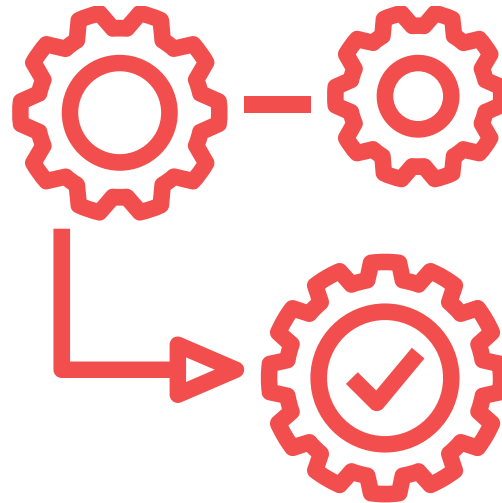
First Hour





First Hour: Environmental Response

- Response Activities
- Deployment
- Communication(s)





CTEH Equipment





HAPSITE® Portable GC/MS

HAPSITE®

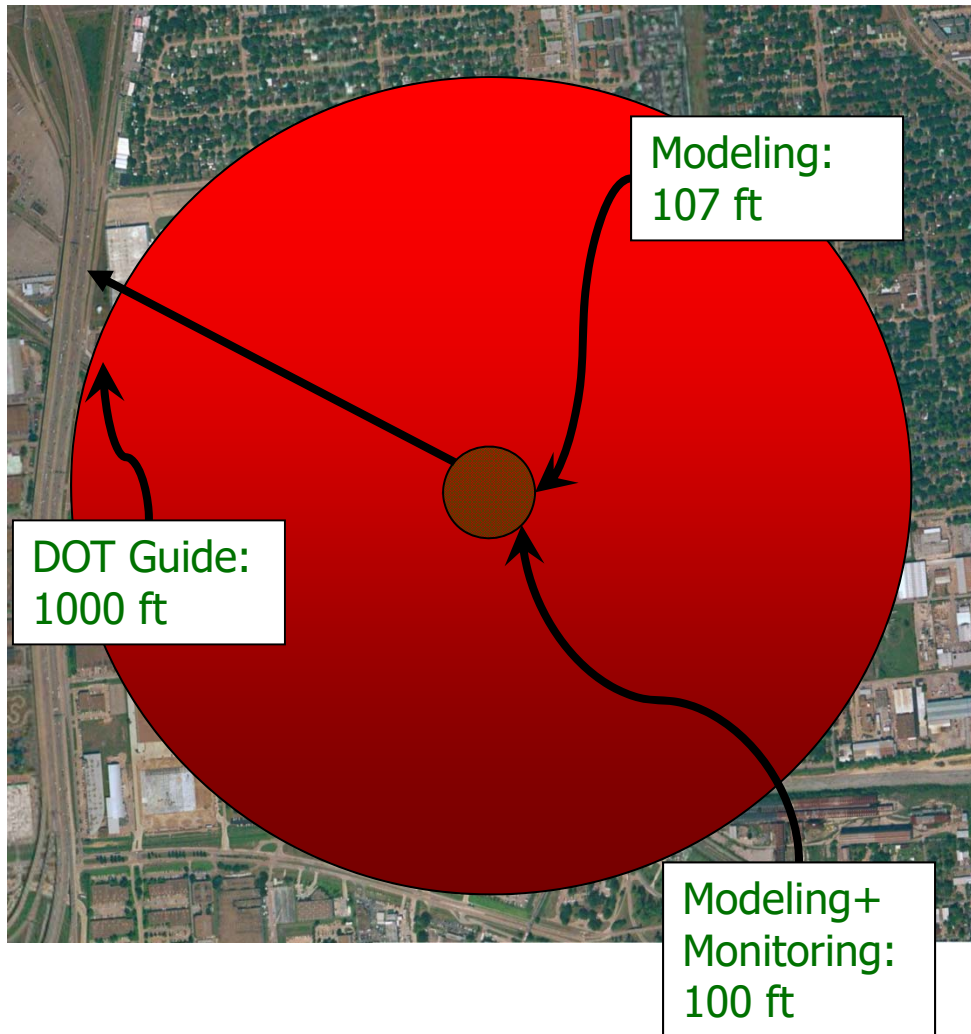
Used to measure VOCs during test controlled burn



- VOCs + Some SVOCs (up to naphthalene)
 - Carbon 1-12
 - Mass fragments 45-300 AMU
 - BP ≥ 250 °C
- Few compounds = < DL
 - Ex. Benzene = 0.1 ppb



Remote Emergency Management



- Real-time updates of critical information collected on-site
- Meteorological Data
- Evacuation Zones
- Incident Time Line
- Air Quality
- Chemical Info
- Gateway for clients, contractors, & agencies to view & share incident info



CTEH Plane





First Hour: Communications Response

- Crisis plan
- Core team roles and responsibilities
- What – Where – Who – How – Why
- Establish monitoring – social media, digital media
- Identify key audiences and communications channels
- Key messages / standby statement



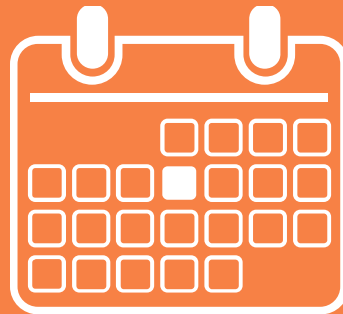


First Hour: Legal Response

- Shelter-in-Place and/or Evacuation Order
- RQ Release Reporting and Notification to Emergency Responders
- Stop the ongoing release
- Crisis management plan
- Assemble team of experts and deploy to location



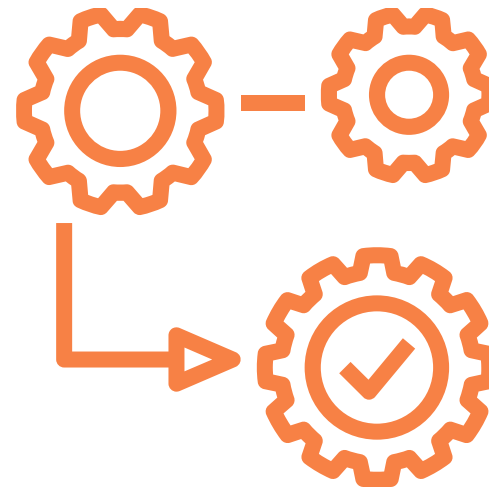
First Day





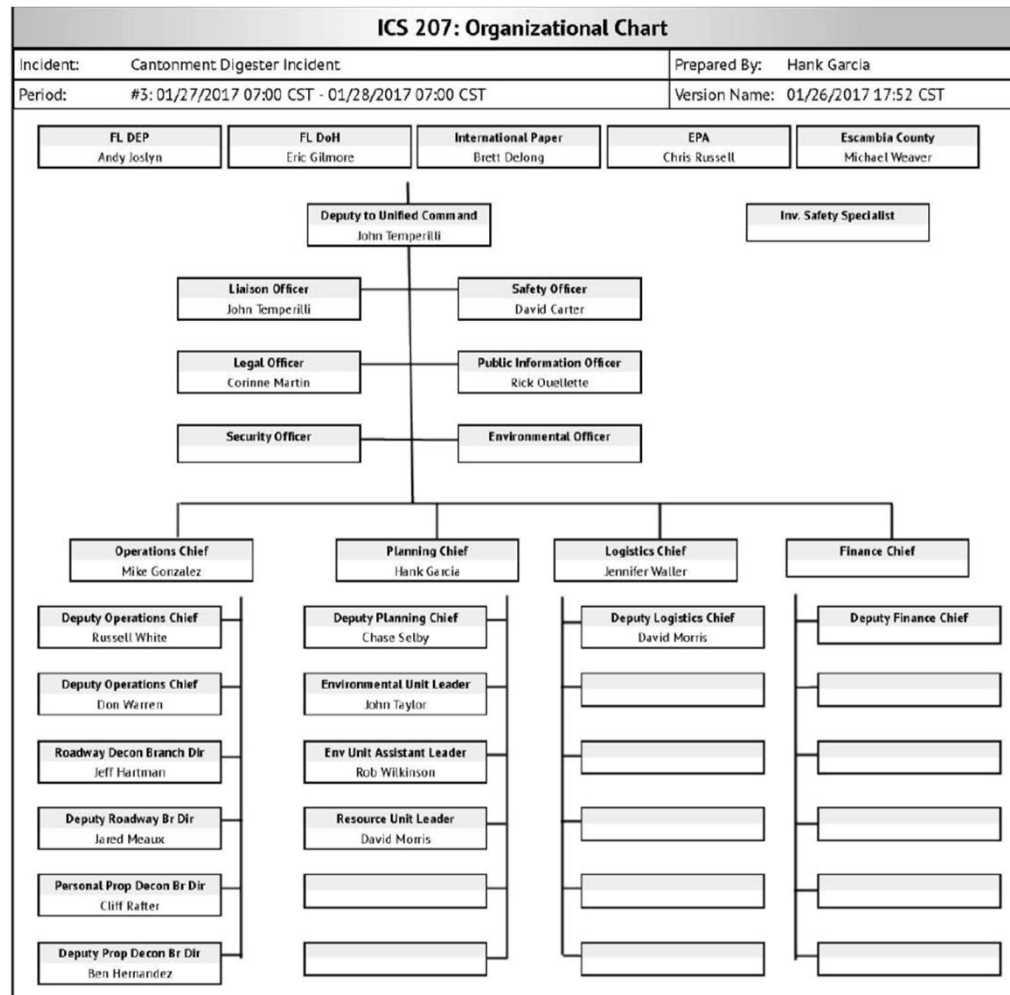
First Day: Environmental Response

- Response Management
- Operation(s)
- Air Monitoring/Data Collection/Toxicology
- Situational Awareness





ICS Structure





Incident Command

Mobile IC



Houma IC





Vinyl Chloride

Vinyl Chloride (C₂H₃Cl) CAS 75-01-4; UN 1086

Synonyms include chloroethene, chloroethylene, 1-chloroethylene, ethylene monochloride, monochloroethylene, monovinyl chloride, MVC, VC, VCM, and vinyl chloride monomer.

- Persons exposed only to vinyl chloride gas pose no risk of secondary contamination. Persons whose clothing or skin is contaminated with pressurized liquid vinyl chloride can secondarily contaminate rescuers by direct contact or through off-gassing of vapor.
- At all ambient temperatures, vinyl chloride is an extremely flammable and potentially explosive gas that is heavier than air. It has a mild, sweet odor, but odor is not an adequate warning of hazardous concentrations.
- Inhalation is the major route of vinyl chloride exposure; absorption is rapid and nearly complete. Gastrointestinal absorption is unlikely as vinyl chloride is a gas at room temperature. Dermal absorption is negligible.

Description

At room temperature, vinyl chloride is a colorless, highly flammable, potentially explosive gas. It has a faint sweet odor. The odor threshold for vinyl chloride is about 3,000 ppm in air, depending on the individual. When confined under high pressure in special containers, vinyl chloride exists in a liquefied state. It is shipped and handled this way. When burned or heated to a high enough temperature, vinyl chloride decomposes to hydrogen chloride, carbon monoxide, carbon dioxide, and traces of phosgene. Vinyl chloride should be stored in a cool, dry, well ventilated location, separate from oxidizing materials and accelerants. Phenol is often added as a stabilizer.

Routes of Exposure

Inhalation

Inhalation is the primary route of exposure, and vinyl chloride is readily absorbed from the lungs. **Its odor threshold is too high to provide an adequate warning of hazardous concentrations.** The odor of vinyl chloride becomes detectable at around 3,000 ppm and the OSHA PEL is 1 ppm (8-hour TWA). Therefore, workers can be overexposed to vinyl chloride without being aware of its presence. A 5-minute exposure to airborne concentrations of 8,000 ppm can cause dizziness. As airborne levels increase to 20,000 ppm, effects can include drowsiness, loss of coordination, visual and auditory abnormalities, disorientation, nausea, headache, and burning or tingling of the extremities. Exposure to higher concentrations of vinyl chloride for longer durations can cause death, presumably due



HASP

CTEH CENTER FOR TOXICOLOGY
AND ENVIRONMENTAL HEALTH, LLC

CTEH® Site-Specific Health and Safety Plan (HASP)

For use by CTEH® employees only

NBU 3208 CO₂ Well Control Monitoring

Perdure Petroleum

Shidler, OK

March 2, 2018

	Name/Position	Signature	Date Signed
Prepared By:	Heath Cobb, Senior PM	<i>Heath Cobb</i>	03/02/2018
Reviewed By:	Mike Berg Ph.D., CIH, CSP	<i>Mike Berg</i>	03/02/2018

5100 Northshore Drive • North Little Rock, AR 72118 • 501.940.8000

Toxicology Emergency Response 24 Hour Help Desk 1.800.800.0134

www.cteh.com

Sound Scientific Solutions





Air Monitoring Plan



GoM Drilling, Completions and Interventions - MC252

Operational Note to Transition and Demobilize Branch Perimeter Air Monitoring Plan

PLANNING SECTION APPROVAL: Cynthia Dewitt CSH/ELH 8 October 2010 0815
Print Name above Sign Above Date: Time:

SAFETY SECTION APPROVAL: Kal Johnson Kelley 10/9/10 2:45 pm
Print Name above Sign Above Date: Time:

In reference to procedures:
Houma MC 252 Oil Spill Branch Area Perimeter Air Sampling and Analysis Plan

0	10/4/2010	Approved - Issued for GoM Use	David Dutton	Mike Utzler		
Rev	Date	Document Status	Custodian/Owner	Authority		
Document Control Number	Organization ID	Sector ID	Discipline ID	Document Class	Sequence Number	Document Revision
						1



Environmental Response



“ . . . I pity the
fool that has no
data . . . ”





Plume Interval

(click on map)

5 Minutes
10 Minutes
15 Minutes
20 Minutes
25 Minutes
30 Minutes
35 Minutes
40 Minutes
45 Minutes
50 Minutes
55 Minutes
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75 Minutes
80 Minutes

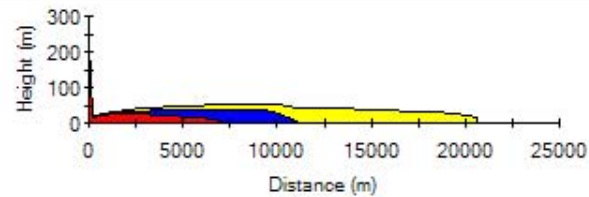


Bow Valley Alliance Church
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Bowness Community Hea
Bowness Senior Citizens
Bowness Tennis Court
Bowwood Gospel Chapel
Chinatown
Edworthy Park
Edworthy Park Douglas
Fire Station 15
Foothills United Church
Greenwood-Greenbriar
Greenwood/Greenbriar

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot



Release time 1:38:20 AM

Elapsed Time 23 (Minutes)

Last Update 1:42:18 AM

Current Time 31/05/2004 2:02:03 AM

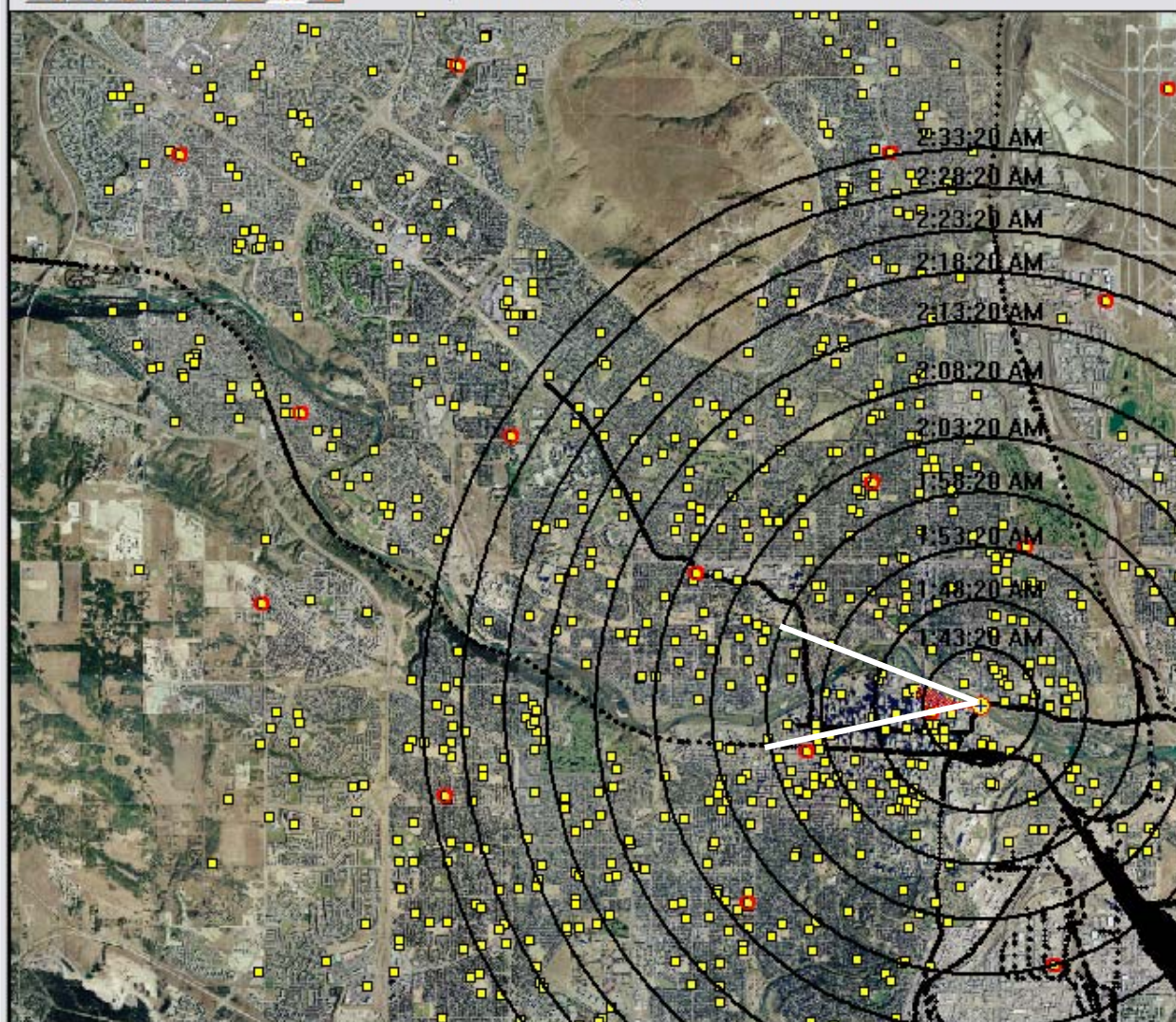
Release Location -3578.77, 5657021.51



Map Width = 15609.1 (m)

X: -16330.7 m

Y: 5663755.4 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

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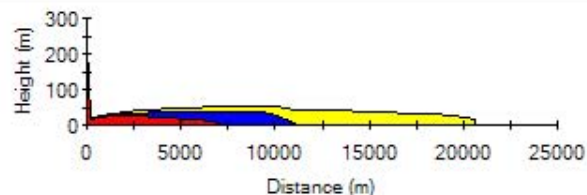


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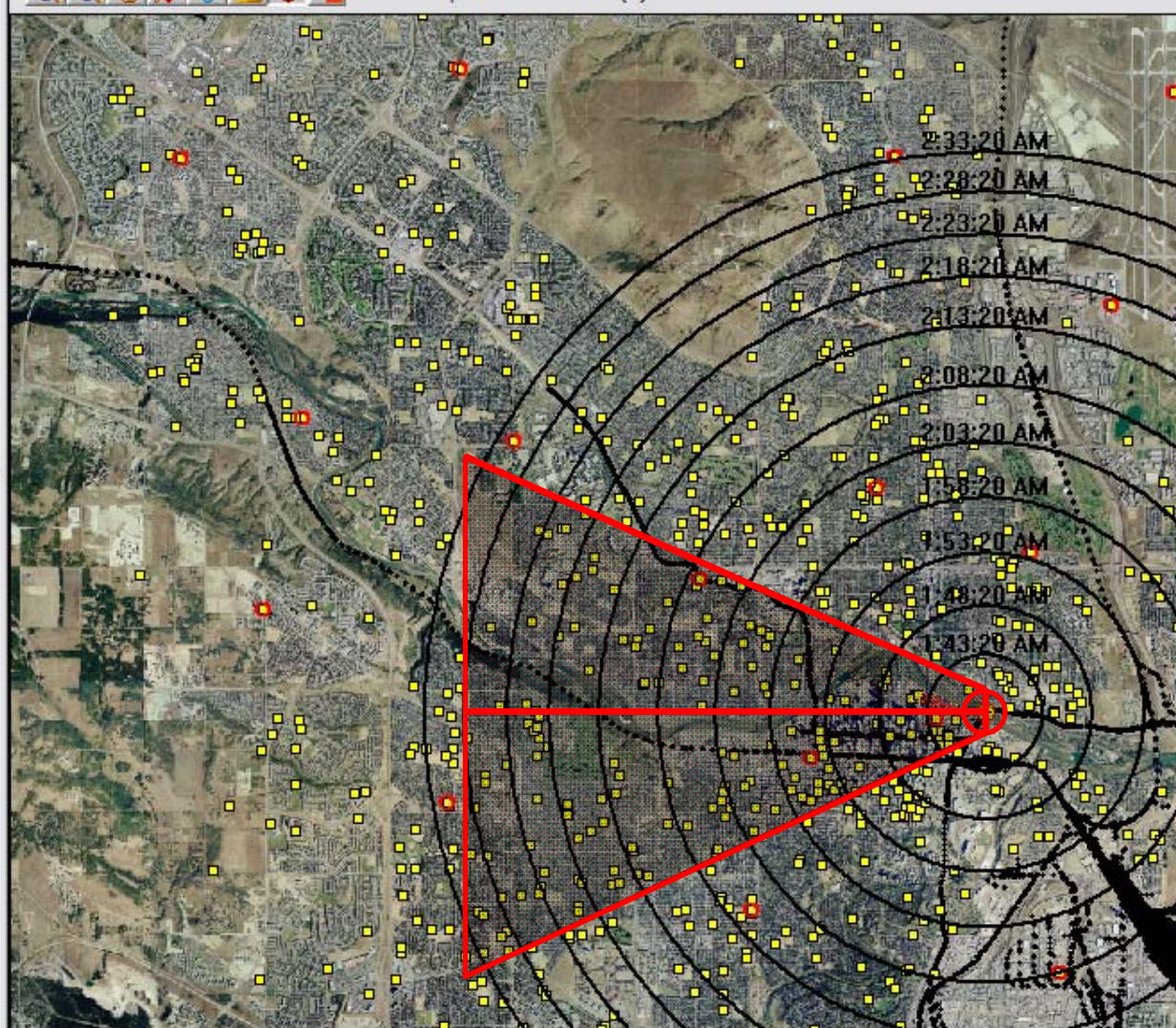
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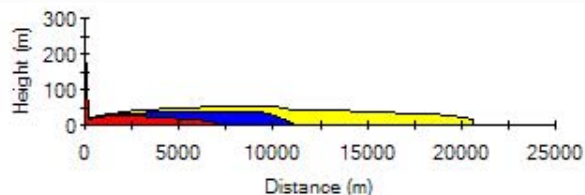


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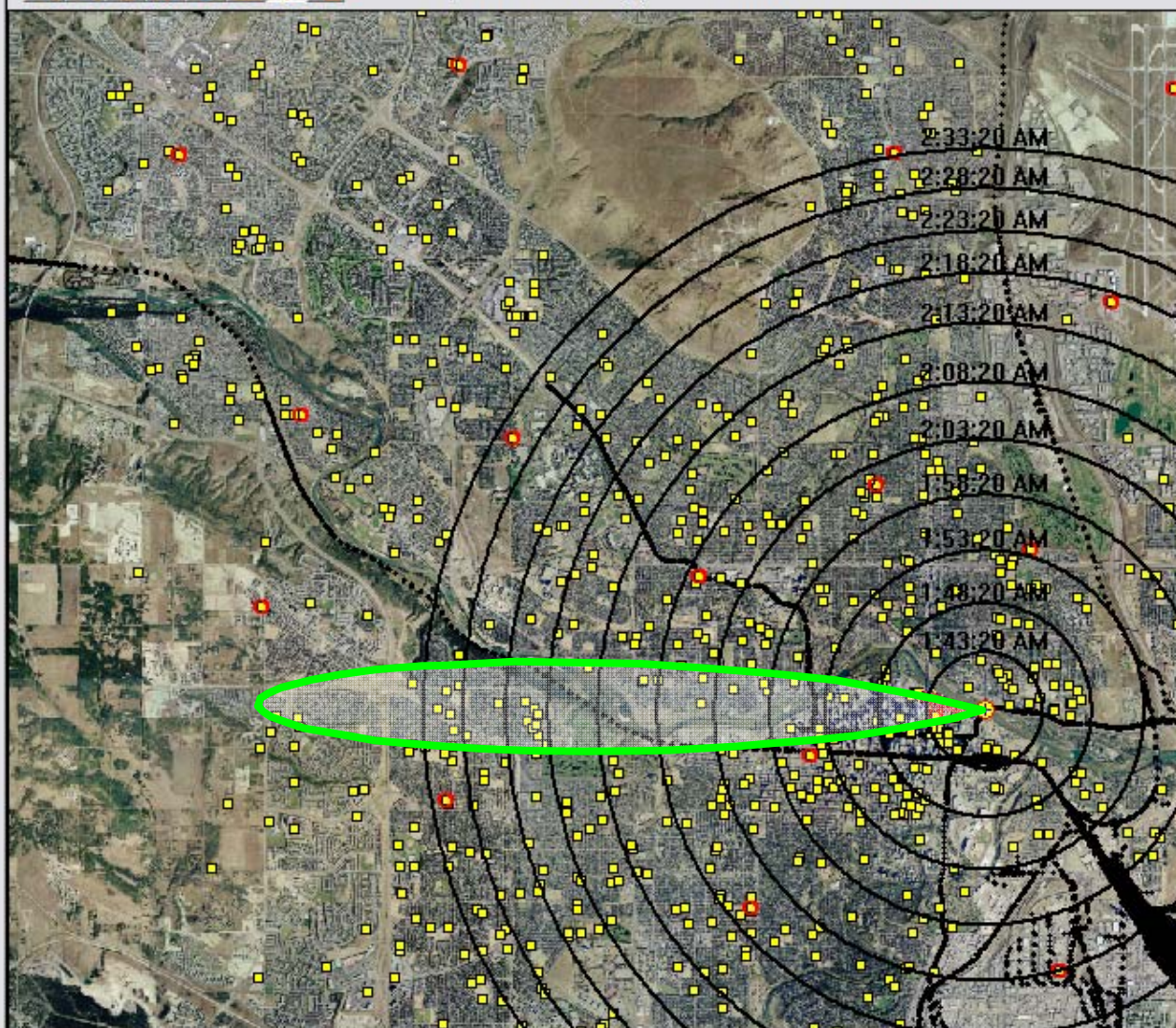
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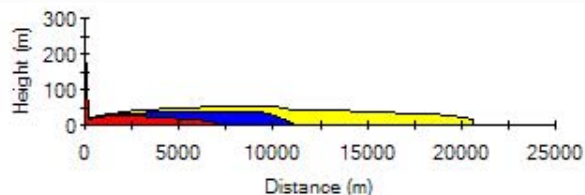


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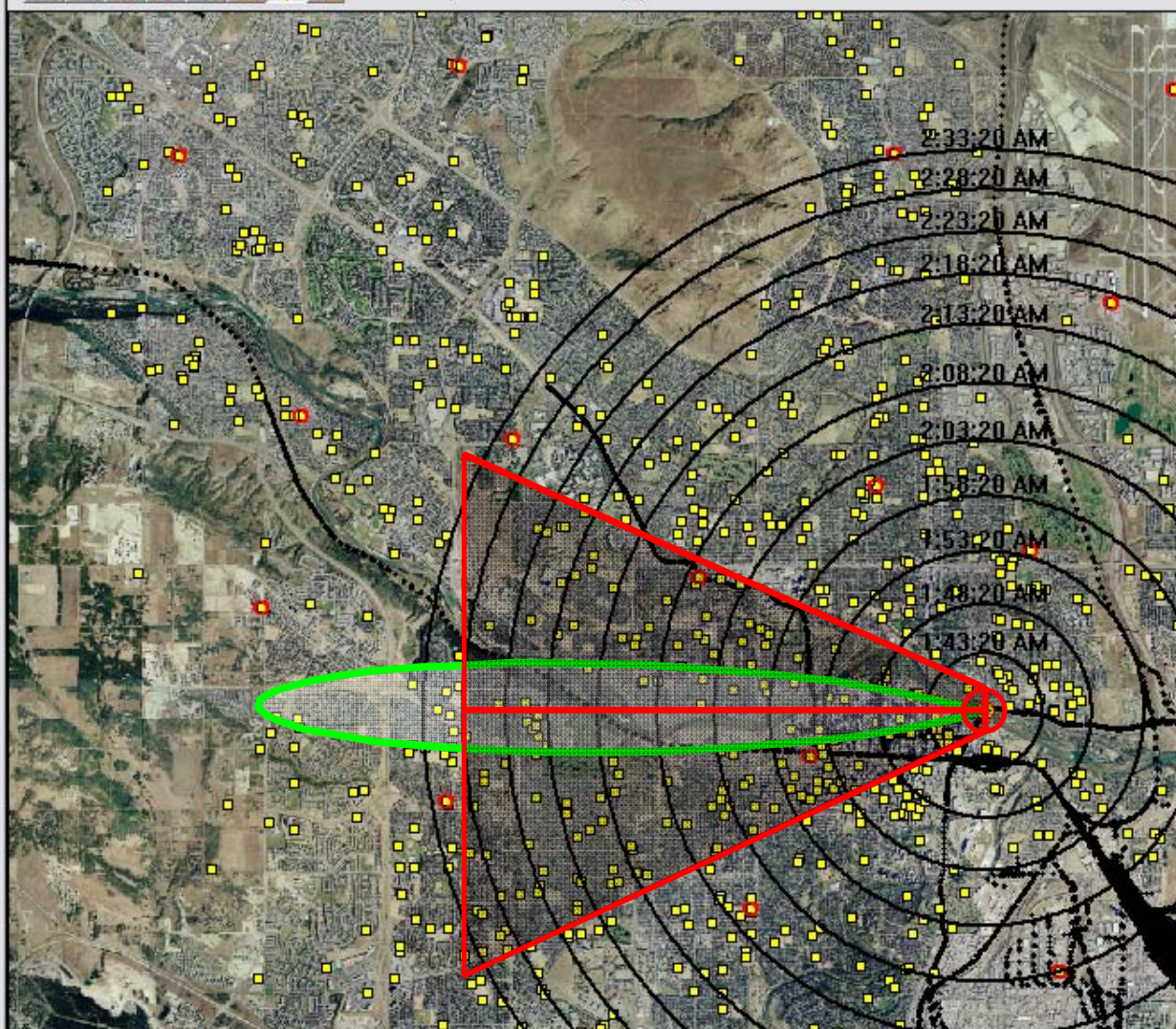
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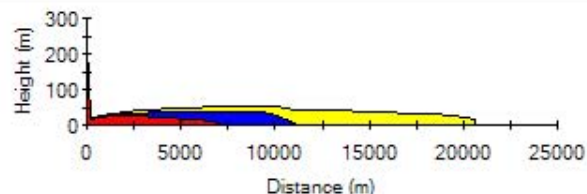


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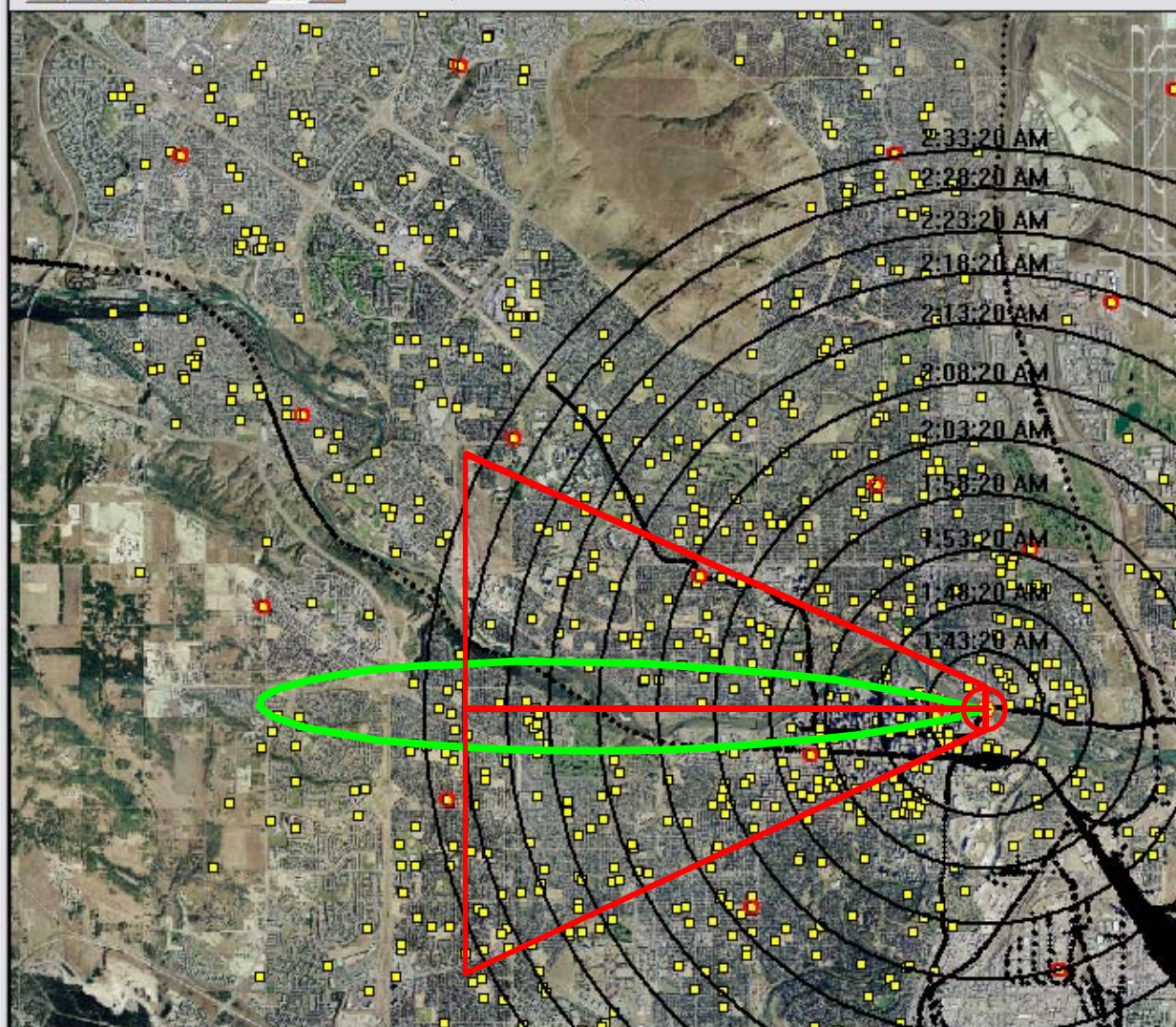
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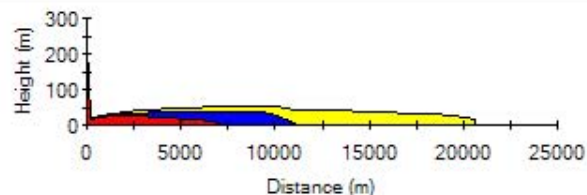


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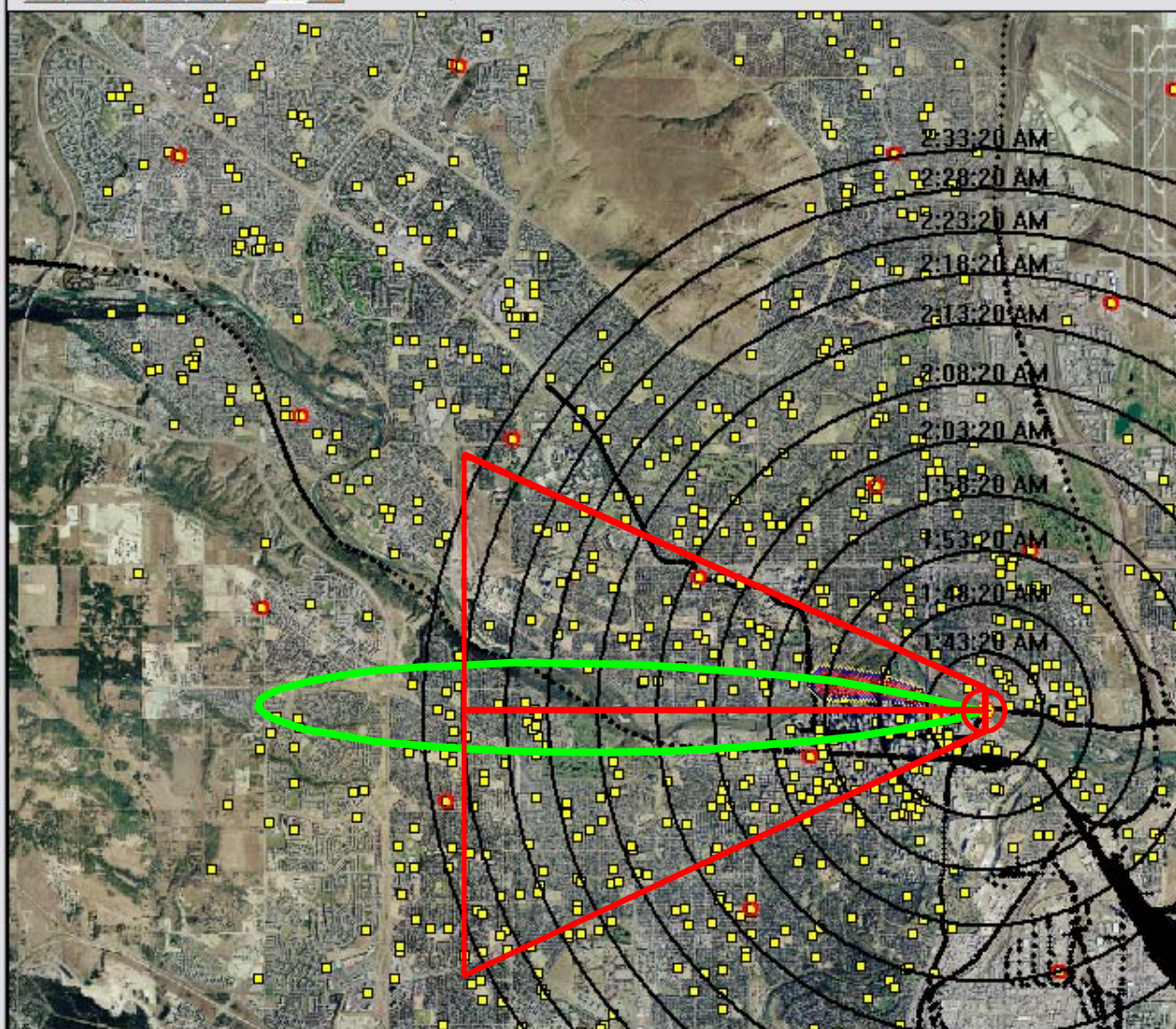
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Release Location -3578.77, 5657021.51



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Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
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Emergency Response - SIMULATED METEOROLOGY

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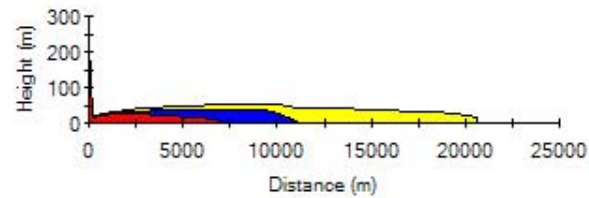


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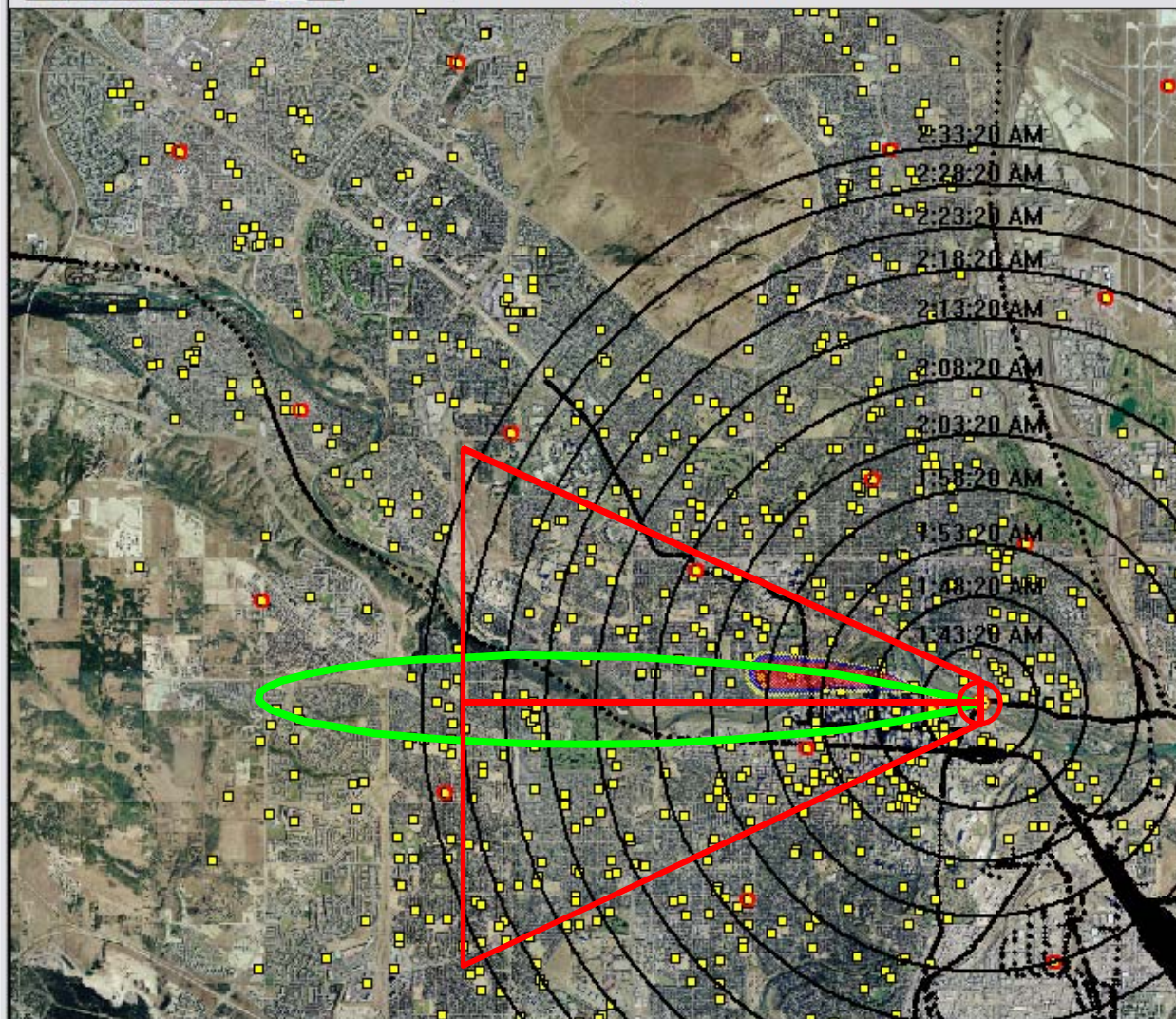
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10.0
(km/h)

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(From)

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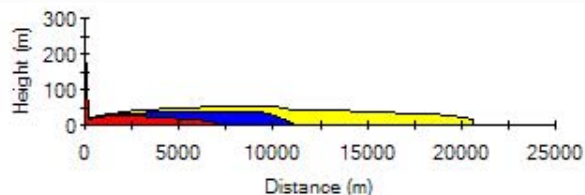


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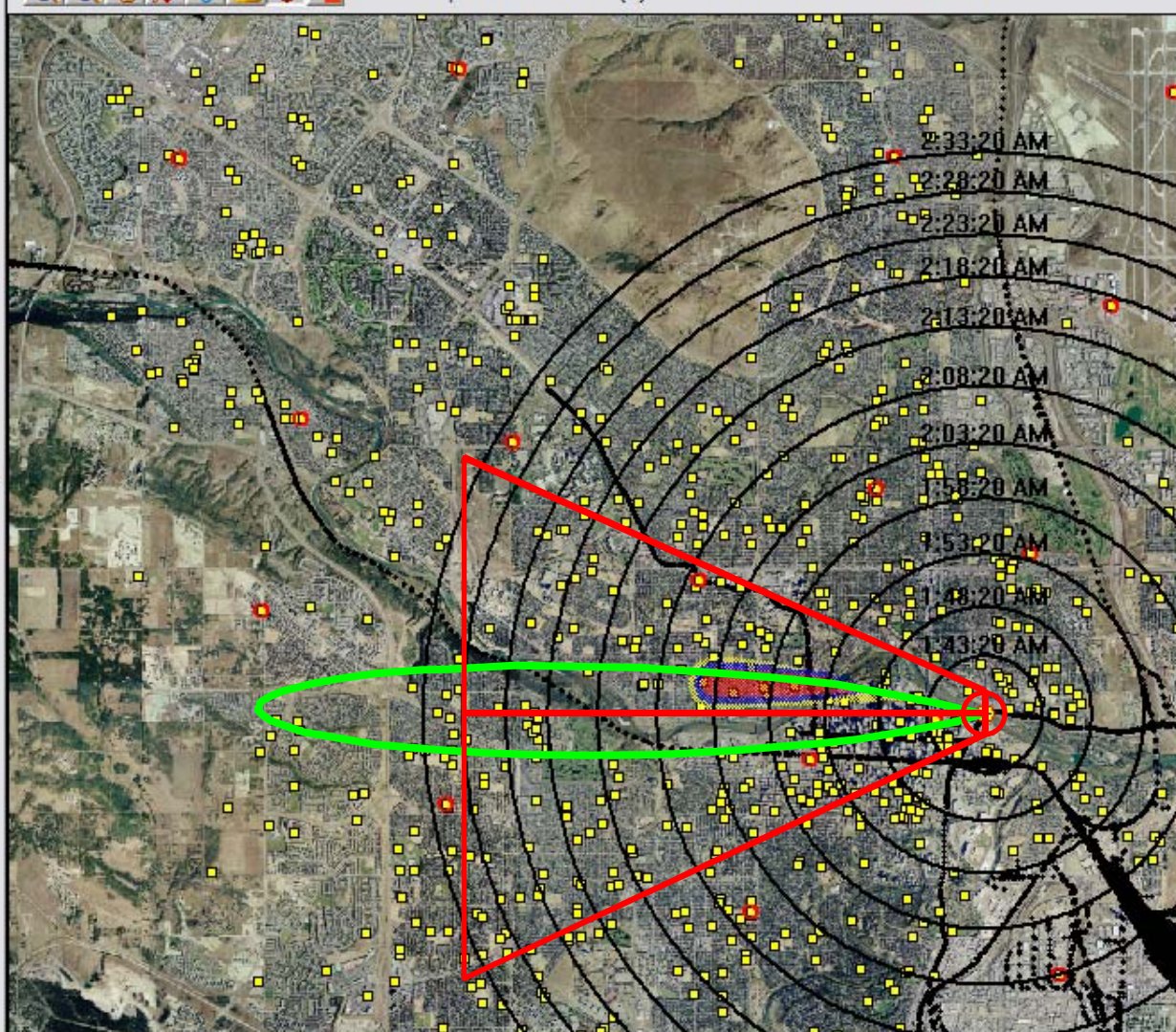


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Elapsed Time 24 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:02:50 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m) X: -16496.7 m Y: 5664134.9 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
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Emergency Response - SIMULATED METEOROLOGY

Plume Interval

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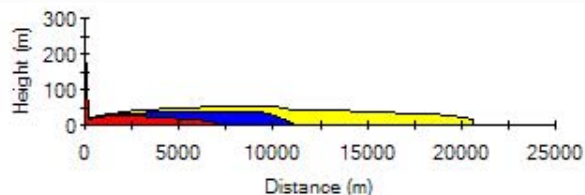


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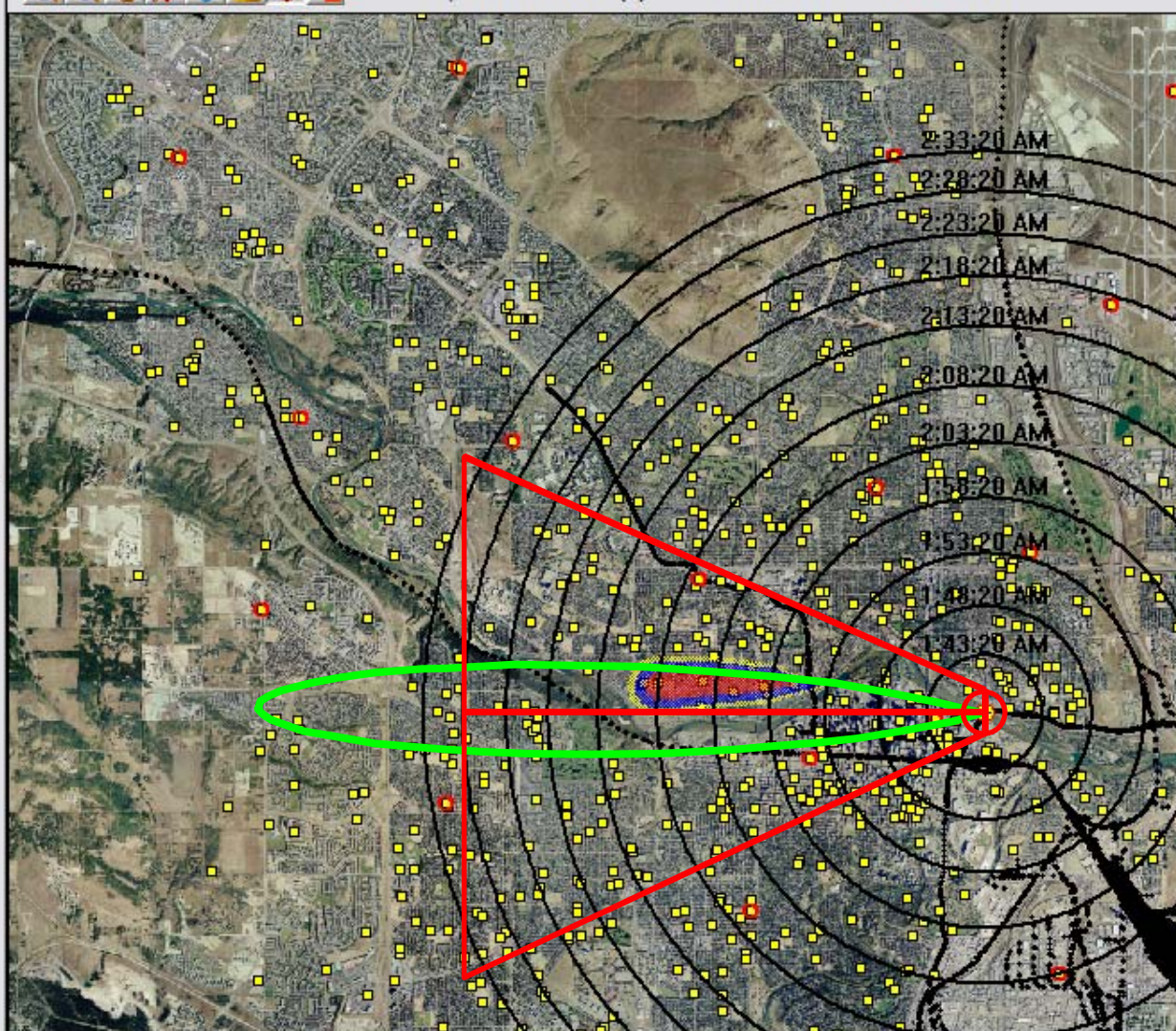
View



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 Current Time 31/05/2004 2:03:05 AM
 Release Location -3578.77, 5657021.51



Map Width = 15609.1 (m) X: -16473.0 m Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

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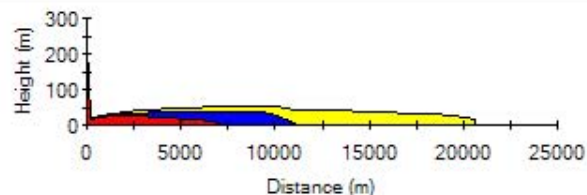


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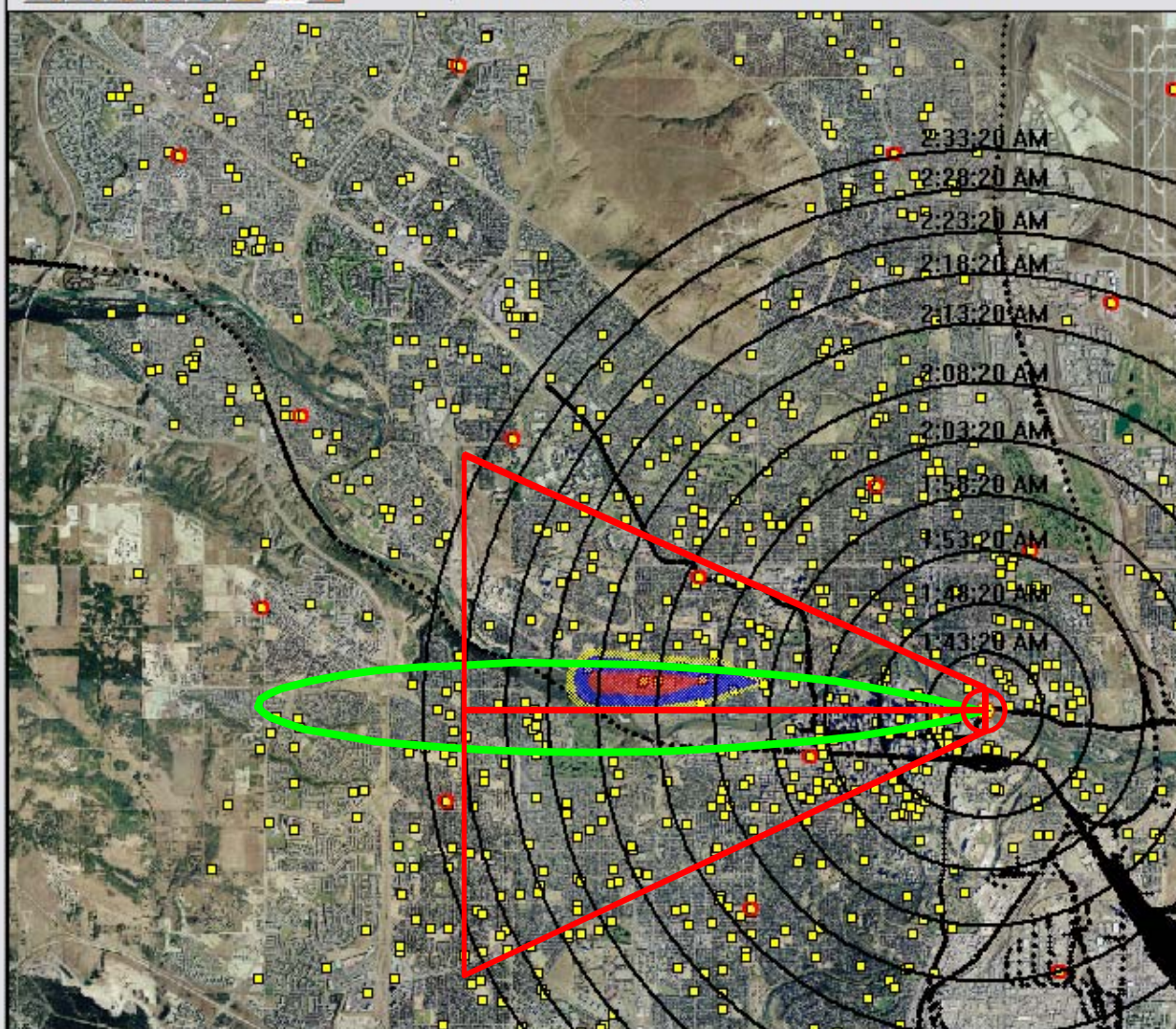
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10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

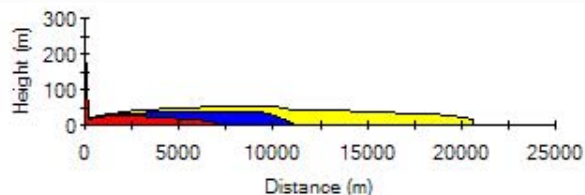


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View Snapshot



Release time 1:38:20 AM
Elapsed Time 25 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:03:34 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE

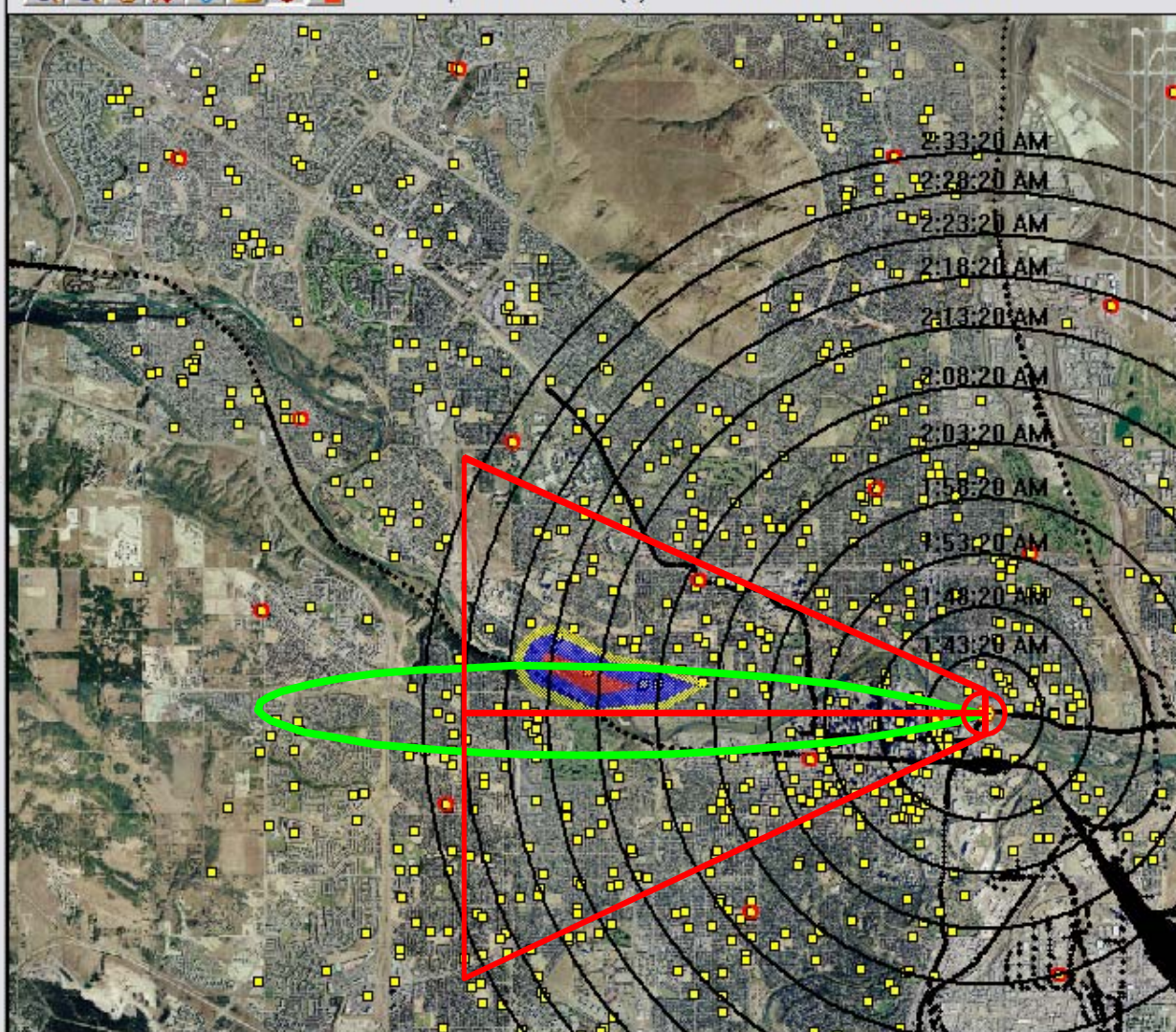
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m)

X: -16473.0 m

Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

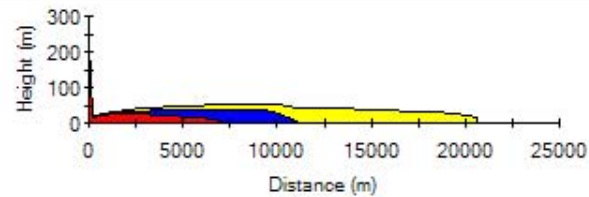


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

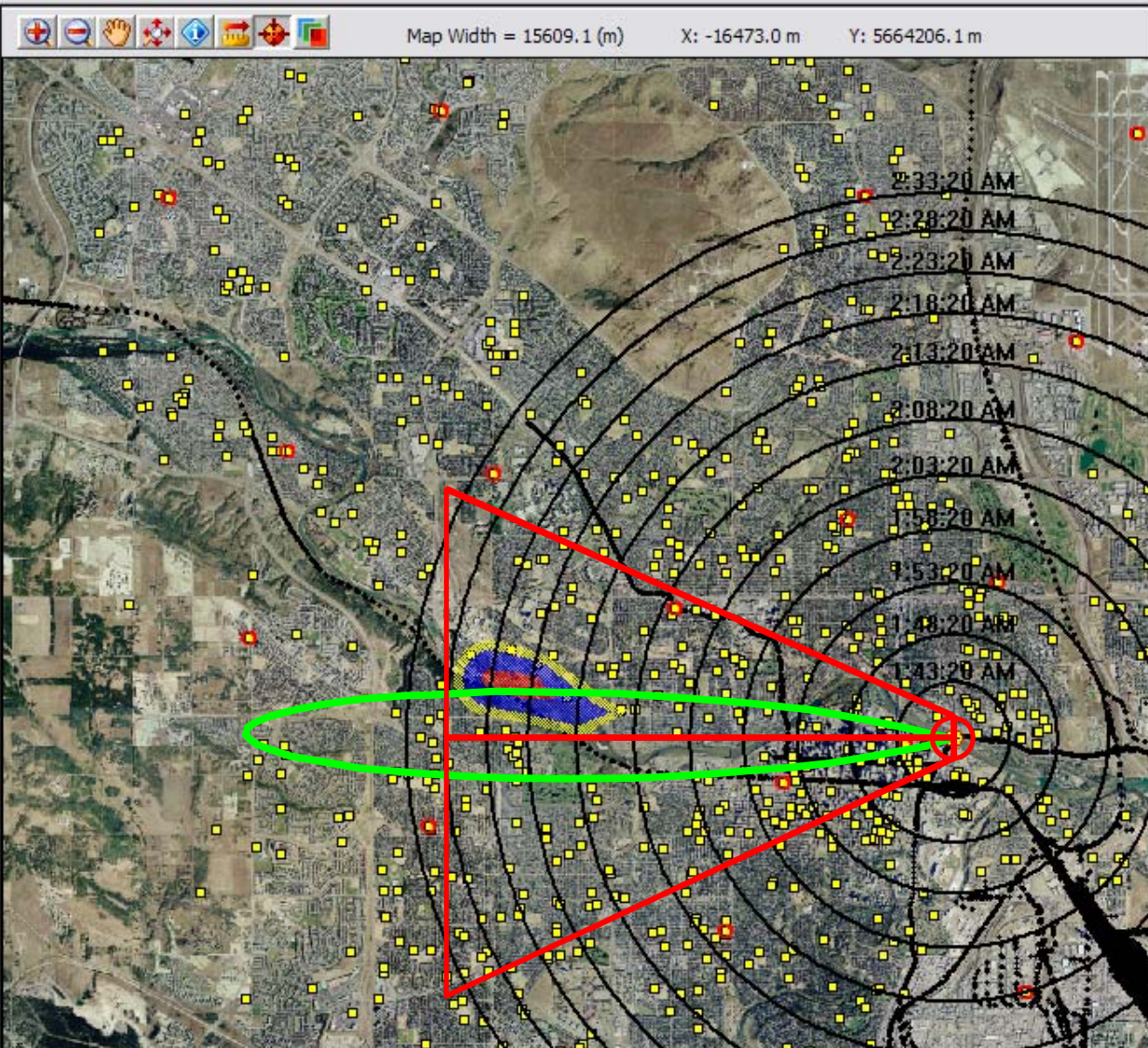
CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View Snapshot



Release time 1:38:20 AM
Elapsed Time 25 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:03:44 AM
Release Location -3578.77, 5657021.51



Meteorology
10.0 (km/h)
East (From)
10.0 (Deg C)
400.0 (W/m ²)
50.0 (%)
6.0 [H Stability]
5.0 [V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

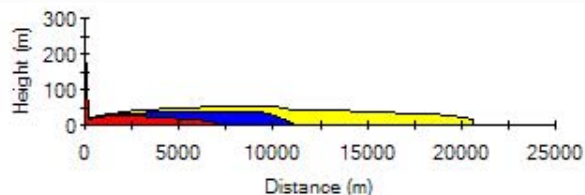


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View Snapshot

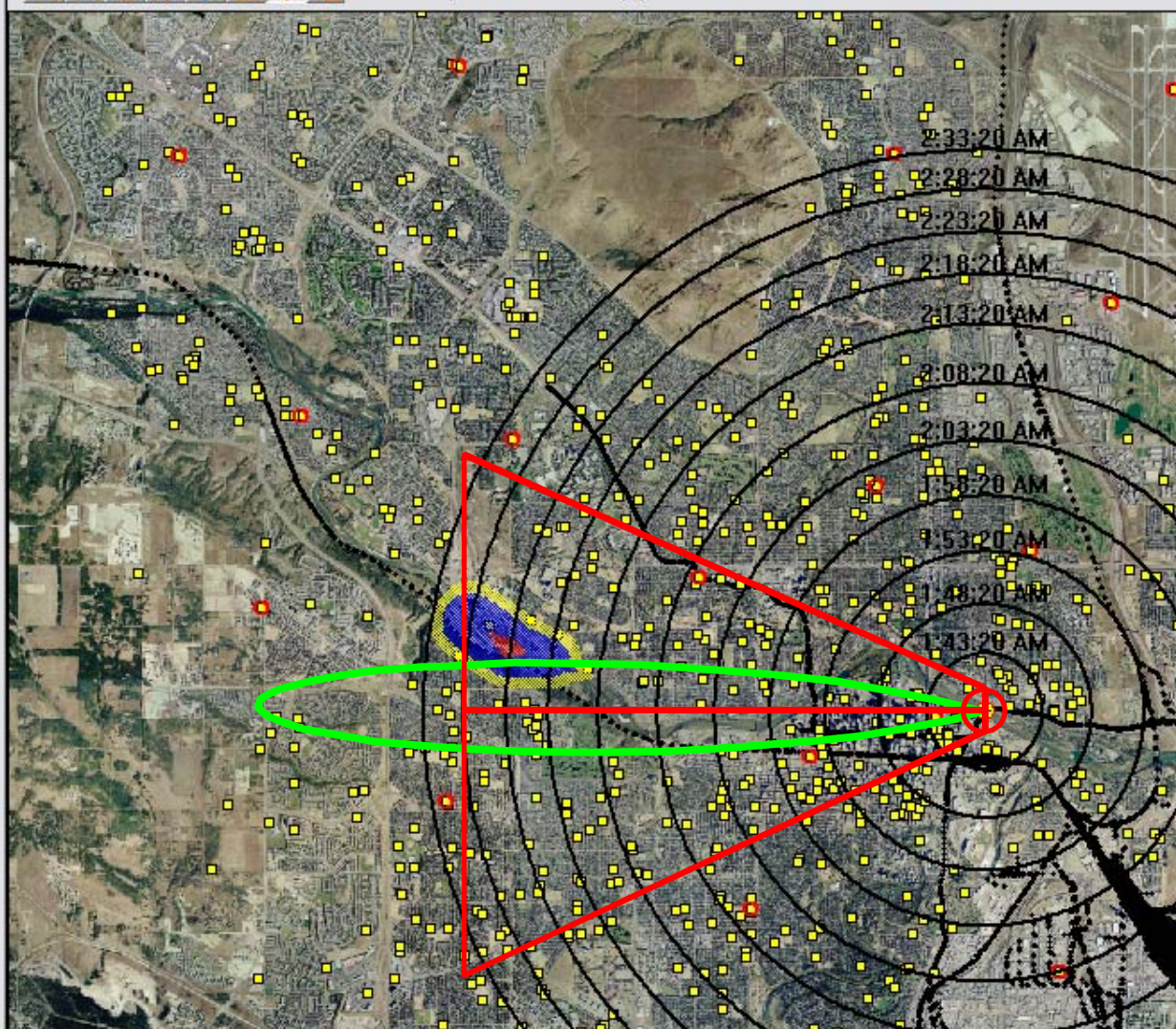


Release time 1:38:20 AM
Elapsed Time 25 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:04:03 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m) X: -16473.0 m Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

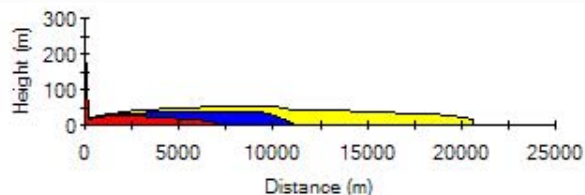


- Bow Valley Alliance Church
- Bowcroft Elementary
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- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

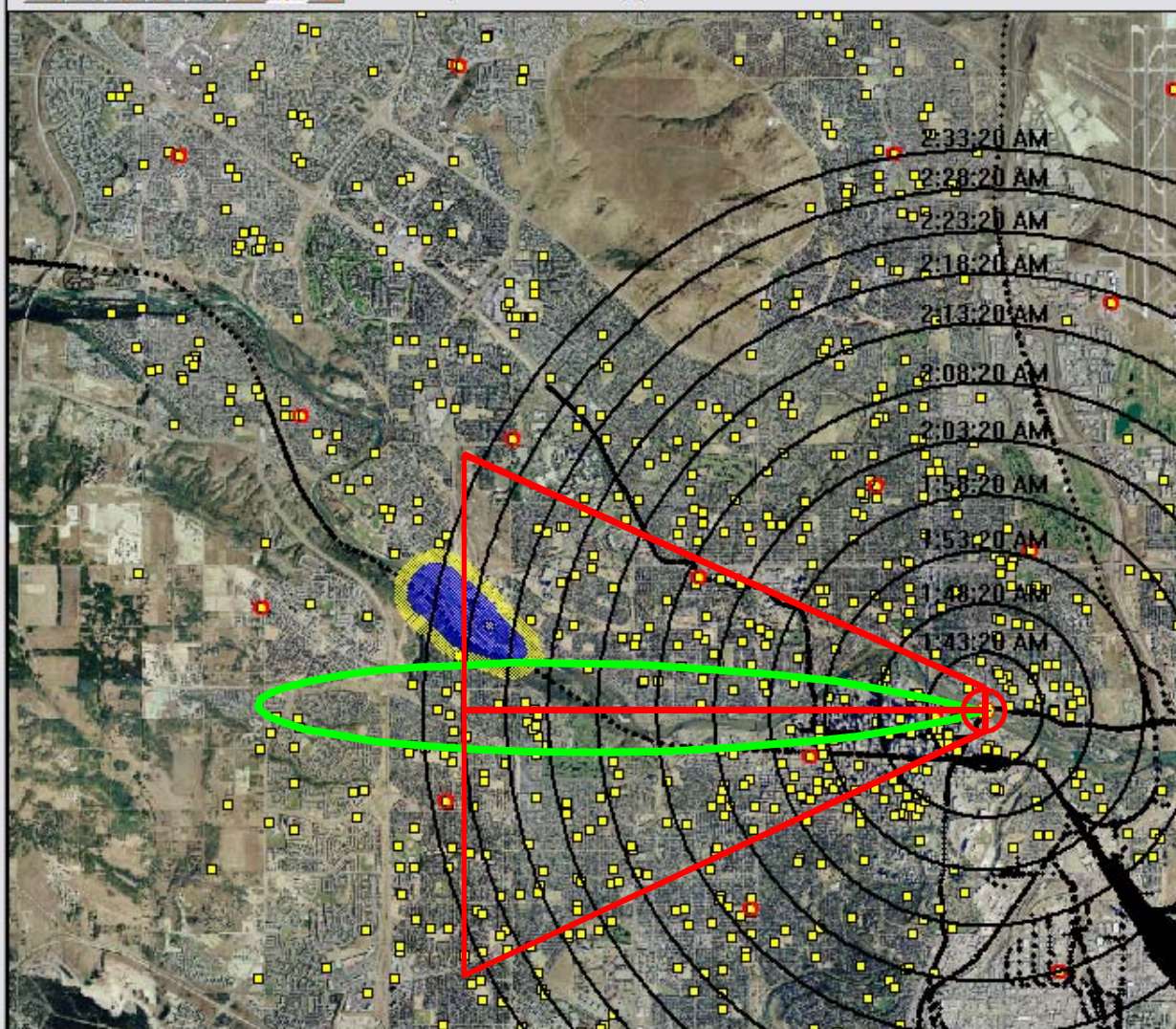
View Snapshot



Release time 1:38:20 AM
Elapsed Time 25 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:04:12 AM
Release Location -3578.77, 5657021.51



Map Width = 15609.1 (m) X: -16473.0 m Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

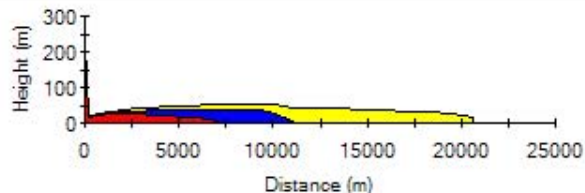


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

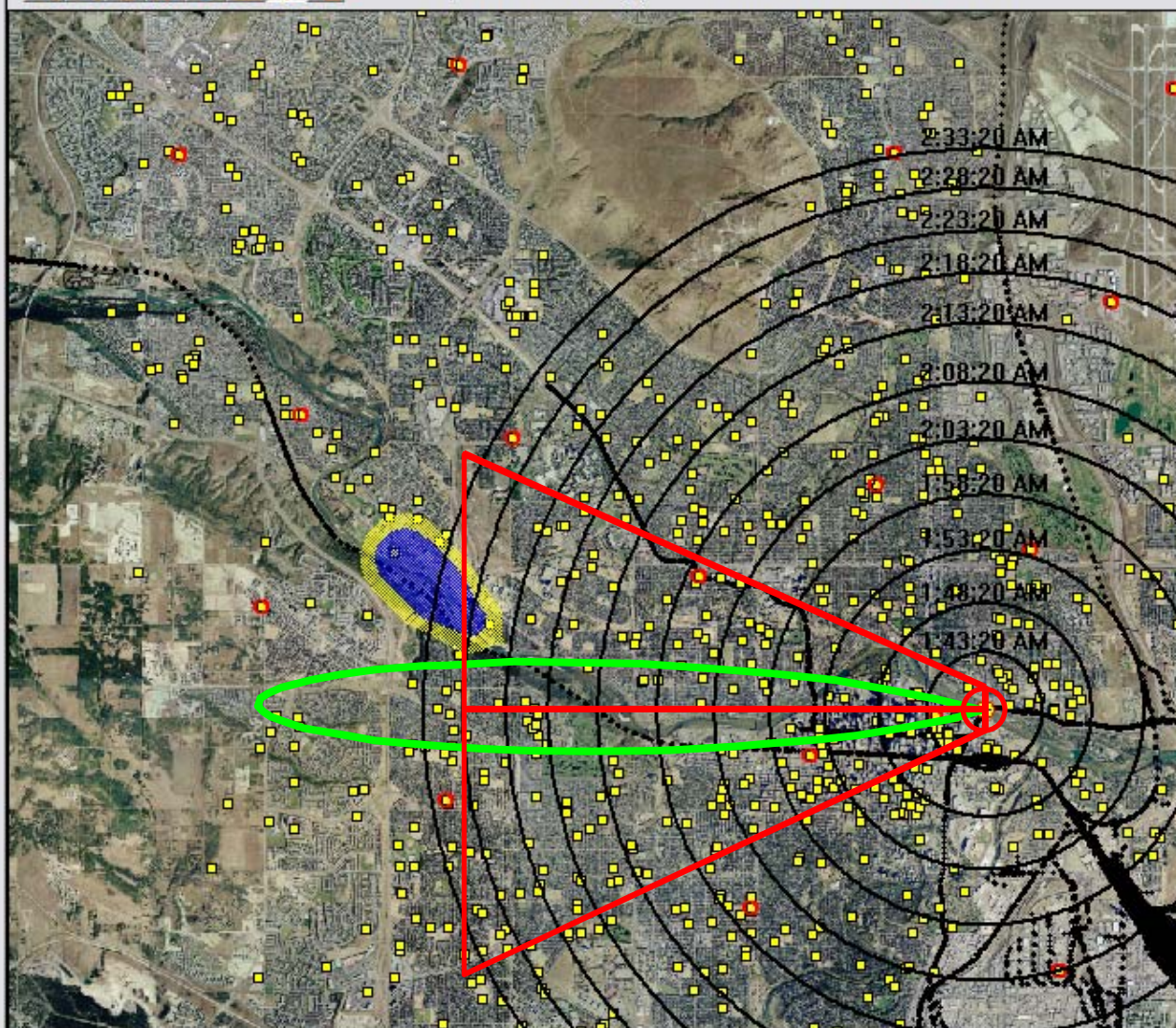
View Snapshot



Release time 1:38:20 AM
Elapsed Time 26 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:04:20 AM
Release Location -3578.77, 5657021.51



Map Width = 15609.1 (m) X: -16473.0 m Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

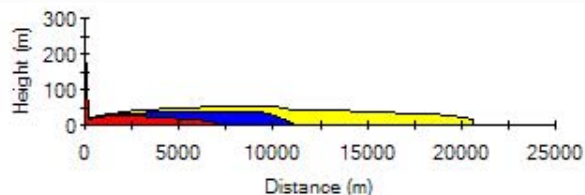


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

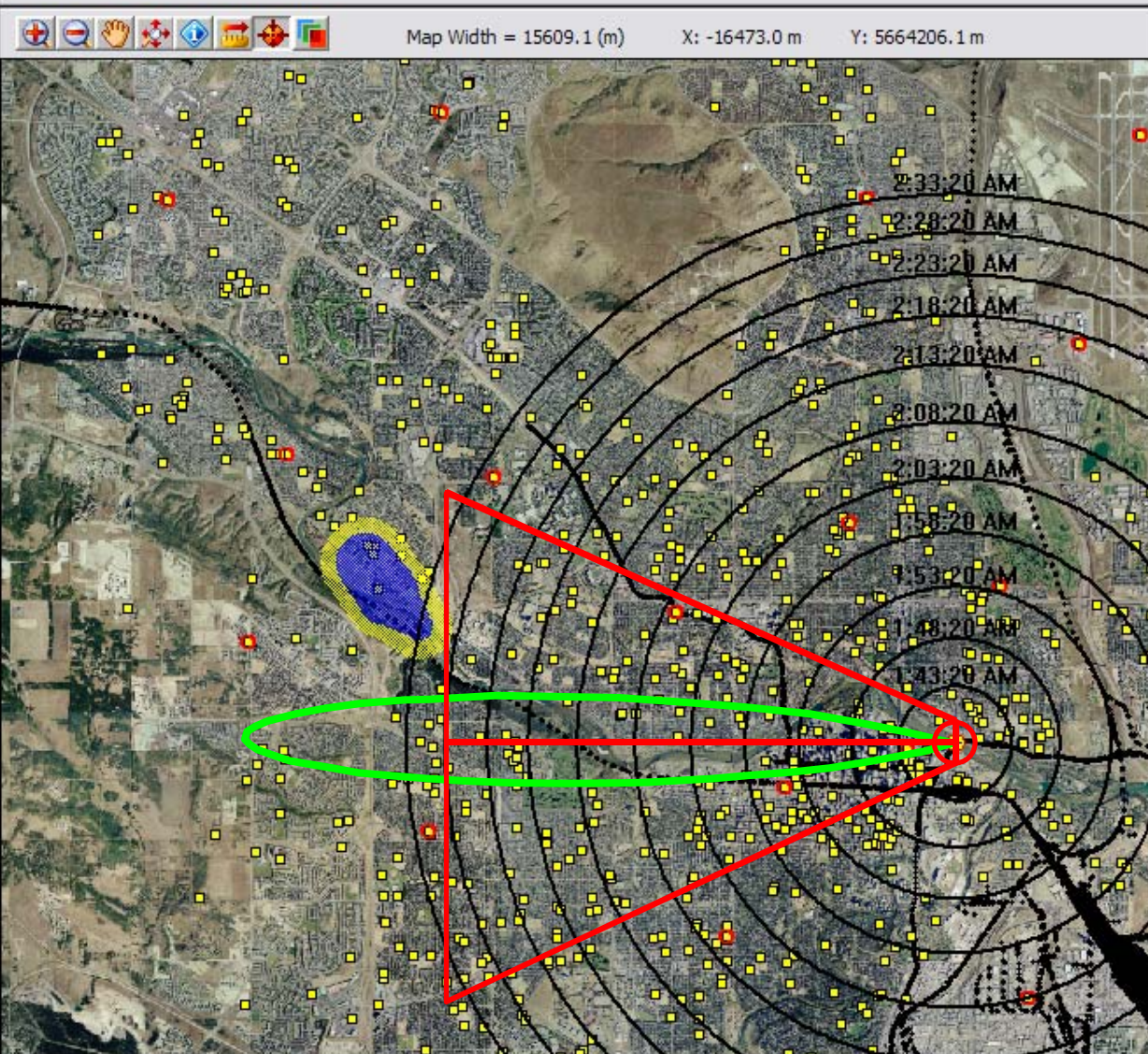
CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View Snapshot



Release time 1:38:20 AM
Elapsed Time 26 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:04:28 AM
Release Location -3578.77, 5657021.51



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

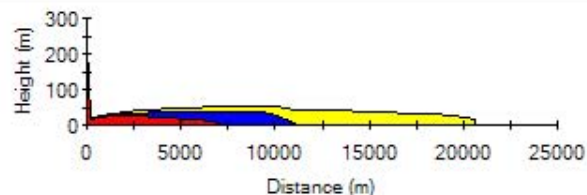


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

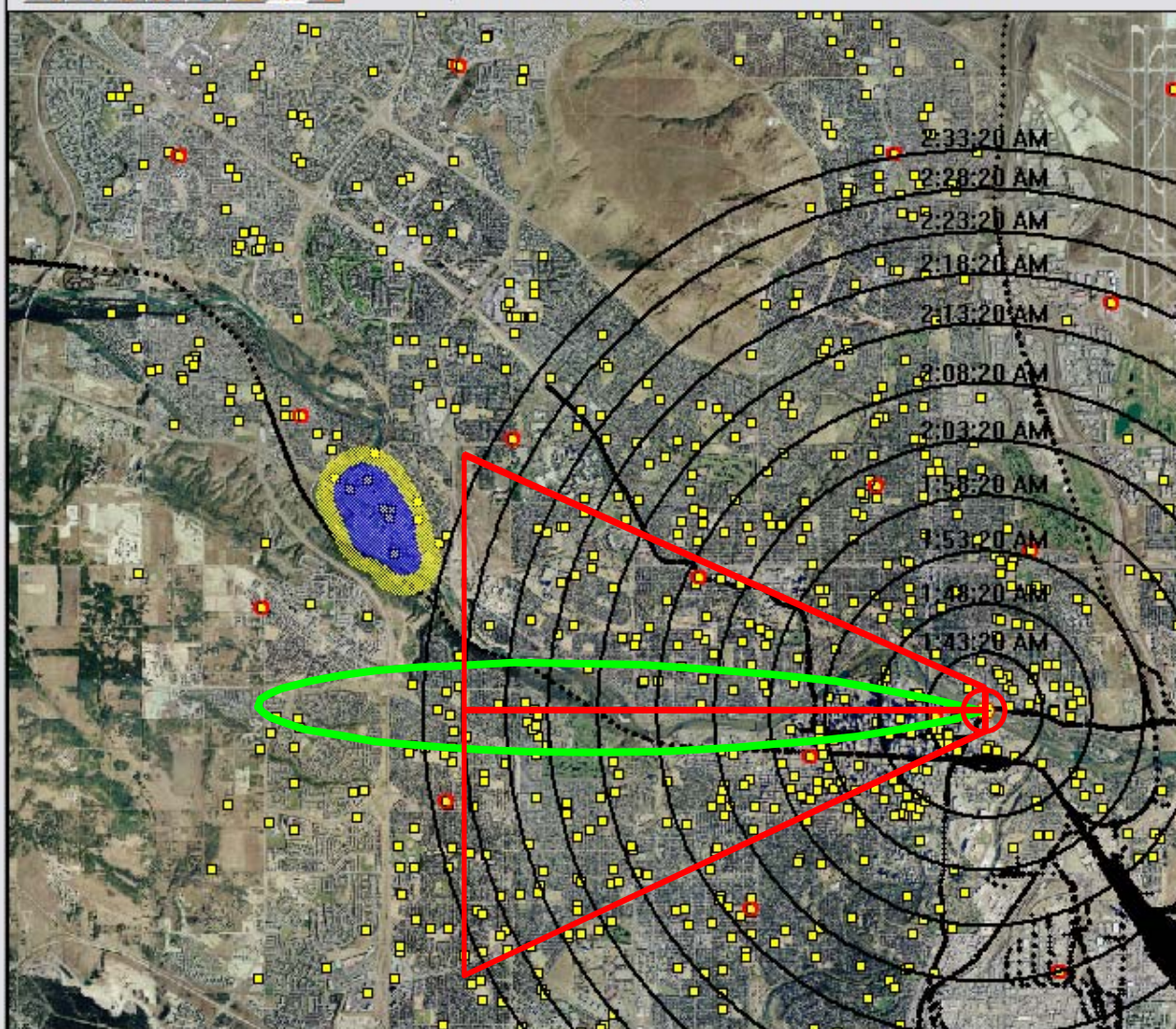
View Snapshot



Release time 1:38:20 AM
Elapsed Time 26 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:04:42 AM
Release Location -3578.77, 5657021.51



Map Width = 15609.1 (m) X: -16473.0 m Y: 5664206.1 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

(click on map)

- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 25 Minutes
- 30 Minutes
- 35 Minutes
- 40 Minutes
- 45 Minutes
- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes

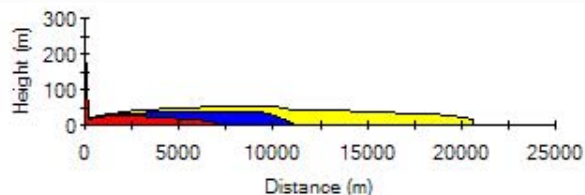


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View Snapshot

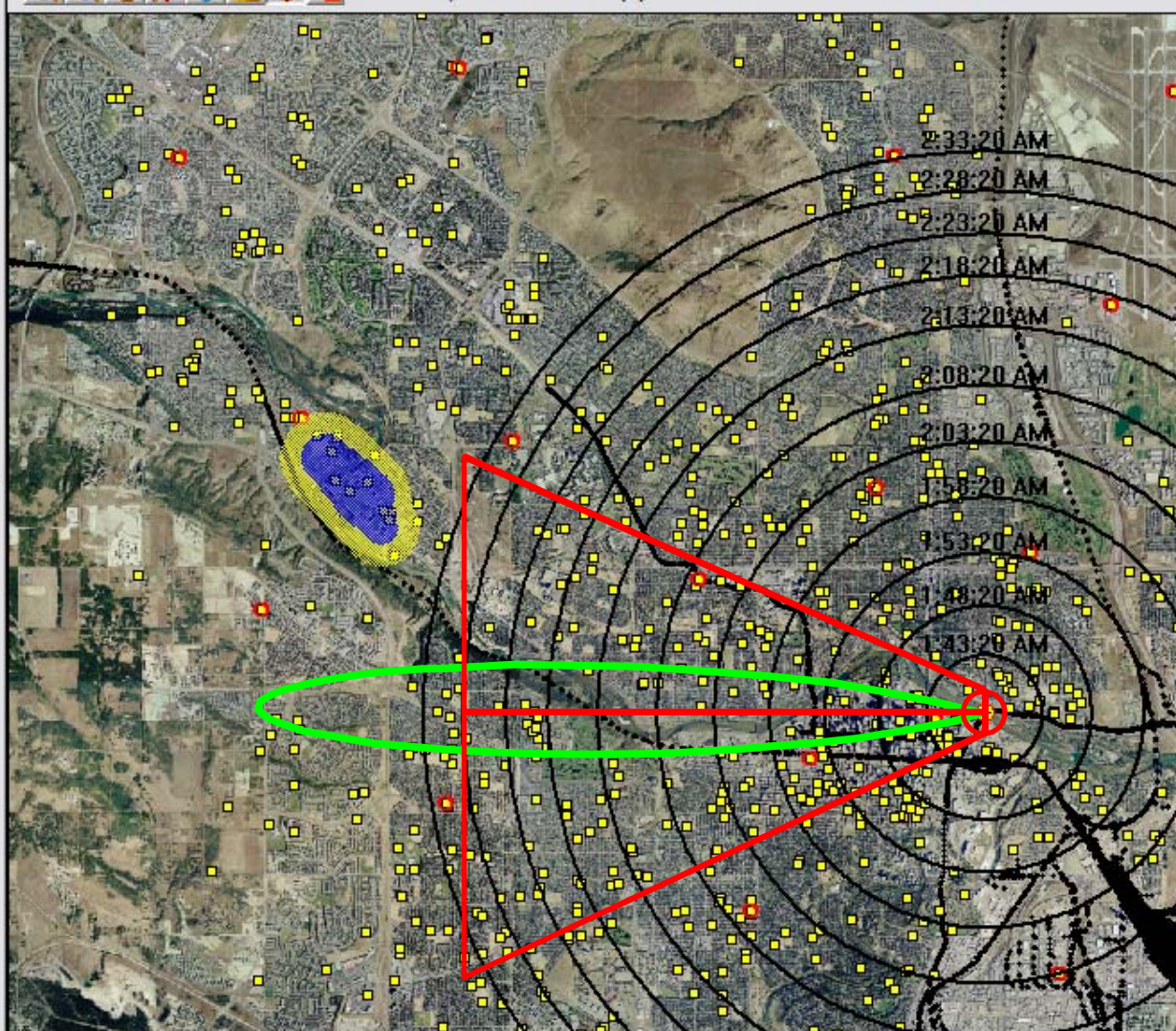


Release time 1:38:20 AM
Elapsed Time 26 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:05:15 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE
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SYSTEMS



Map Width = 15609.1 (m) X: -16496.7 m Y: 5661976.2 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

50 Minutes
55 Minutes
60 Minutes
65 Minutes
70 Minutes
75 Minutes
80 Minutes
85 Minutes
90 Minutes
95 Minutes
100 Minutes
105 Minutes
110 Minutes
115 Minutes
120 Minutes
RETURN

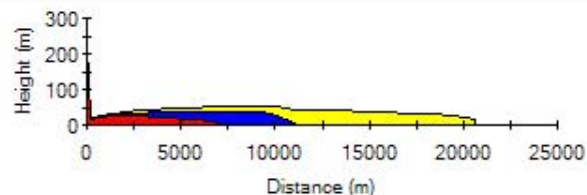


- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot

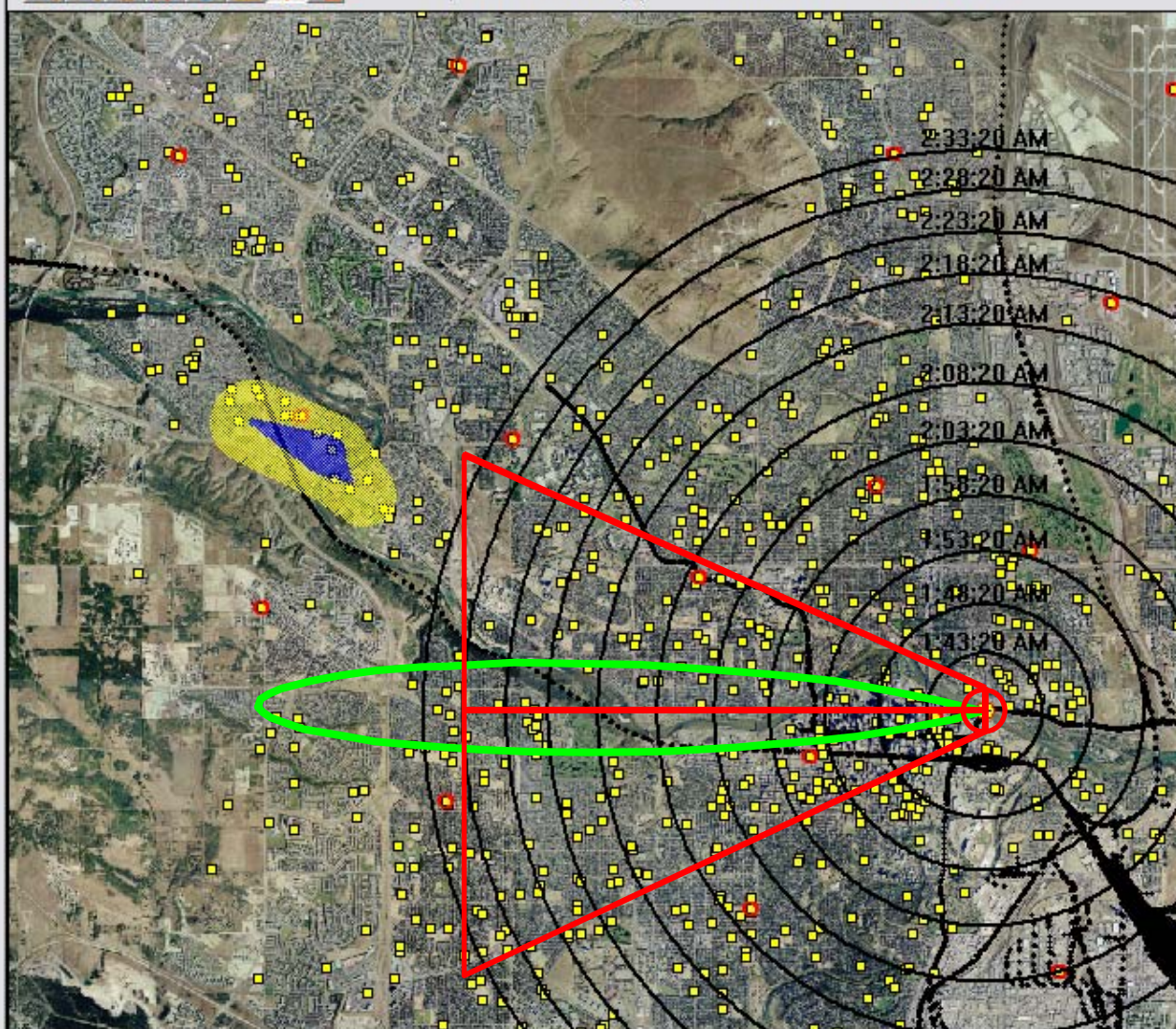


Release time 1:38:20 AM
Elapsed Time 27 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:05:37 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m) X: -16473.0 m Y: 5663304.7 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

Plume Interval

50 Minutes
55 Minutes
60 Minutes
65 Minutes
70 Minutes
75 Minutes
80 Minutes
85 Minutes
90 Minutes
95 Minutes
100 Minutes
105 Minutes
110 Minutes
115 Minutes
120 Minutes
RETURN

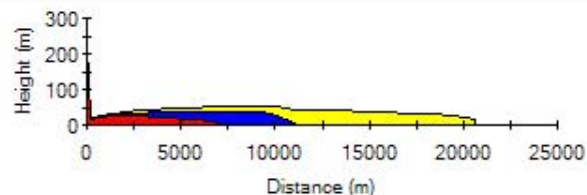


- ☐ Bow Valley Alliance Church
- ☐ Bowcroft Elementary
- ☐ Bowmont Community Pre
- ☐ Bowness
- ☐ Bowness Community Hea
- ☐ Bowness Senior Citizens
- ☐ Bowness Tennis Court
- ☐ Bowwood Gospel Chapel
- ☐ Chinatown
- ☐ Edworthy Park
- ☐ Edworthy Park Douglas
- ☐ Fire Station 15
- ☐ Foothills United Church
- ☐ Greenwood-Greenbriar
- ☐ Greenwood/Greenbriar

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot

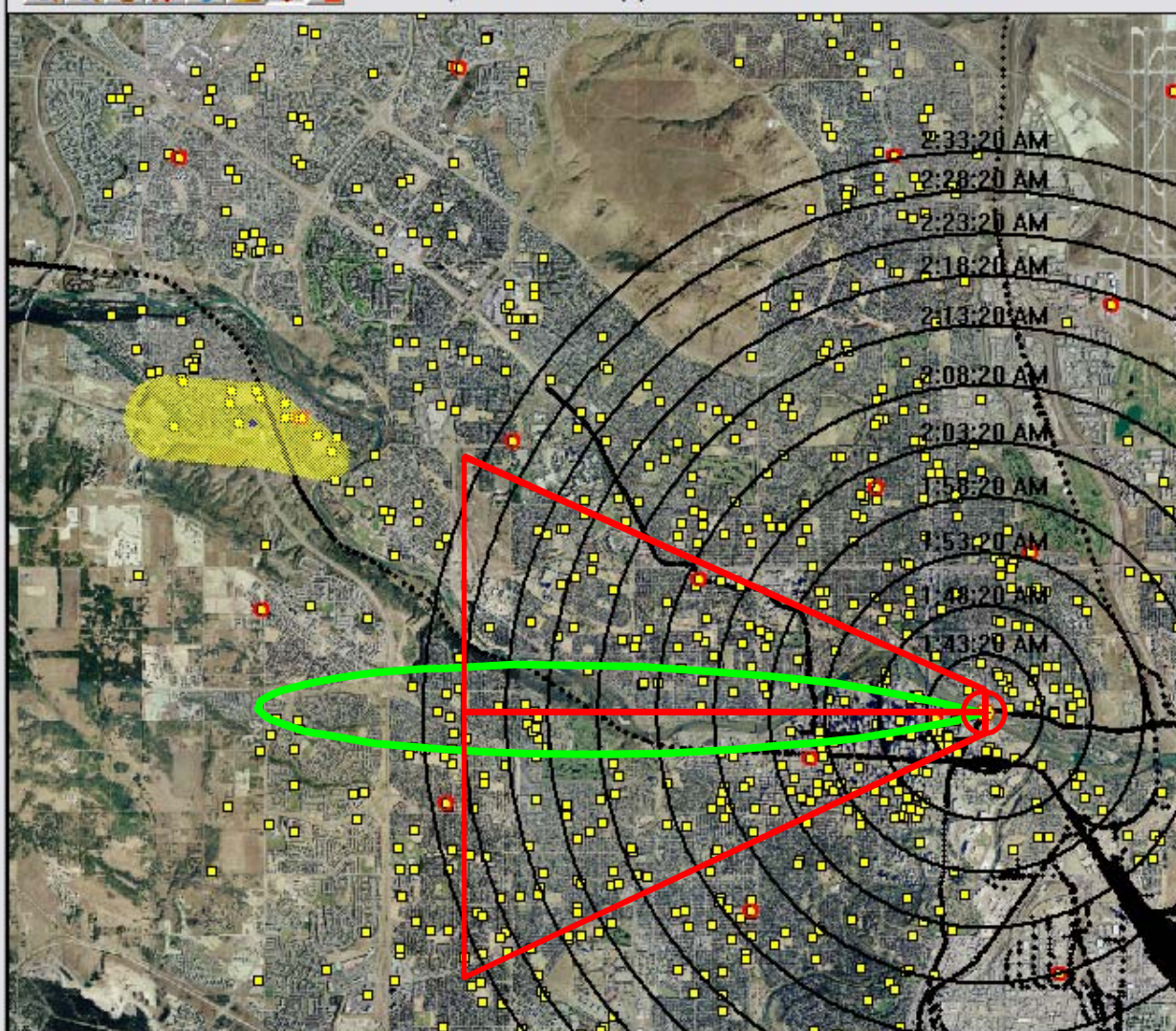


Release time 1:38:20 AM
Elapsed Time 27 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:05:47 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m) X: -16473.0 m Y: 5663304.7 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

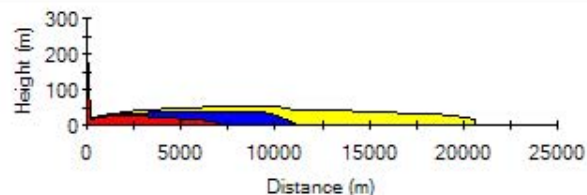
Plume Interval

50 Minutes
55 Minutes
60 Minutes
65 Minutes
70 Minutes
75 Minutes
80 Minutes
85 Minutes
90 Minutes
95 Minutes
100 Minutes
105 Minutes
110 Minutes
115 Minutes
120 Minutes
RETURN

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot



Release time 1:38:20 AM

Elapsed Time 27 (Minutes)

Last Update 1:42:18 AM

Current Time 31/05/2004 2:06:04 AM

Release Location -3578.77, 5657021.51

PlumeRAE
RAE

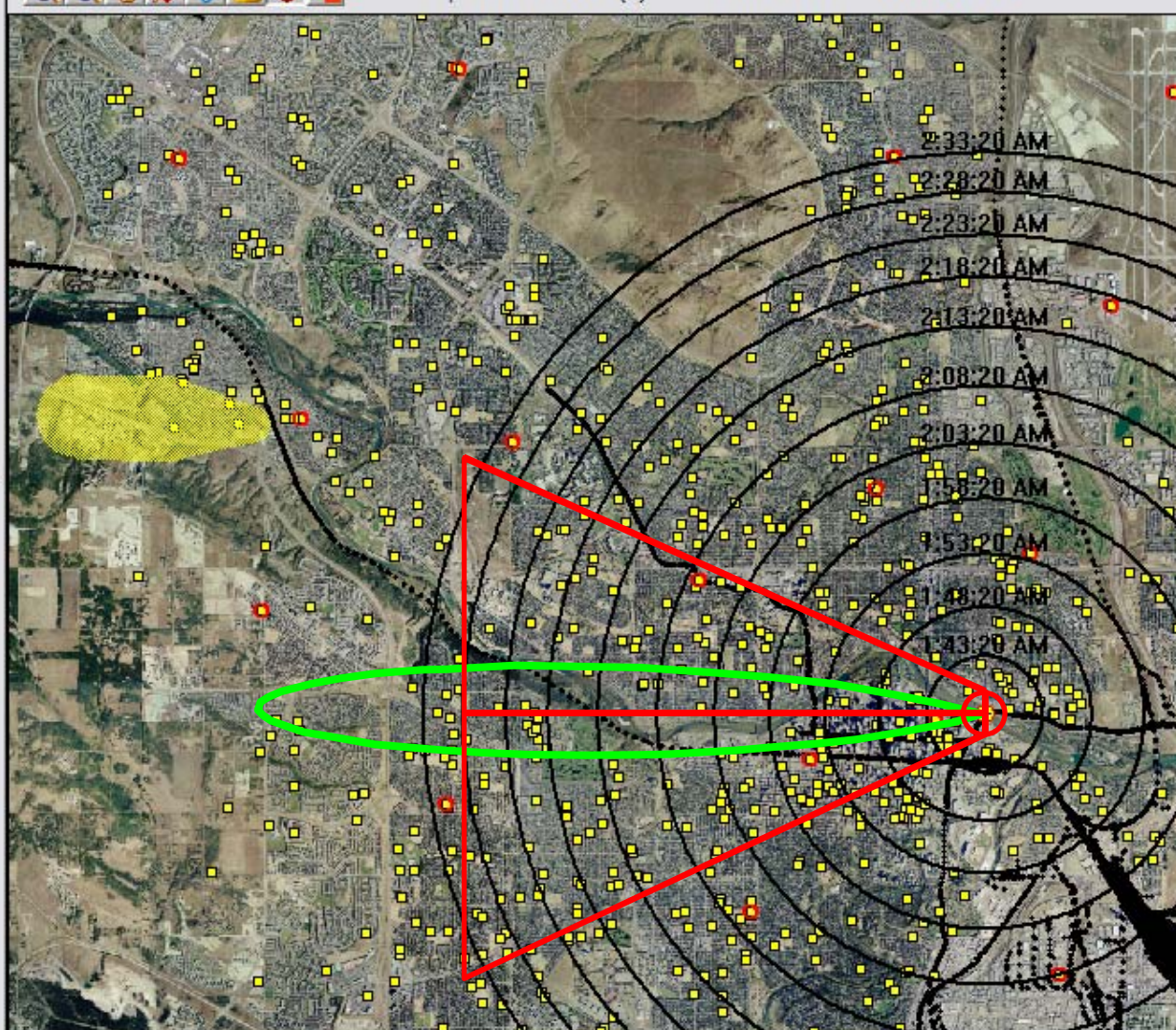
Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m)

X: -16473.0 m

Y: 5663304.7 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
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- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

Emergency Response - SIMULATED METEOROLOGY

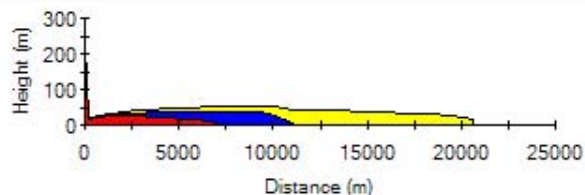
Plume Interval

50 Minutes
55 Minutes
60 Minutes
65 Minutes
70 Minutes
75 Minutes
80 Minutes
85 Minutes
90 Minutes
95 Minutes
100 Minutes
105 Minutes
110 Minutes
115 Minutes
120 Minutes
RETURN

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot



Release time 1:38:20 AM

Elapsed Time 27 (Minutes)

Last Update 1:42:18 AM

Current Time 31/05/2004 2:06:19 AM

Release Location -3578.77, 5657021.51

PlumeRAE
RAE

Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m)

X: -16473.0 m

Y: 5663304.7 m

Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

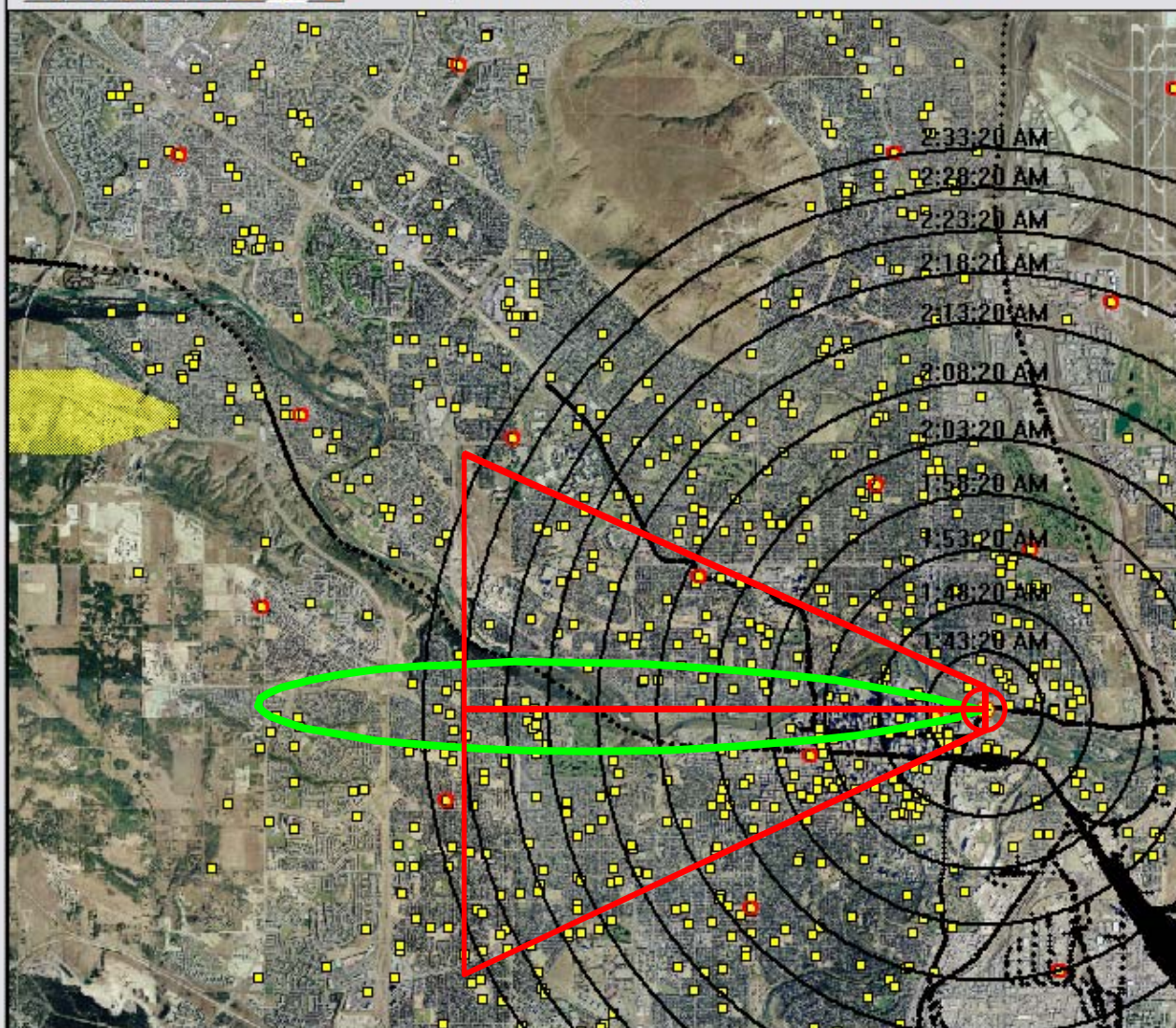
400.0
(W/m^2)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar



Emergency Response - SIMULATED METEOROLOGY

Plume Interval

- 50 Minutes
- 55 Minutes
- 60 Minutes
- 65 Minutes
- 70 Minutes
- 75 Minutes
- 80 Minutes
- 85 Minutes
- 90 Minutes
- 95 Minutes
- 100 Minutes**
- 105 Minutes
- 110 Minutes
- 115 Minutes
- 120 Minutes
- RETURN

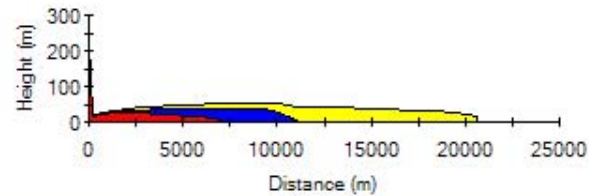


- ☒ Bow Valley Alliance Church
- ☒ Bowcroft Elementary
- ☒ Bowmont Community Pre
- ☒ Bowness
- ☒ Bowness Community Hea
- ☒ Bowness Senior Citizens
- ☒ Bowness Tennis Court
- ☒ Bowwood Gospel Chapel
- ☒ Chinatown
- ☒ Edworthy Park
- ☒ Edworthy Park Douglas
- ☒ Fire Station 15
- ☒ Foothills United Church
- ☒ Greenwood-Greenbriar
- ☒ Greenwood/Greenbriar

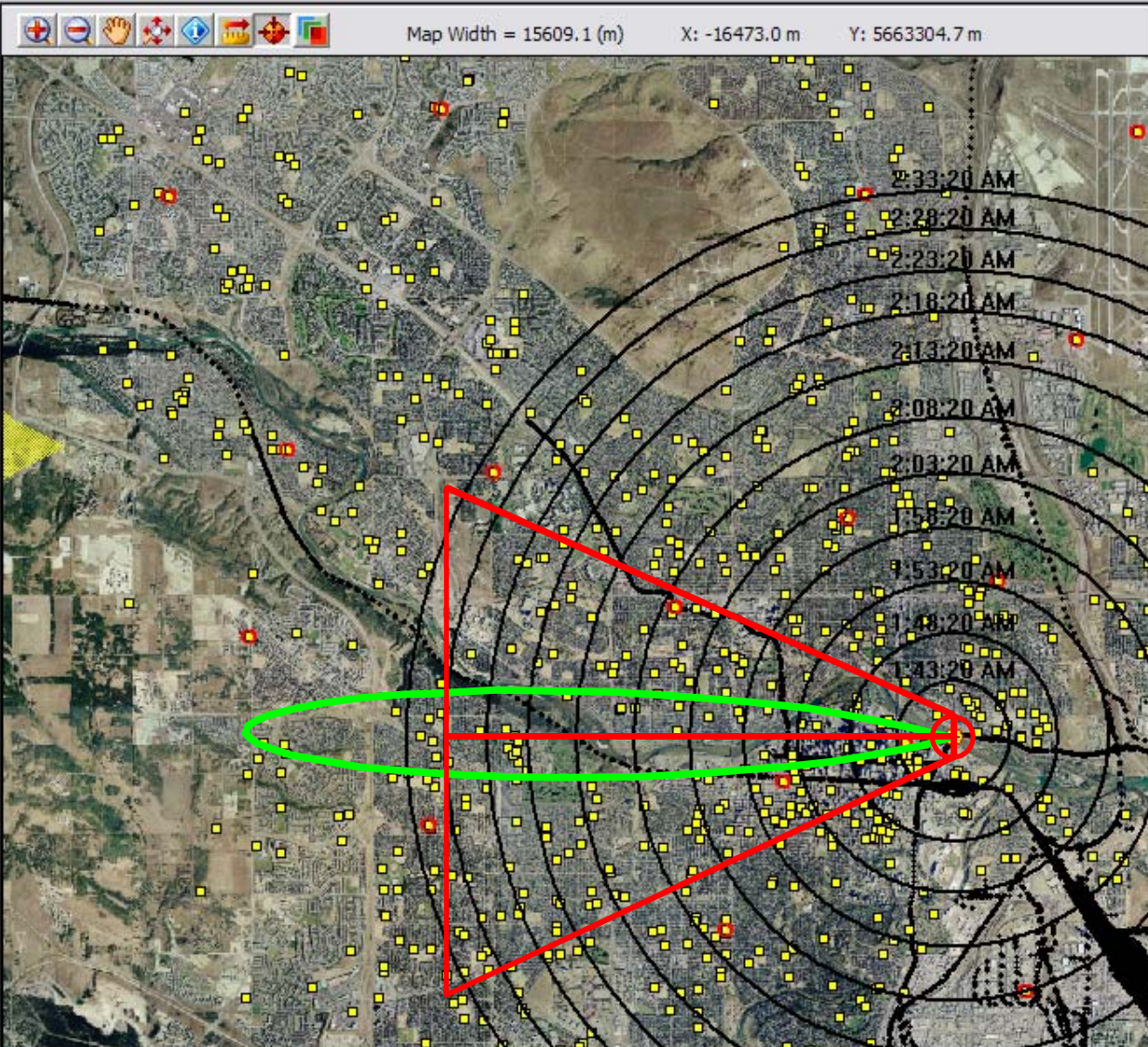
CHLORINE

- 1.0 (ppm)
- 3.0 (ppm)
- 10.0 (ppm)

View



Release time 1:38:20 AM
 Elapsed Time 28 (Minutes)
 Last Update **1:42:18 AM**
 Current Time 31/05/2004 2:06:34 AM
 Release Location -3578.77, 5657021.51



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

Emergency Response - SIMULATED METEOROLOGY

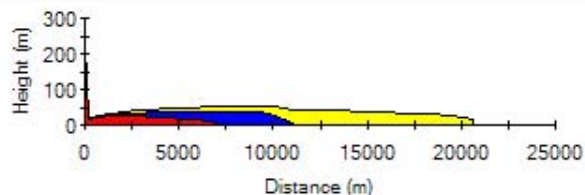
Plume Interval

50 Minutes
55 Minutes
60 Minutes
65 Minutes
70 Minutes
75 Minutes
80 Minutes
85 Minutes
90 Minutes
95 Minutes
100 Minutes
105 Minutes
110 Minutes
115 Minutes
120 Minutes
RETURN

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Snapshot



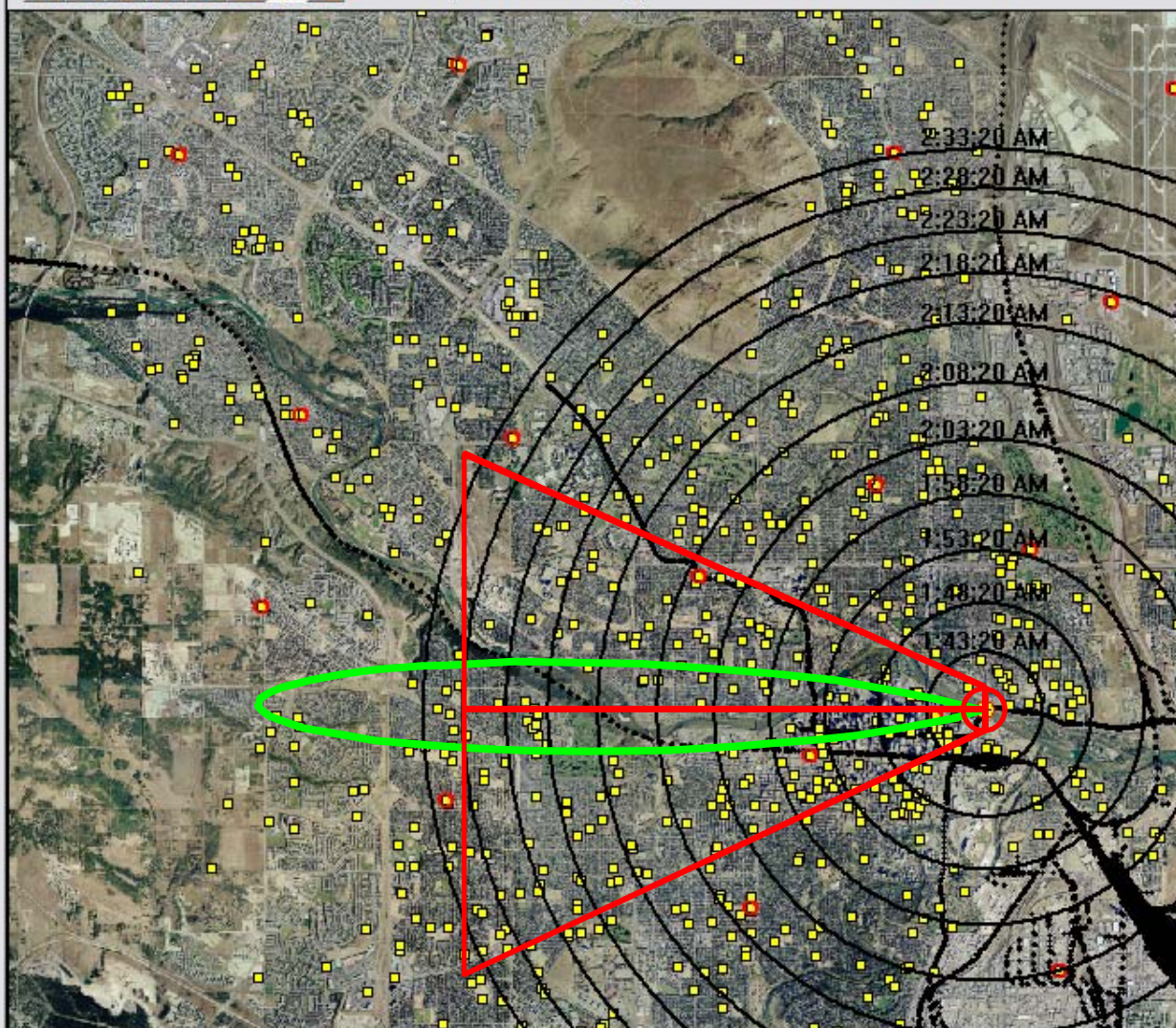
Release time 1:38:20 AM
Elapsed Time 28 (Minutes)
Last Update 1:42:18 AM
Current Time 31/05/2004 2:07:05 AM
Release Location -3578.77, 5657021.51

PlumeRAE
RAE

Powered by
SAFER
SYSTEMS



Map Width = 15609.1 (m) X: -16401.8 m Y: 5661928.8 m



Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

400.0
(W/m²)

50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

- Bow Valley Alliance Church
- Bowcroft Elementary
- Bowmont Community Pre
- Bowness
- Bowness Community Hea
- Bowness Senior Citizens
- Bowness Tennis Court
- Bowwood Gospel Chapel
- Chinatown
- Edworthy Park
- Edworthy Park Douglas
- Fire Station 15
- Foothills United Church
- Greenwood-Greenbriar
- Greenwood/Greenbriar

Scenario Options

RUN THE MODEL
Update Scenario
Change to Back Calculation
Reports

Plume Analysis

Infiltration Analysis

Export Plume

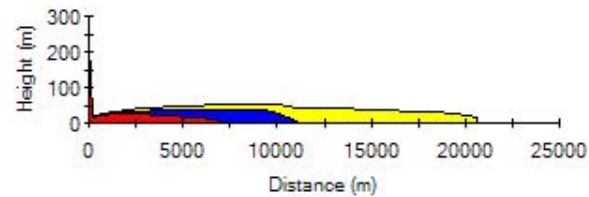
Run Pre-defined Case

All Done (QUIT)

CHLORINE

1.0 (ppm)
3.0 (ppm)
10.0 (ppm)

View Footprint



Release time 1:38:20 AM

Elapsed Time 43 (Minutes)

Last Update 1:42:18 AM

Current Time 31/05/2004 2:22:19 AM

Release Location -3578.77, 5657021.51

PlumeRAE
RAE

Powered by
SAFER
SYSTEMS



Map Width = 15422.4 (m)

X: -16352.4 m

Y: 5662150.2 m

Meteorology

10.0
(km/h)

East
(From)

10.0
(Deg C)

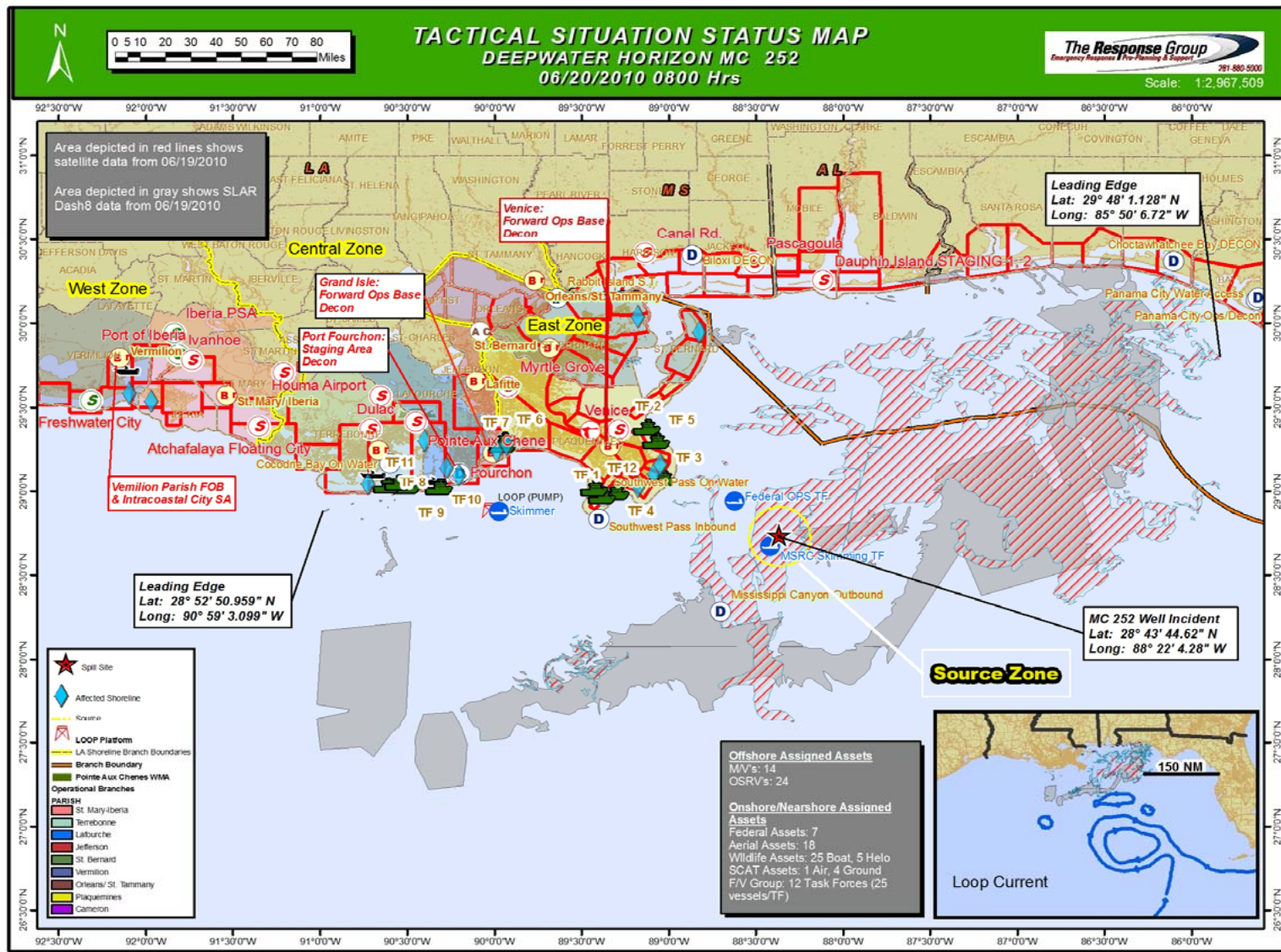
400.0
(W/m²)

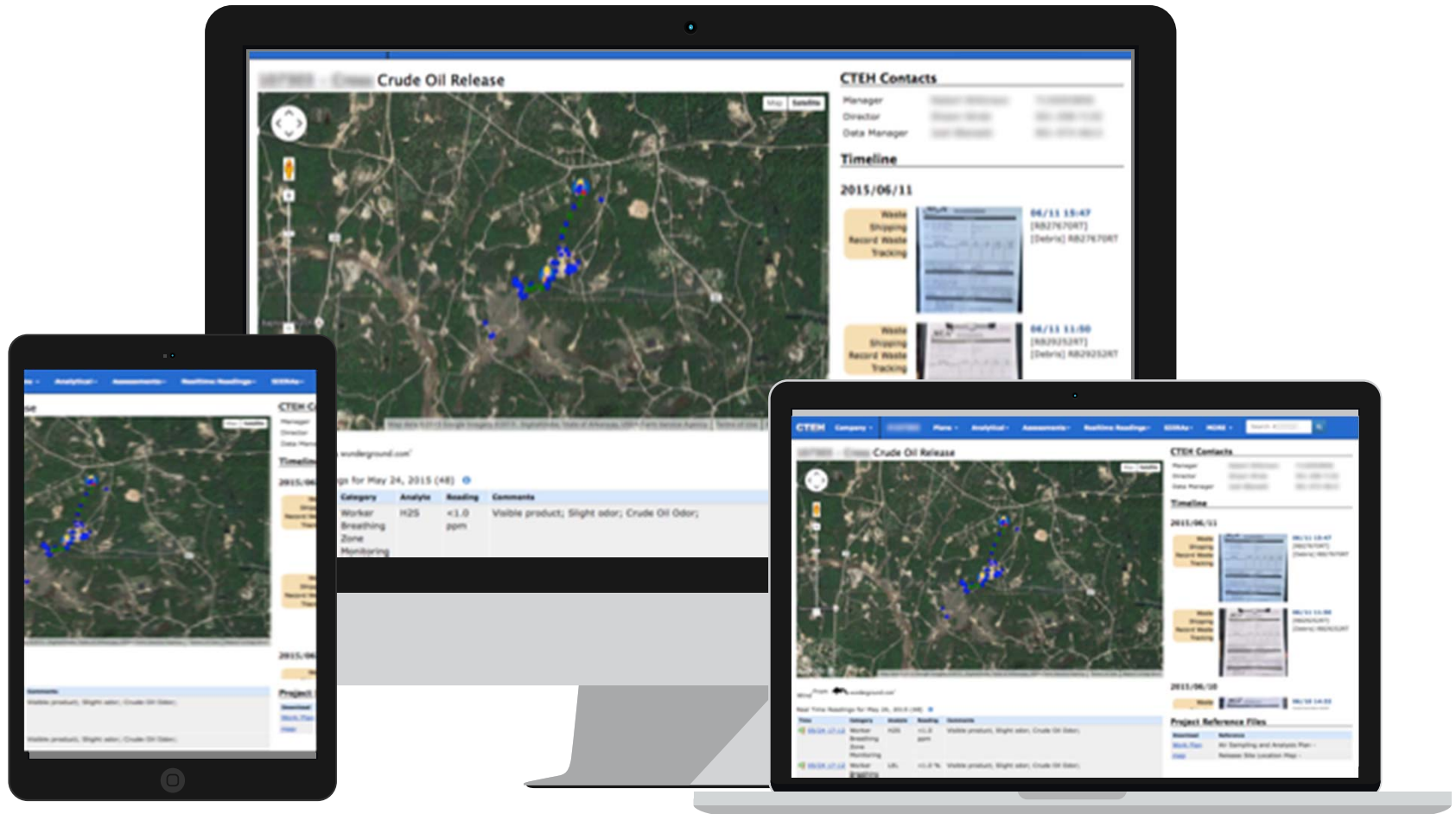
50.0
(%)

6.0
[H Stability]

5.0
[V Stability]

- Bow Valley Alliance Church
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NEAR REAL-TIME VISIABILITY

View sample collections as they are captured with field notes of local conditions and readings



PERSONALIZED LOGIN

Data is accessible with a simple username and password.



KEYWORD SEARCHABLE

Search your project by date, keyword, and location







First Day: Communications Response

- Do our words and our actions align?
- Do we have a plan?
 - Media
 - Social media
 - Communications (internal and external)
- Establish timeline for coming days
- Continue ongoing media monitoring / responding
- Schedule daily touch base with core team, more if necessary





First Day: Legal Response

- OSHA fatality and severe injury reporting
- Establish designated point of contacts with government agencies
- Evidence preservation
 - Electronic and physical evidence
- Preservation hold memorandum
- Eyewitness statements
- Work with PR Team on media alerts / social media
- Contact / tender notice to Insurance Carriers



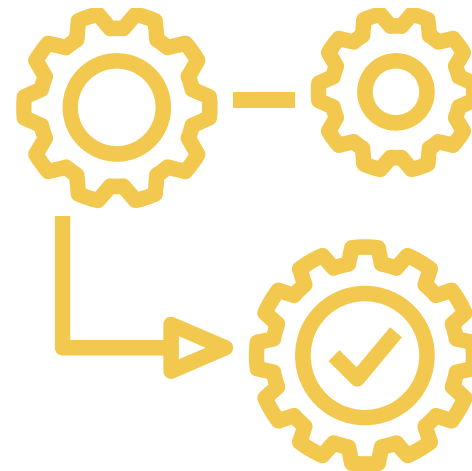
First Week

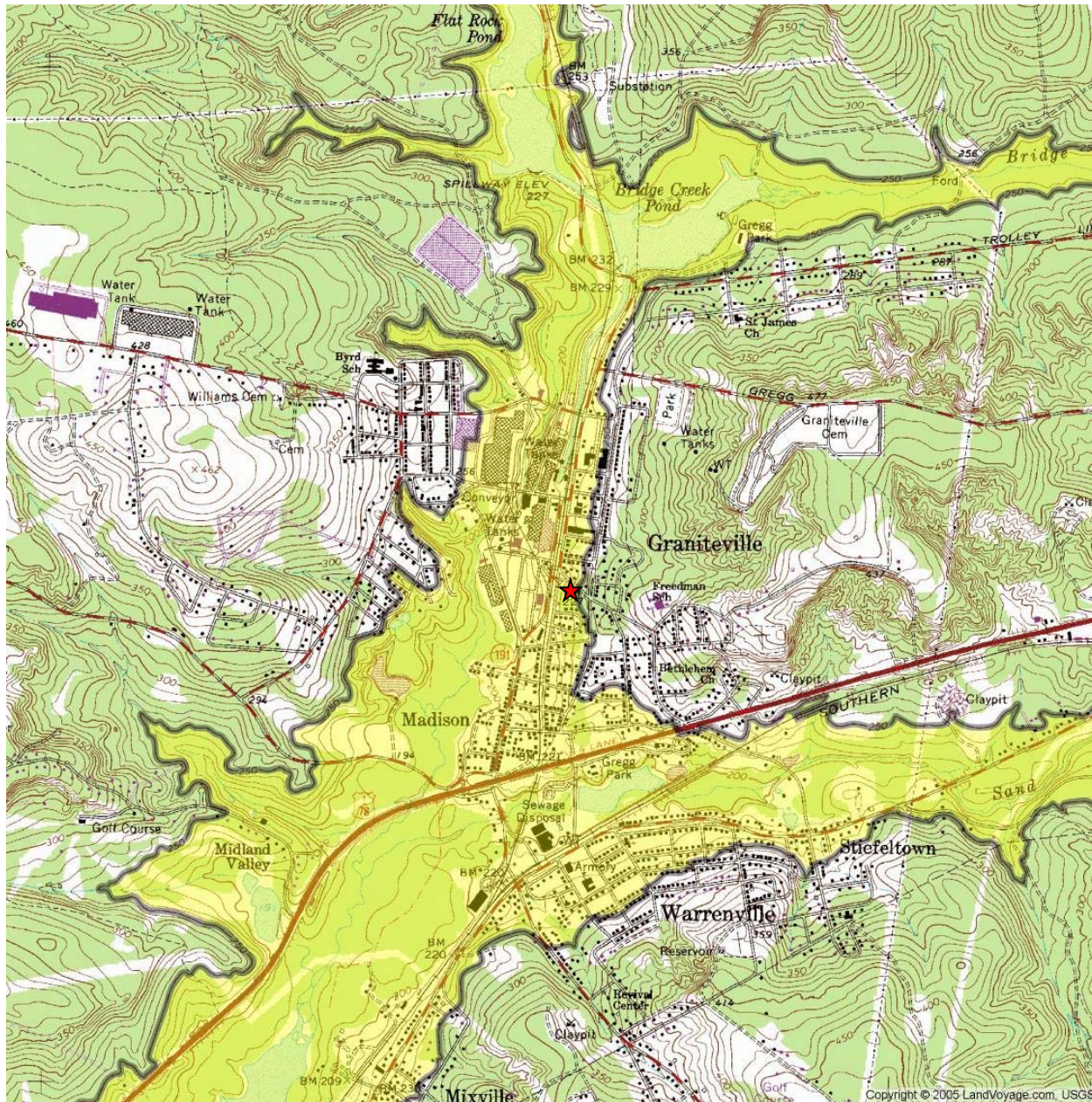




First Week: Environmental Response

- Ongoing Operations
- Address Stakeholder Concerns/Issues
- Communication(s)
- Data Analyses and Presentation



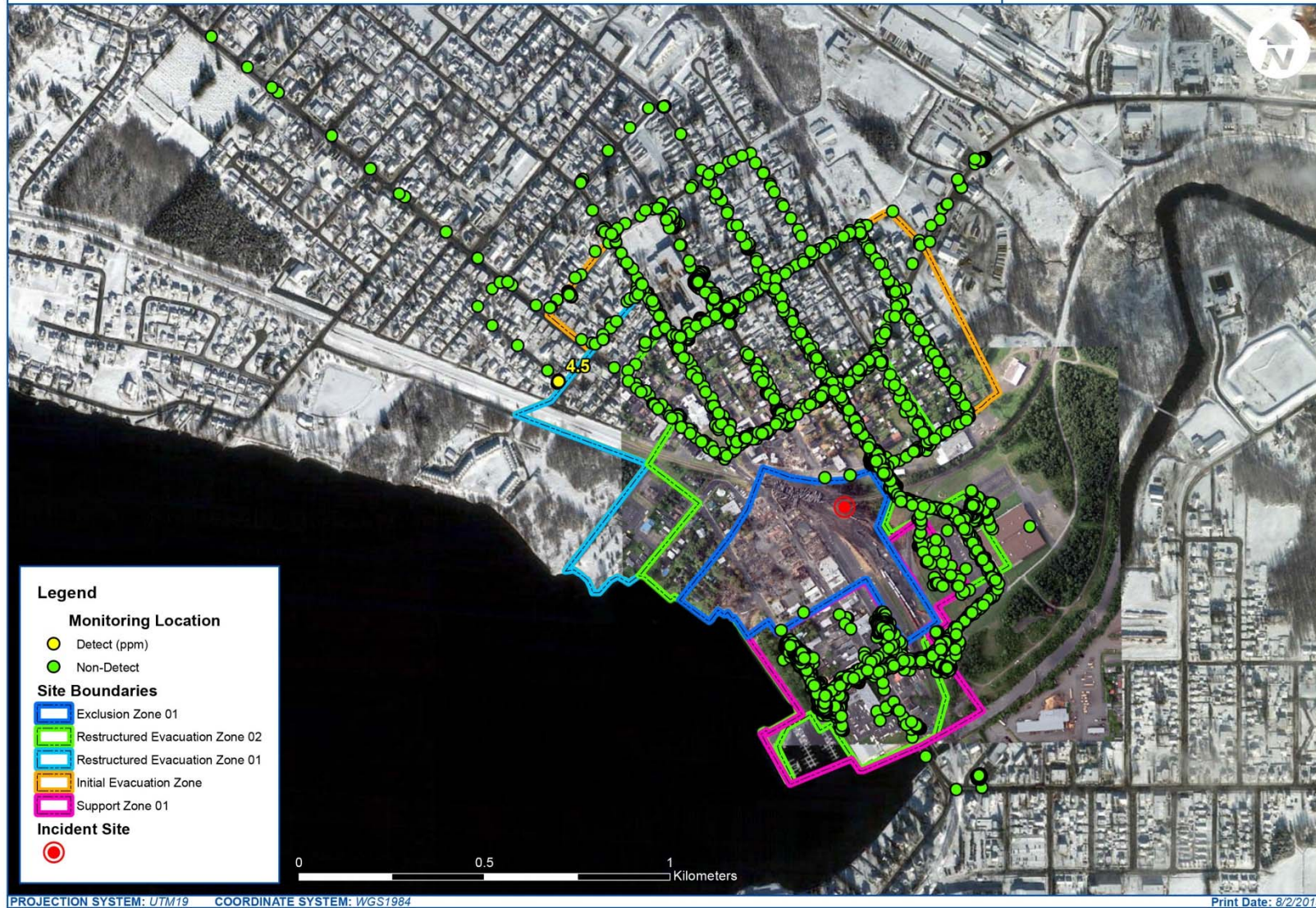


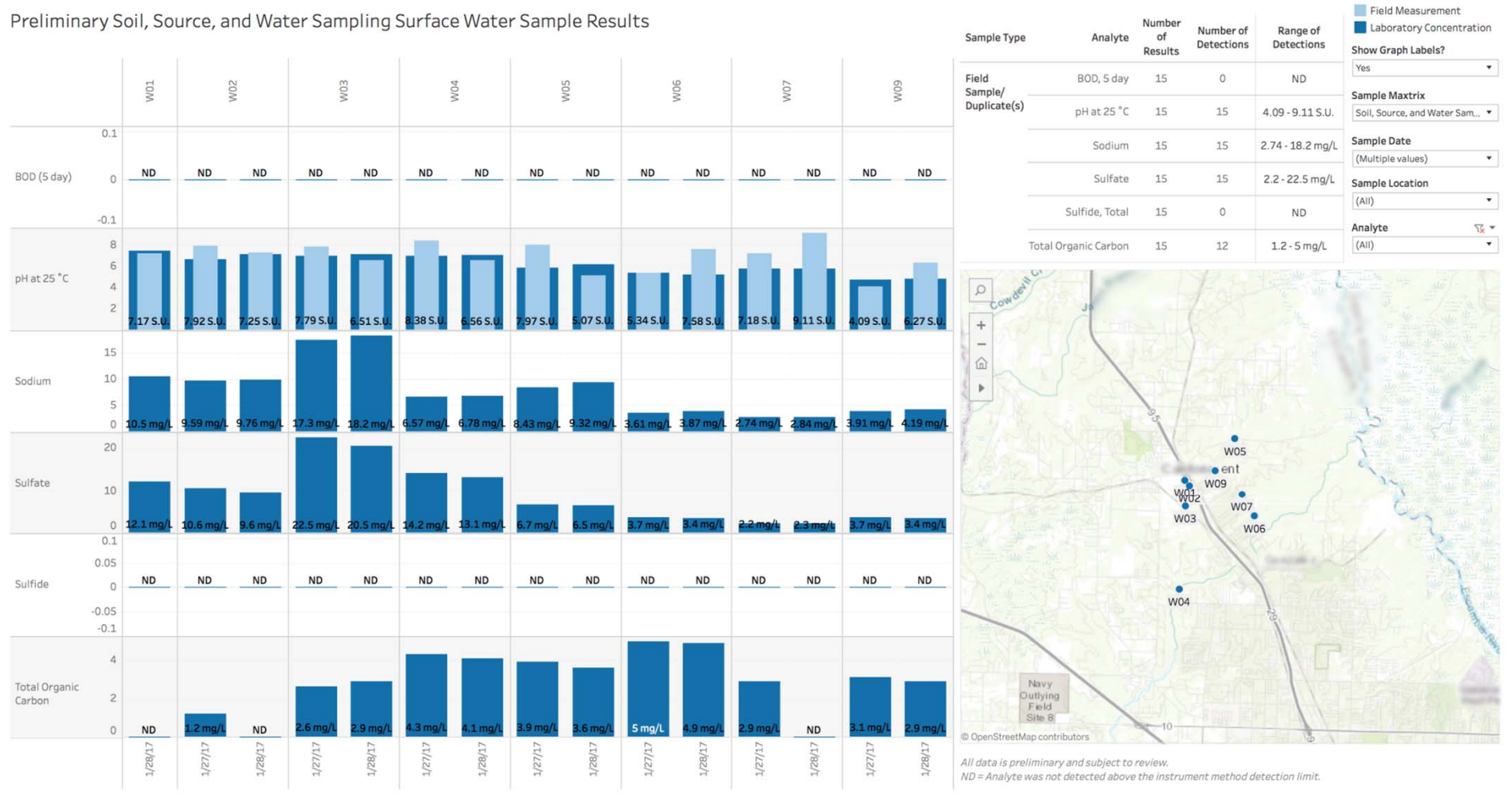
- ✓ Chlorine gas is 2.5 times heavier than air
- ✓ Chlorine was below the 250 ft elevation shown on the map
- ✓ Wind was from the South
- ✓ Homes affected by the Chlorine were localized to directly east of the accident (west of Gregg Street) and just west of the Avondale plants

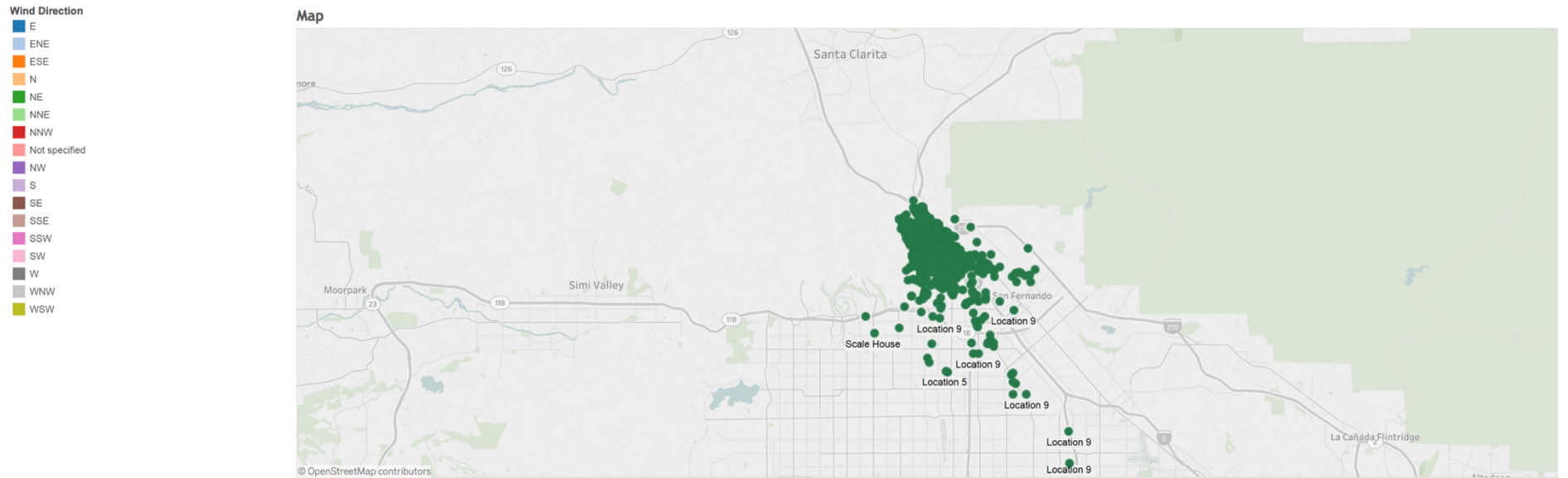


Risk Communication









Odor Description with met data

Address uniformed	Detection	Odor_Descriptor_Category	
		200 Fruity, 300 Vegetable, 40...	No reading
		200 Fruity, 300 Vegetable, 50...	No reading
		200 Fruity, 300 Vegetable, 50...	No reading
		200 Fruity, 300 Vegetable, 70...	No reading
		200 Fruity, 400 Earthy	No reading
		200 Fruity, 400 Earthy, 500 Of...	No reading
		200 Fruity, 500 Offensive	No reading
		200 Fruity, 700 Chemical	No reading
		300 Vegetable	No reading
		300 Vegetable, 400 Earthy	No reading
		300 Vegetable, 400 Earthy, 70...	No reading
		300 Vegetable, 400 Offensive...	No reading
		400 Earthy	No reading
		400 Earthy, 500 Offensive	No reading
		400 Earthy, 500 Offensive, 70...	No reading
		400 Earthy, 700 Chemical	No reading



First Week: Communications Response

- Work the plans
 - Crisis
 - Media
 - Social Media
 - Communications
- Assess and determine if all audiences have been reached and if messages are resonating; adjust as necessary
- Identify vulnerabilities and plan accordingly
- Ongoing monitoring and coordination with core team





First Week: Legal Response

- Facilitate and handle requests from government inspectors (CSB, EPA, OSHA, DOT, State agencies):
 - Site visits;
 - Document requests;
 - Witness interviews
- Work with company on its own Incident Investigation / Root Cause Analysis
- Begin your own Internal Investigation
- Key aspects of Witness interviews
- Experts
- Develop framework for claims processing / litigation
 - Workers Compensation
 - Personal injury
 - Other entities involved
- Continue to work with PR Team and insurance carrier(s)



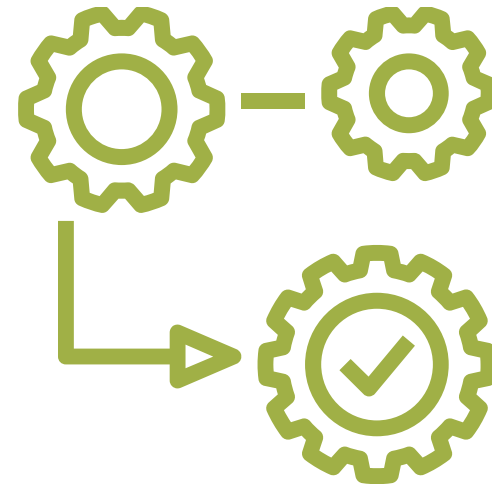
First Month





First Month: Environmental Response

- Ongoing Operations
- Address Public and Business Claims/Concerns
- Return to normal operations
- Legal





Impacted coins





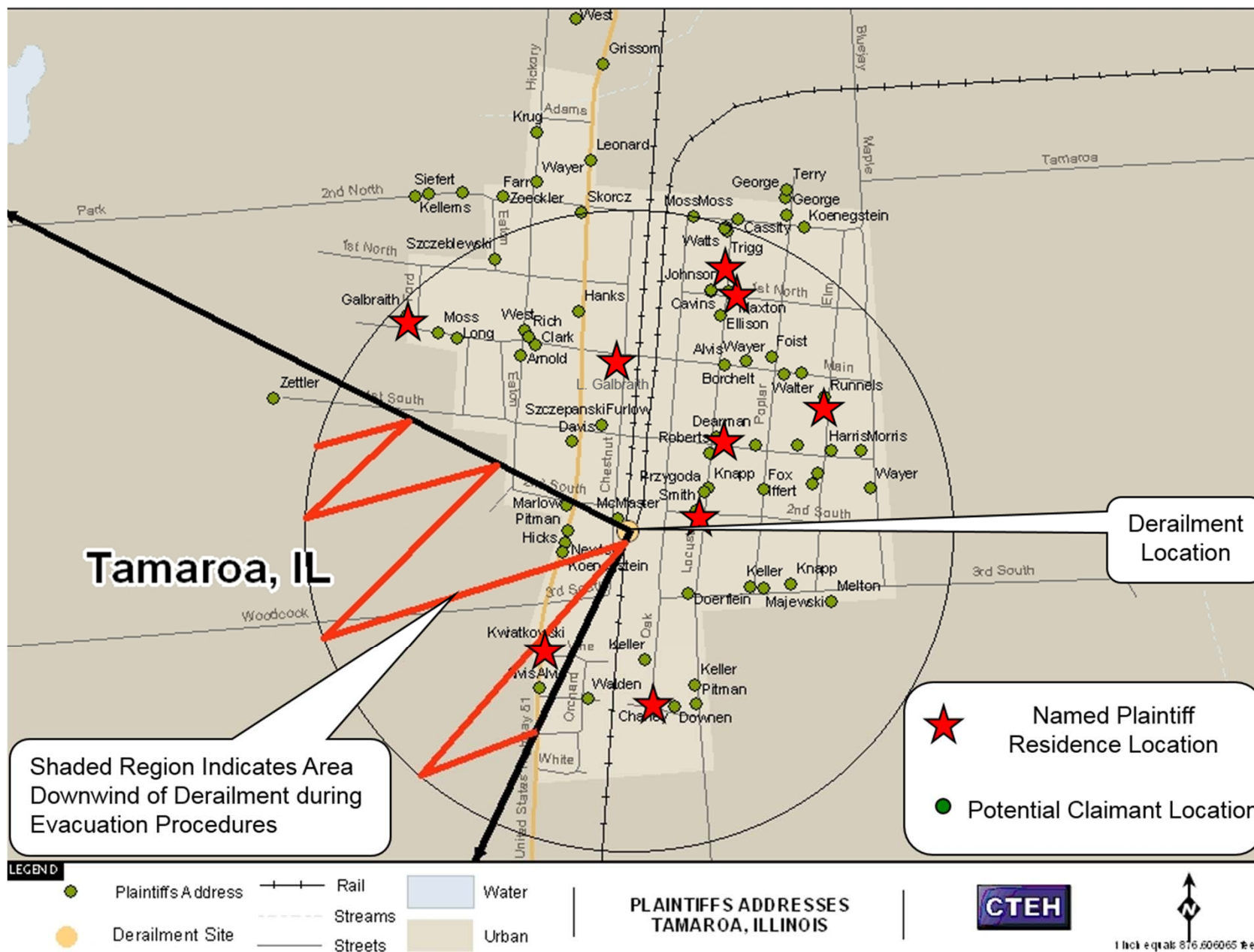
Door Knob at Heavily Impacted Property





Impacted Car Dealership







First Month: Communications Response

- Assess media coverage and stakeholder engagement
- Update key messages and material as appropriate
- Upcoming milestones – regulatory, legal
- Ongoing communications planning





First Month: Legal Response

- Facilitating Government Investigation
 - Be prepared for hundreds of document requests
 - Multiple witness interviews
- Incident Investigation and Root Cause Analysis
- Internal Investigation
- Begin obtaining reports from emergency responders
- Employee discipline
- Corrective actions and subsequent remedial measures
- Personal injury claims management
- Causation and contributing factors from other parties
 - Preservation demand letters to other parties



Questions?





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Appendix



MC252 Deepwater Horizon



April 20, 2010 | Deepwater Horizon Rig





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El Dorado Chemical



Potterville, MI



Graniteville, SC



Murphy Oil Spill



Farragut, TN - Oleum



Minot, ND - Ammonia

