ADVANCED, REAL TIME, CHEMICAL EMERGENCY DECISION SUPPORT

Overview

Chemical Emergency Response E-Service (CERES) is a collaborative SaaS application for chemical release event modeling, threat assessment, situational awareness and protective action decision support. It includes live meteorology, government vetted models and guides, incorporating special sensor driven algorithms for source location identification and release rate estimation – anywhere – any time – on any device.

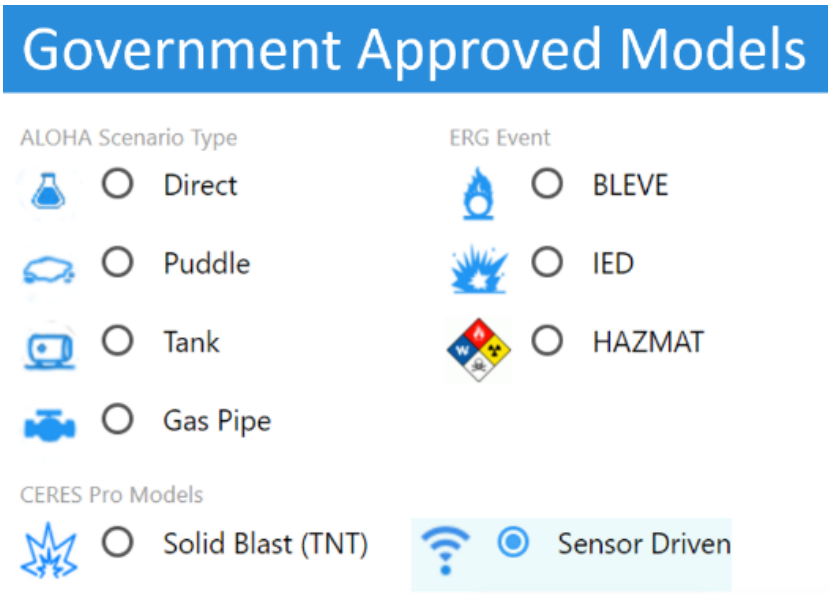
Vlahi Systems LLC was founded by a team well versed in the design and development of real-time, chemical hazard analysis, decision support technology.

CERES is a device-agnostic, cloud-based application used to prepare for, respond to, and analyze chemical incidents, fire incidents or explosions.

The system incorporates GPS enabled devices (including phones), live traffic, real-time meteorological data, gas concentration and radiation data from deployed sensors. All data is displayed live on a map of the area of interest along with sensitive receptors including schools, hospital, churches, fire and police stations etc. to provide improved situational awareness.

Models and Guides

Using US government-vetted dispersion models CERES can model toxic gas clouds, flammable gas clouds, BLEVEs (Boiling Liquid Expanding Vapor Explosions), jet fires, pool fires, tank top fires, flare stacks, vapor cloud and solid explosions, and it also incorporates and plots ERG, PERG, BLEVE, and IED protective action guidance distances.



Users can input the chemical **"release details"** (location, type of threat, size of the containment, failure mode or size of the leak), and generate threat zone estimates for various types of hazards (toxic, thermal, flammable, overpressure).

Threat zones are plotted on Google Maps and the impacted receptors list is generated live, along with time to impact, severity and expected impact duration. All scenario activity with impact assessments and live data are recorded and available for post-event reporting and analysis.

Users can import local SEVESO, US EPA RMP, E2 and Tier II regulated site information and launch auto-generated and/or manual **predefined scenarios** using the chemical inventory data from these imported databases or custom defined vessel dimensions and transportation vehicles.

SDP (Sensor Driven Plume) Model

Because many **"release details"** may be difficult or impossible to determine at the onset of an event, CERES can also **generate threat zones based on live gas sensor data**. Additionally, this approach also considers the real time impact of mitigative actions that cannot be quantified by traditional modeling methods.

When gas concentrations are detected, if the source is unknown, the user can run the CERES Source Location ID (identification) model to help responders identify the source of the detected release. Once the location is identified, the user can run the CERES "Sensor Driven Plume" or "SDP" model.

SDP averages the real-time gas sensor values over time and, using connected meteorological data, runs a convergence routine until the plume concentrations match the sensor measured values. The system displays the affected area on a map along with the estimated time of arrival and concentration impacting each receptor location. The information can help better inform responders about event severity and extent, and support decisions related to shelter in place or evacuation.

VLAHI CERES

Chemical Emergency Response E-Service

CERES updates as winds shift and monitored conditions change, notifying the user to rerun and update the analysis, giving the emergency management organization the most accurate information about the incident and helping them coordinate and adjust the scale and scope of the response.

Anywhere, Anytime, Any device

Desktop (CERES Web)

Our web application can be accessed from any PC, Mac or laptop connected to the internet.

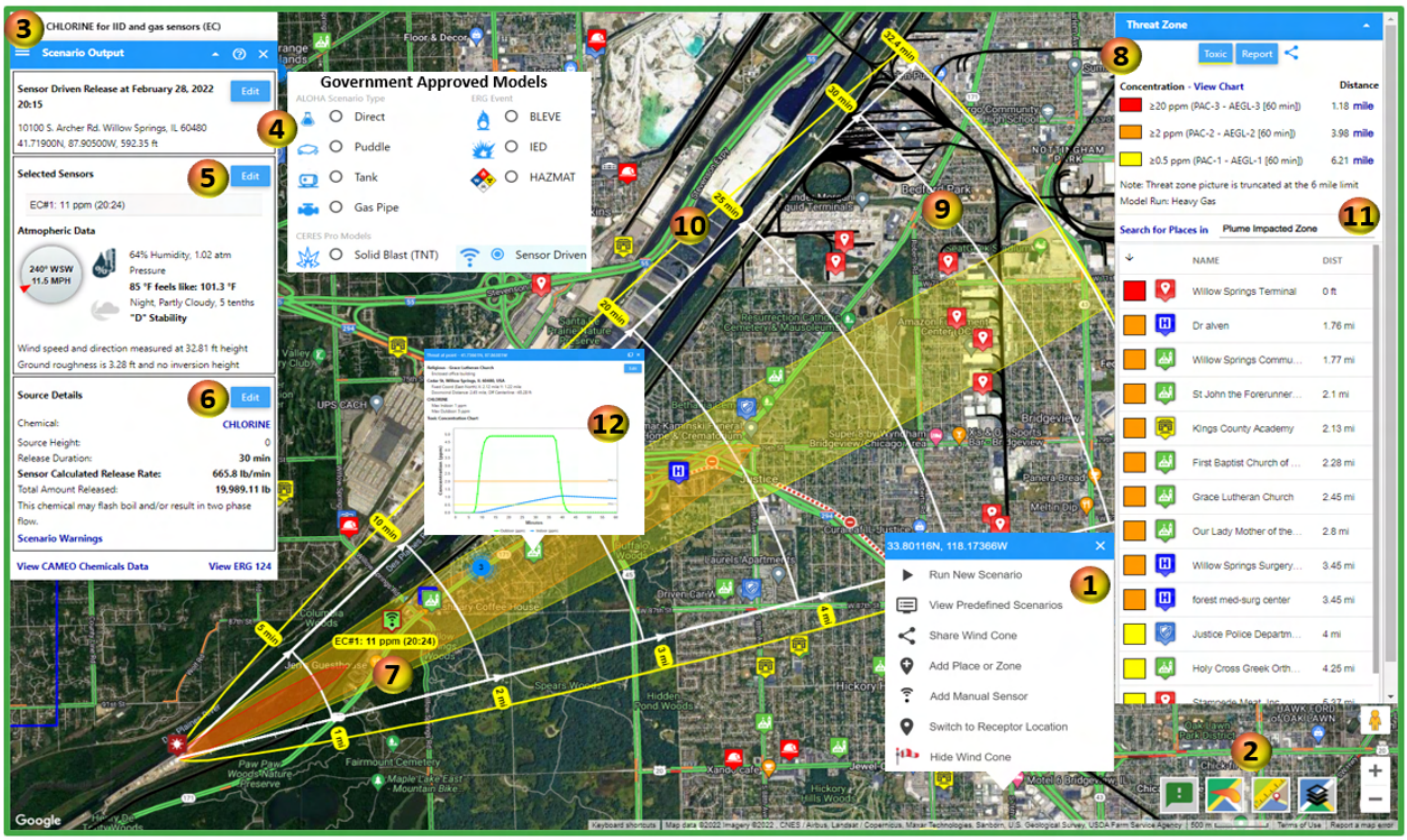
Tablet (iOS and Android app)

CERES iOS and Android apps are designed and optimised for your tablet.

Mobile (iOS and Android app)

The mobile user interface has been updated for iOS and Android phones, making CERES accessible on any device.

Vlahi CERES - Chemical Emergency Response E-Service Overview



1. Click on map activation
2. Map management & measurement tools
3. Admin and historical archive
4. Location, time and model selection
5. Sensor and met data editing
6. Scenario input editing
7. "Sensor Driven Plume" plot
8. Impact type, sharing & reports
9. Downwind cone (speed, direction, time, stability)
10. Wind confidence lines (potential wind shifts)
11. Threat zone vulnerability analysis
12. Threat at point "Shelter-In-Place" analysis

Current Weather Conditions (Meteorological Resources)

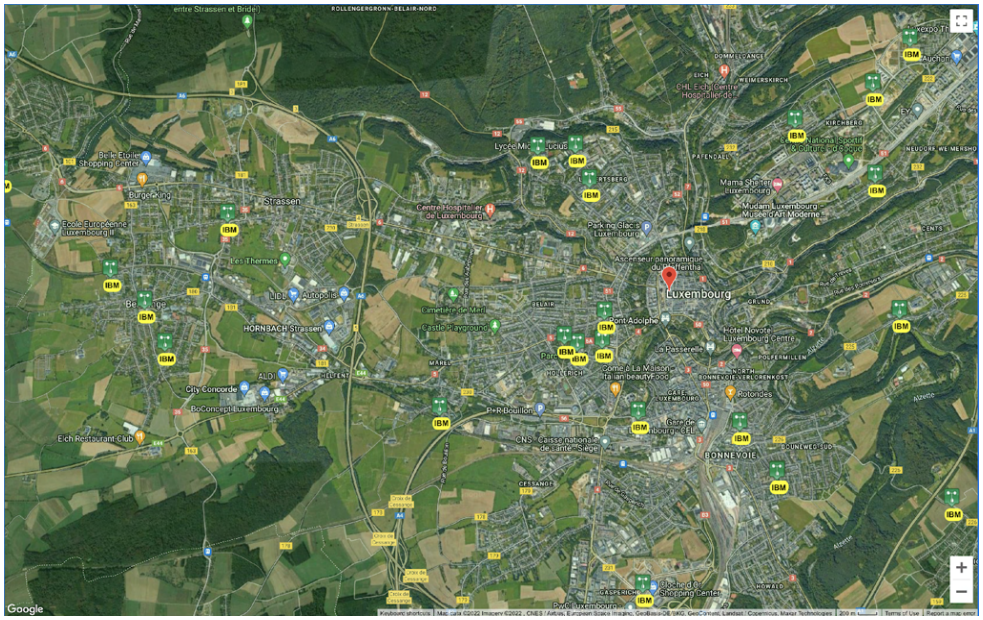
CERES Live Team comes with hyperlocal **IBM Enhanced Weather** with current weather observation elements gridded across the globe at a 4 km / 2.5 mile geocode resolution with data refreshed every 10 minutes.

In addition, the system includes access to a broad network of meteorological stations from **Earth Networks, IBM PWS,** and government weather forecasts through the **European YRNO** system to provide anywhere anytime met data. To help accommodate customer / site specific requirements, CERES is also compatible and often deployed with a variety of fixed and portable meteorological instruments (**WeatherPak, ZENO station, Campbell Scientific, WeatherFlow Tempest, Vaisala, AIRMAR, AreaRAE Pro**…). Customers can consult with Vlahi if different or additional meteorological or communication hardware is required.

Current conditions at any remote incident scene are generated automatically in CERES from its built-in networks. In conjunction with downwind and upwind wind vectors showing impacted municipal receptors and built-in hazmat models and guidance, CERES permits responding agencies to conduct release source identification and local threat assessment from the moment the team is activated, well before the Hazmat team arrives onsite.

CERES can quickly provide guidance to first on-scene responders, help develop safe approach, standoff, and staging area plans. This accelerates threat analysis and enables the implementation of protective strategies and tactics before any portable devices can be deployed locally and helps plan for and optimize the deployment of monitoring devices once the team arrives.

IBM Enhanced Weather provides access to a variety of meteorological inputs including local available physical surface observations, radar, satellite, lightning, and short-term forecast models. The system returns a similar set of data elements as traditional site-based observations to provide information on temperature, precipitation, wind, barometric pressure, visibility, ultraviolet (UV) radiation. The system spatially and temporally blends each input, producing a result that improves upon any individual input used on its own.



Perhaps most importantly, all wind values are calculated based on wind status 10 meters above ground as specified in the EPA's Meteorological Monitoring Guidance for dispersion modeling.

The CERES screen snag on the left provides an example of the coverage of connected meteorological networks in the Luxembourg area.

Interagency Device Sharing, Cooperation and Support

During a Mutual Aid incident, response teams with their own separate CERES accounts with connected devices can link their devices to a single CERES account. ***The responding agency with authority over the incident will provide a CERES generated 4-digit pin code (3 mouse clicks to activate) to their mutual aid partners and all the devices the partners have deployed, connected to the partner CERES systems, will now appear on the "main" CERES System for use during the event.*** If they must leave to stand down or respond to another event, they simply remove the PIN and they are back on their own.

Monitoring and Data Archiving

CERES fully records meteorological and gas sensor data and alarm history offering a time interval reporting and meteorological wind rose.
At industrial facilities, gas detector devices connected to CERES can assist with compliance to regulatory mandates in detecting and monitoring exposures as well as detecting gas concentrations migrating off-site.

CERES applications allow for periodic and post-event data review, reporting and analysis. CERES can access detailed response action and scenario impact history.

About Vlahi Systems

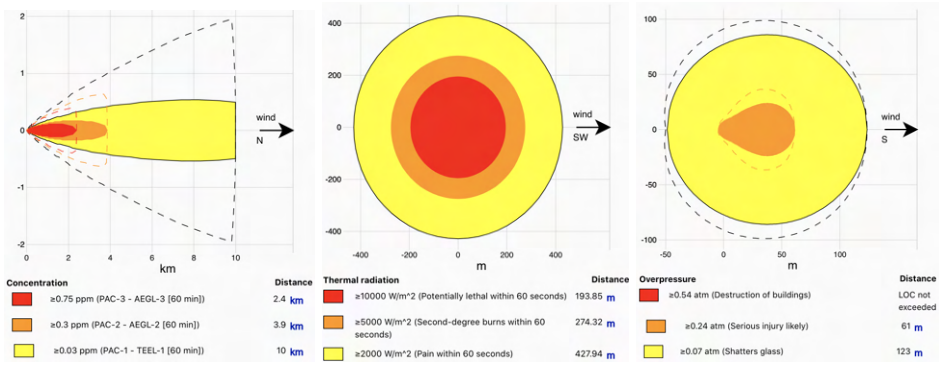
Vlahi Systems LLC, is a Houston-based technology company with a mission to deliver the most cost effective and feature-rich emergency response solutions to planners, responders, chemical plants, government organizations and the transportation industry.

Currently used by over 8,000+ users globally (including ICL-Group, Nutrien, Michigan MABAS and CANUTEC) and distributed across more than 100 countries as a software-as-a-service application CERES delivers an industry-leading user experience for planning, responding to, and analyzing chemical, fire and explosion events — anytime, anywhere and on any device, before, during or after a chemical incident. For more information, visit www.vlahi.com

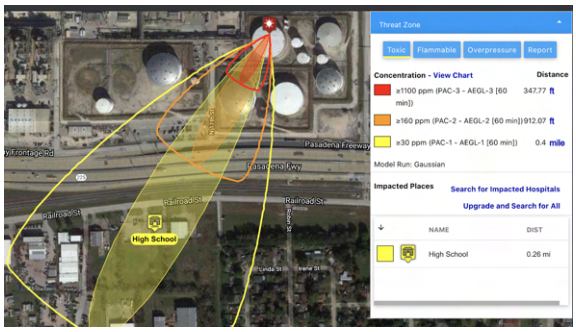
CERES Features

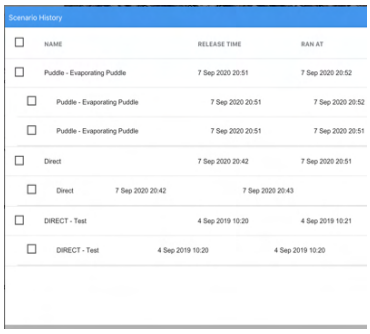
CERES BASE

CAMEO ALOHA plume dispersion modeling capabilities including toxic gas clouds, flammable gas clouds, BLEVEs, jet fires, pool fires, vapor cloud explosions, building infiltration analysis and the following source strengths: Direct, Puddle, Tank, and Gas Pipe.



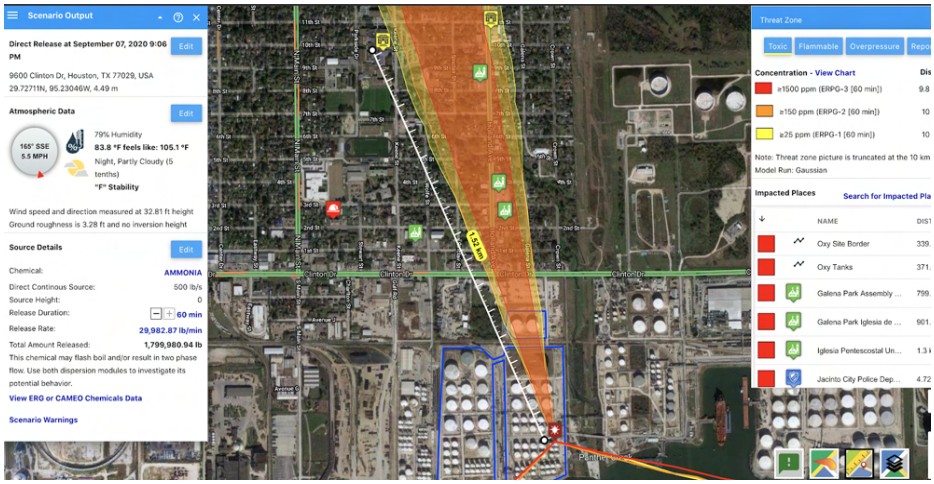
Google Maps base integration for displaying the threat zones and assessing the impacted manual receptors. Scenario history for managing current and past modeling runs, along with basic reporting capabilities.





CERES LIVE TEAM

Additional map functionality: Live traffic, Street view, Live current location, Map ruler, Drawing tools, Google Places for automatic generation and assessment of impacted receptors; KML/KMZ and custom imagery (satellite imagery) import / export.



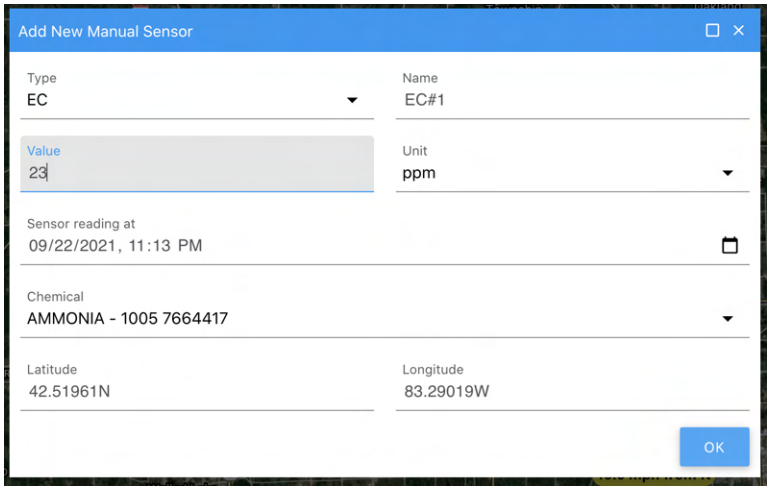
New ! - **[Blackline Safety Partnership and Integration]**

CERES integrates the real-time, location-enabled data from Blackline's G7 and G7 EXO portable gas detectors, for live monitoring, alarms management, data history, and for the new sensor driven plume module.

Chemical Emergency Response E-Service

New ! - Manual Sensors

Input manual sensor data in CERES from gas detectors that are not connected to the system.
Run the Sensor Driven Plume model with manually inputted data.

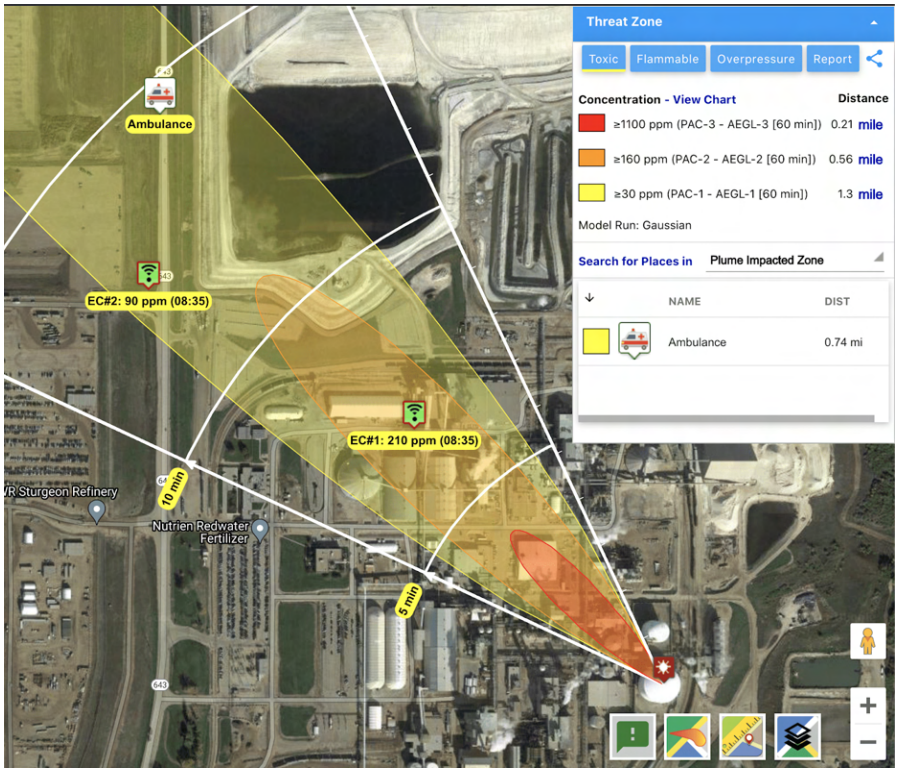


New ! - Sensors Driven Plume

CERES can **autoselect** or allow user input of live portable and fenceline wireless gas sensors to generate threat zones based on measured concentrations and meteorological data.

This "Sensor Driven Plume" approach has the added benefit of providing real-time feedback on the effectiveness of mitigating actions that cannot be quantified by traditional modeling methods.

.

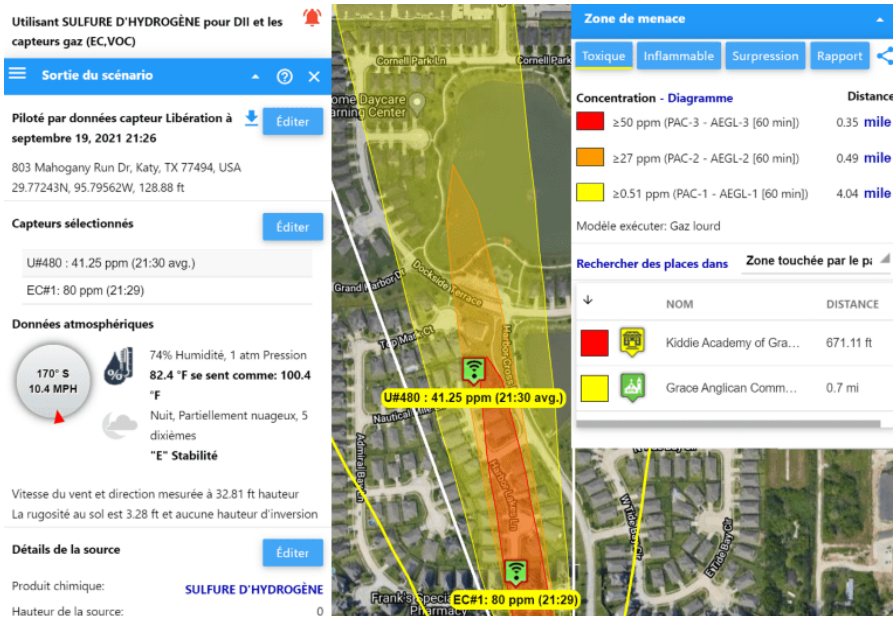


VLAHI CERES

Chemical Emergency Response E-Service

New ! - Multi Language Support

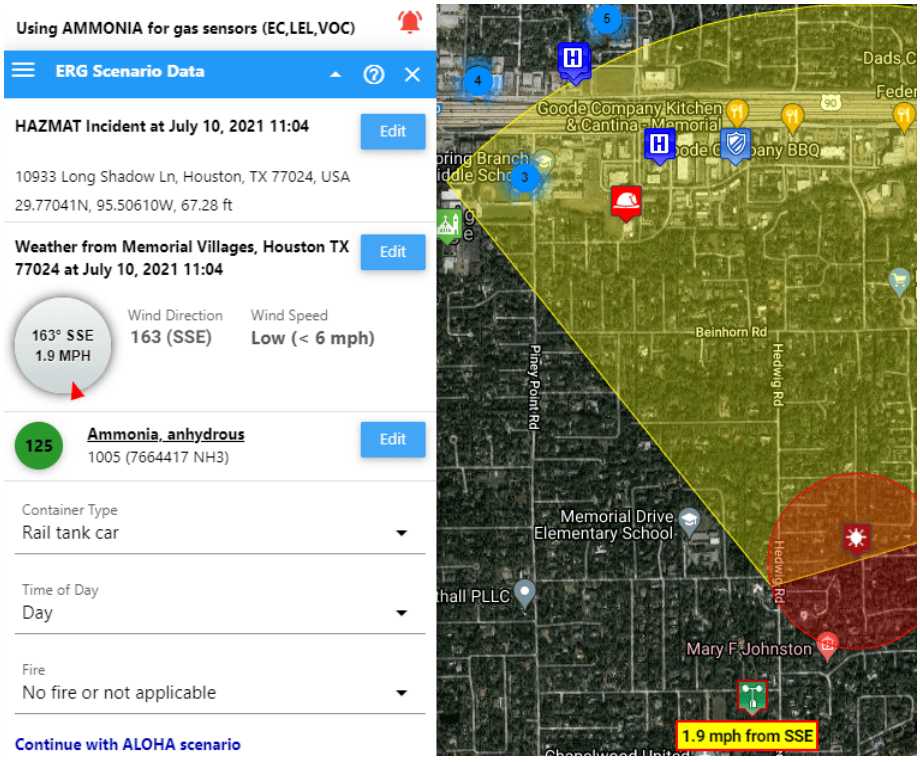
CERES Pro comes preloaded with English and French language and can be configured for other languages on customer request.



New ! - ERG 2020 Integration
Full ERG 2020 integration including BLEVE, IED and HAZMAT incidents.

Map visualization of the initial isolation distance, protective action distance, IED
and BLEVE threat zones.

Real time enhanced internet weather from IBM, live traffic, possible impacted points of interest, reports and **custom IED and BLEVE distances**.

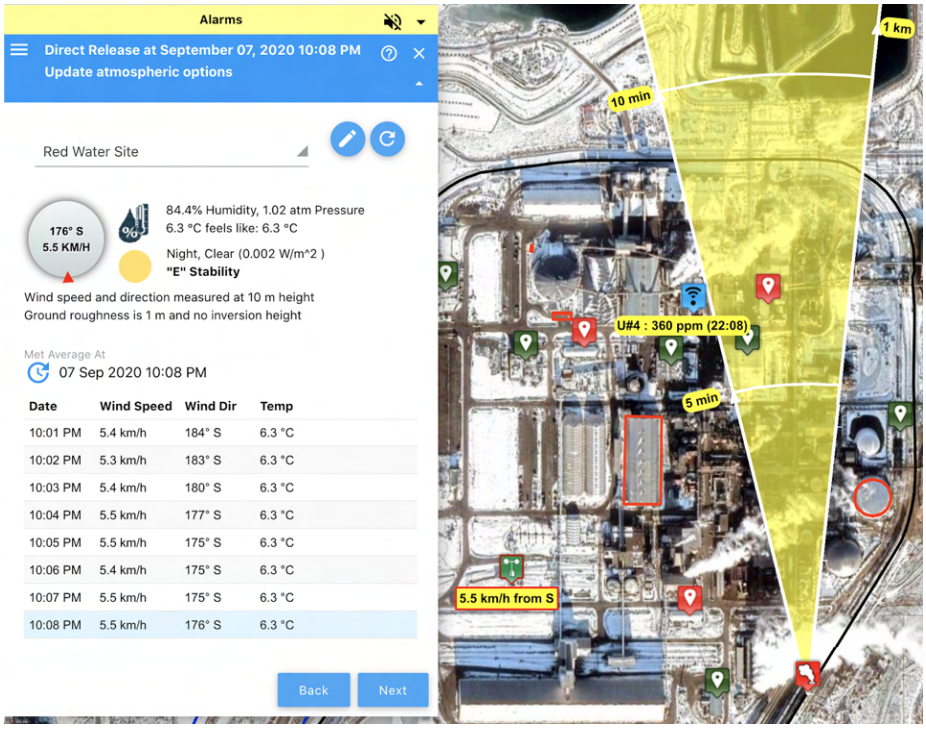


VLAHI CERES

Chemical Emergency Response E-Service

Access live meteorological data for modeling by selecting nearby internet weather stations or user provided local fixed or portable met stations and compare model results against gas sensor concentrations.

New ! - Enhanced Internet Weather by IBM
Real time weather data for any point in the world at a resolution of 2.5 miles / 4 km.



Predefined scenario library management; prioritized library highlighting “my chemicals”; extended chemical library (LPG, Gasoline, Formaldehyde, Sarin) and chemical creation service.
New ! - Manage your Emission Source Library and Predefined Scenarios using **associated zones, tags, and location**. Share scenarios with other sites.

Nozzle Failure (Refrigerated Ammonia Tank)	Tank	AMMONIA	Refrigerated Ammonia Tank	14 Nov 2019 13:11
Total Failure (Refrigerated Ammonia Tank)	Puddle	AMMONIA	Refrigerated Ammonia Tank	16 Nov 2019 18:52
BLEVE (Ammonia Tanker)	Tank	AMMONIA		20 Nov 2019 20:27
Fusible Plug Failure (Chlorine Tank)	Tank	CHLORINE	Chlorine Tank	14 Nov 2019 13:52
BLEVE (Methane Tank)	Tank	METHANE	Methane Tank	17 Nov 2019 07:37
Methane Pipe Leak	Gas Pipe	METHANE		30 Nov 2020 02:40
Short Pipe Failure (Propane Tank)	Tank	PROPANE	Propane Tank	16 Nov 2019 20:07

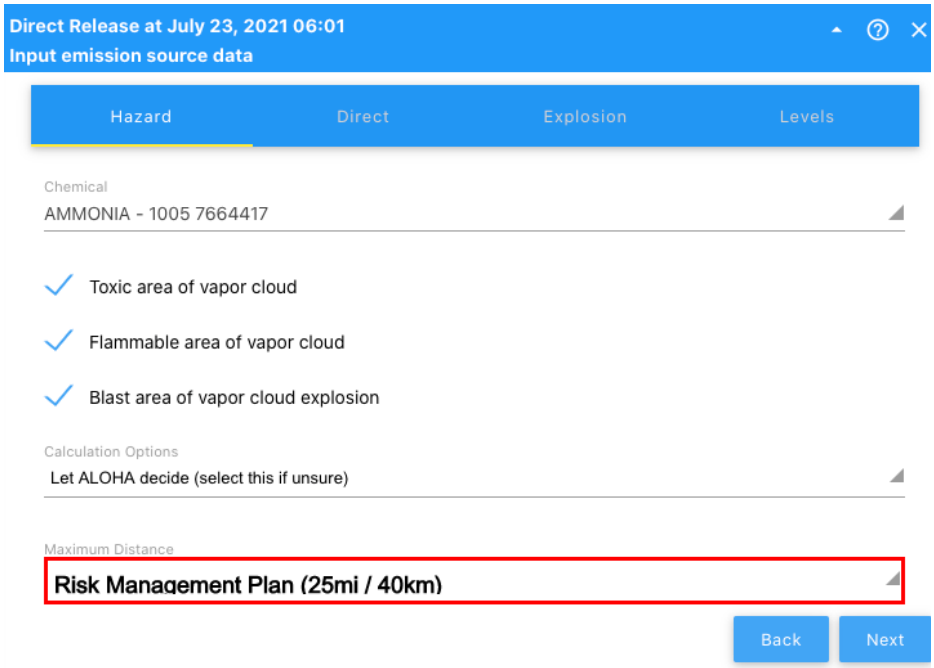
VLAHI CERES

Chemical Emergency Response E-Service

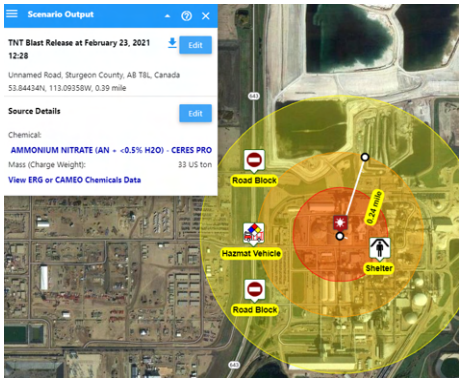
New ! - SEVESO, RMP and E2 regulation scenarios

CERES application can now be used for running Risk Management Plan or E2 regulation scenarios.

We removed the ALOHA 10 Km dowind plot limitation and **extended the run time up to two hours** and we increased the tank and puddle sizes to support these worst case situations.



New ! - TNT Blast
Model solid explosives using a new TNT Blast Equivalent model that calculates blast-wave parameters based on the work of Kingery and Bulmash.



New ! - Tempest Station
Connect your Weatherflow Tempest met station

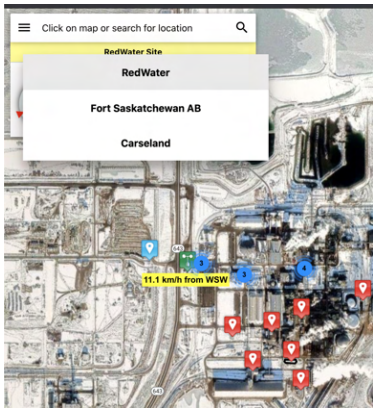
New ! - Meteorological Stations Manager

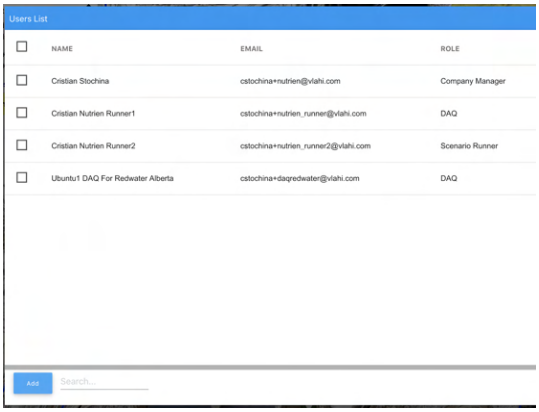
Manage all of your meteorological stations in one place, mix internet and local stations to cover your area of interest as granular as you like.

One click to start recording data from the closest online meteorological station.

Chemical Emergency Response E-Service

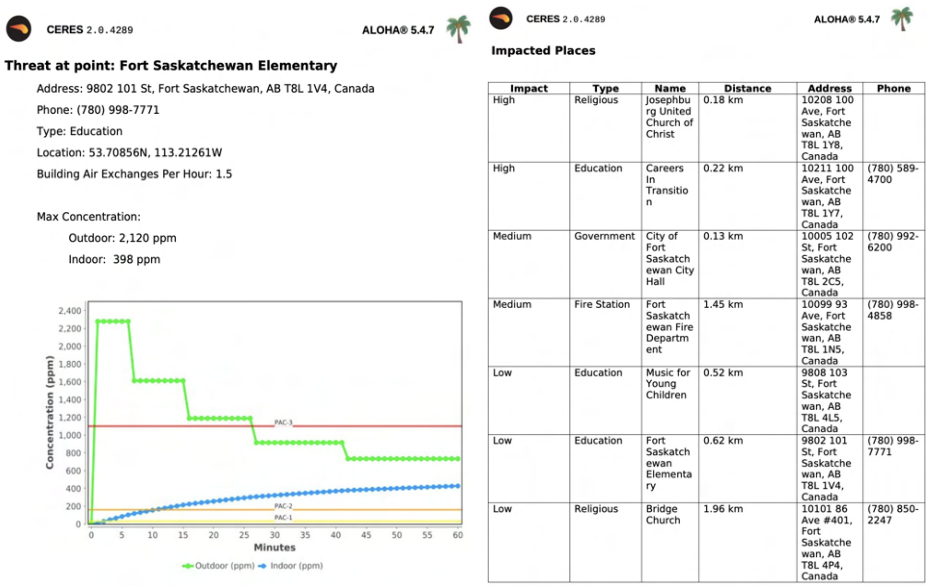
Creation and management of multiple areas of interests. Multi-users share the same area of interest, GIS Data, imported emission sources, and predefined scenarios.





Advanced reporting including impacted zone map imagery, impacted border, area and point receptors and KMZ impact zone export. Report option for infiltration analysis for multiple impacted receptors.

Incident report / data sharing by email or **incident link to facilitate scenario sharing and team back and forth collaboration**.



CERES 2.0.4289 ALOHA® 5.4.7

Threat at point: Fort Saskatchewan Elementary

Address: 9802 101 St, Fort Saskatchewan, AB T8L 1V4, Canada
Phone: (780) 998-7771
Type: Education
Location: 53.70856N, 113.21261W
Building Air Exchanges Per Hour: 1.5

Max Concentration:
Outdoor: 2,120 ppm
Indoor: 398 ppm

CERES 2.0.4289 ALOHA® 5.4.7

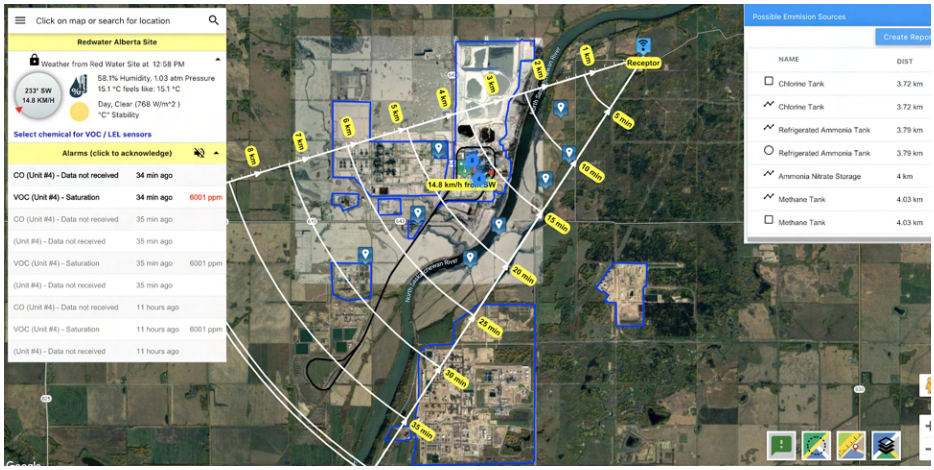
Impacted Places

Impact	Type	Name	Distance	Address	Phone
High	Religious	Josephbu rg United Church of Christ	0.18 km	10208 100 Ave, Fort Saskatche wan, AB T8L 1Y8, Canada	
High	Education	Careers In Transitio n	0.22 km	10211 100 Ave, Fort Saskatche wan, AB T8L 1Y7, Canada	(780) 589-4700
Medium	Government	City of Fort Saskatch ewan City Hall	0.13 km	10005 102 St, Fort Saskatche wan, AB T8L 2C5, Canada	(780) 992-6200
Medium	Fire Station	Fort Saskatch ewan Fire Departm ent	1.45 km	10099 93 Ave, Fort Saskatche wan, AB T8L 1N5, Canada	(780) 998-4858
Low	Education	Music for Young Children	0.52 km	9808 103 St, Fort Saskatche wan, AB T8L 4L5, Canada	
Low	Education	Fort Saskatch ewan Elementa ry	0.62 km	9802 101 St, Fort Saskatche wan, AB T8L 1V4, Canada	(780) 998-7771
Low	Religious	Bridge Church	1.96 km	10101 86 Ave #401, Fort Saskatche wan, AB T8L 4P4, Canada	(780) 850-2247

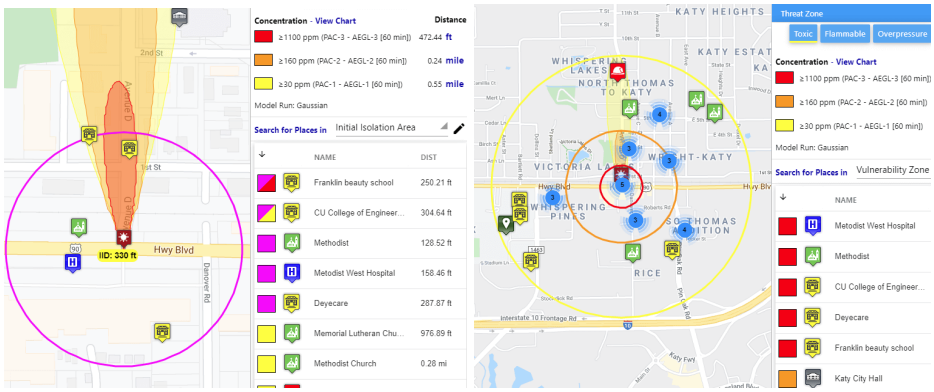
Monitor meteorological and fixed/mobile gas sensors data acquisition and display, **Quick Response mode for immediate identification of receptors downwind** from the event when the chemical or release rate is unknown as well as optimizing gas sensor deployment locations during an event. Visual and audible alarms.

Chemical Emergency Response E-Service

Fugitive Emission Corridor (upwind corridor) to help identify likely / possible emission sources to assist with odor complaint investigation, regulatory compliance and claims management.



New ! - Initial Isolation Distances (ERG 2020) Emergency Response Guidebook initial isolation distances and methane pipeline association for public awareness distances table.

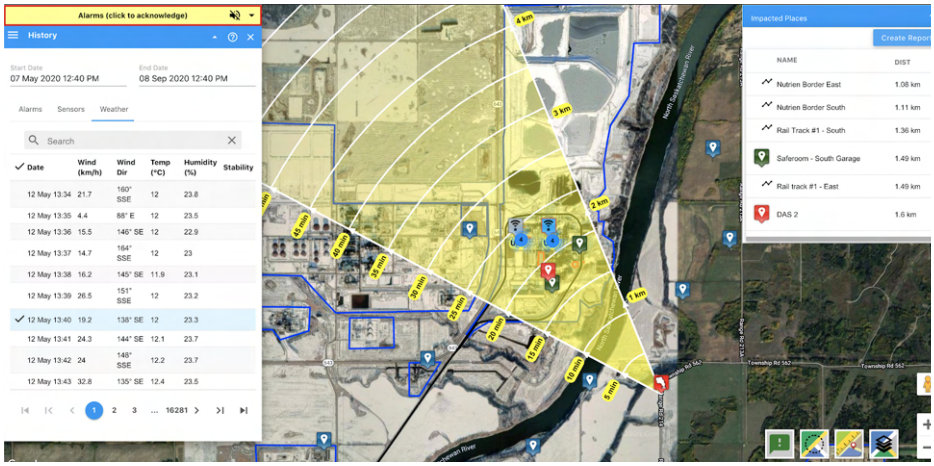


New ! - Vulnerability Zone Analyze possible impact using vulnerability zones for long duration incidents or for low wind speed or unstable wind direction.

Historical Data

Meteorological and gas sensor historical data and alarm history archives, time interval reporting and meteorological wind rose.

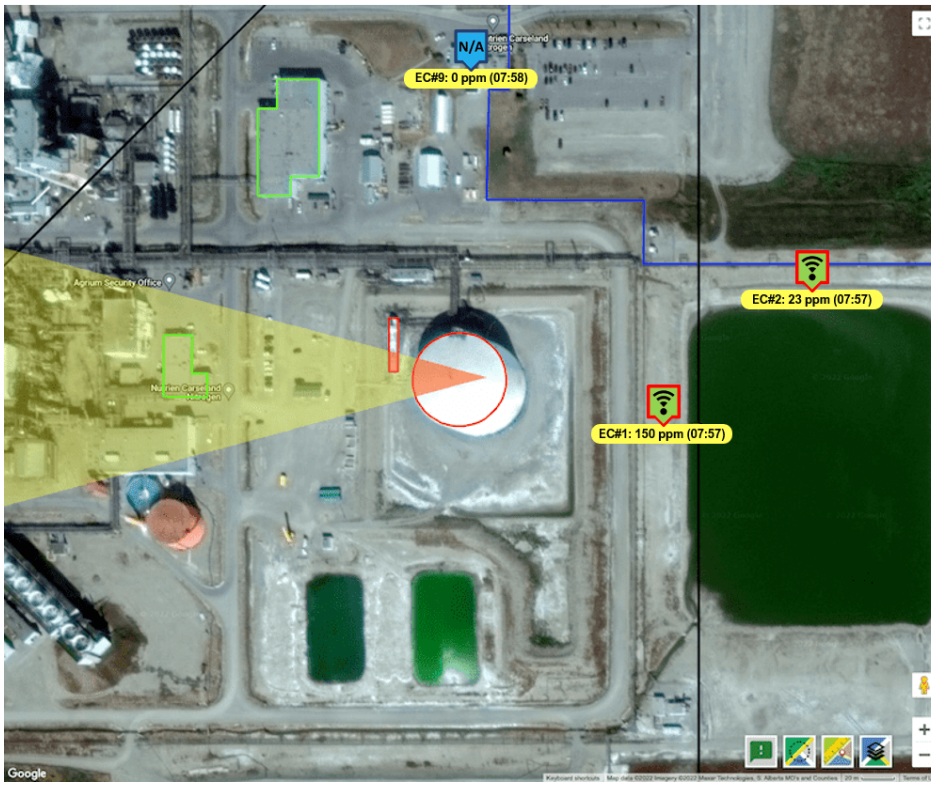
Use the historical data to run scenarios during your “Hot Wash” sessions.



New ! - Sensor Driven Source Location ID

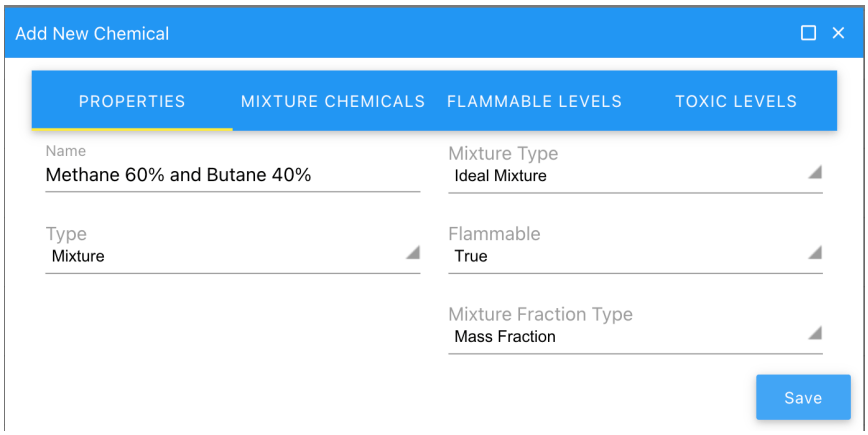
Locate release source area using gas sensors. Users can manually select from the deployed sensors (or use autoselect) and CERES identifies the release source area related to the measured concentrations on the selected sensors.

The possible emission sources from within the source area are filtered by the chemical and highlighted.



New ! - Chemical mixture and key component capability

Use custom chemical mixture and their associated percentages to run scenarios and plot the threat zones for the mixture or a key component chemical.



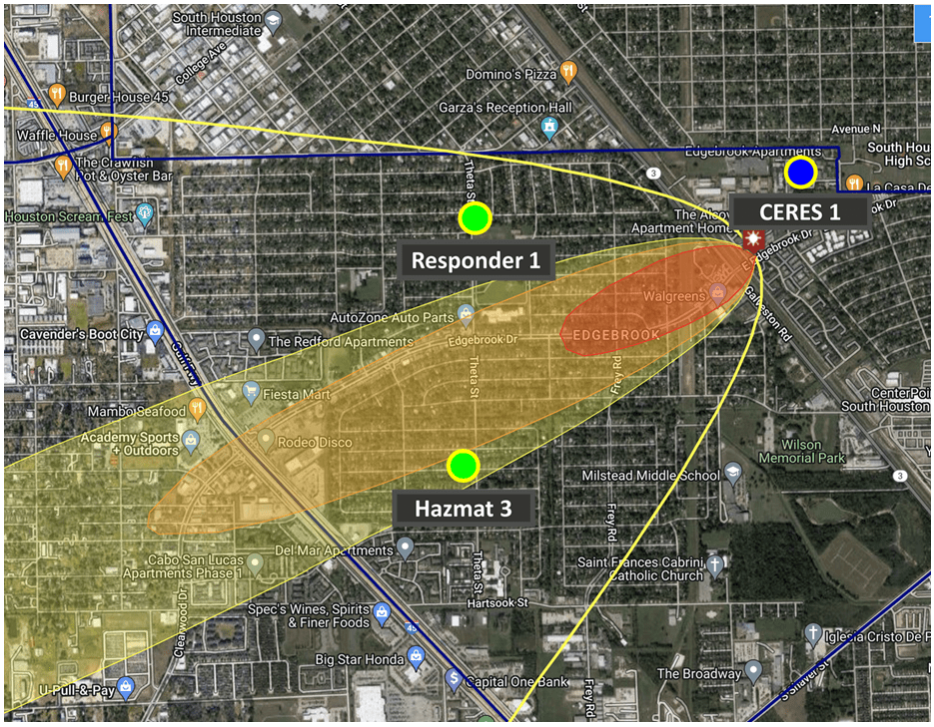
VLAHI CERES

Chemical Emergency Response E-Service

New ! - Live Tracking for GPS Enabled Devices

Geolocate, collect and record data from GPS enabled devices (cell phones, gas detectors, vehicle trackers).

Improve incident ground management. Visualize the position of responders and assets and support operational decisions based on their proximity to the threat zone.



Wireless GPS Enabled Sensor Integration

Blackline G7 and G7 EXO, Honeywell AreaRAE, MultiRAE

WeatherFlow Tempest, Campbell Scientific, AreaRAE Pro, WeatherPak, Vaisala, AIRMAR, PI Server, Modbus, OPC, IoT, Serial, NMEA ….

VLAHI CERES

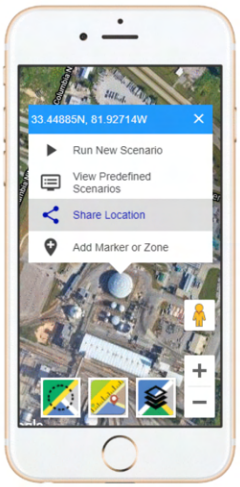
Chemical Emergency Response E-Service

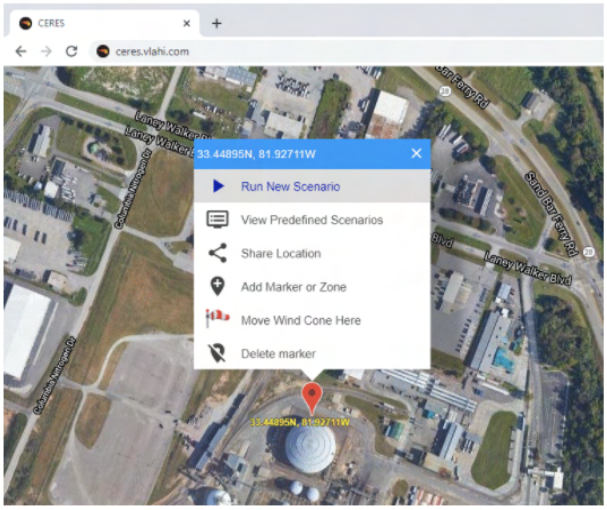
New ! - Elevated Pool and Pipe Fires

Pool and jet fire model upgrade to consider the elevation of a heat source to calculate the thermal radiation from a tank top fire or a flare stack.

Sharing and collaborative enhancements

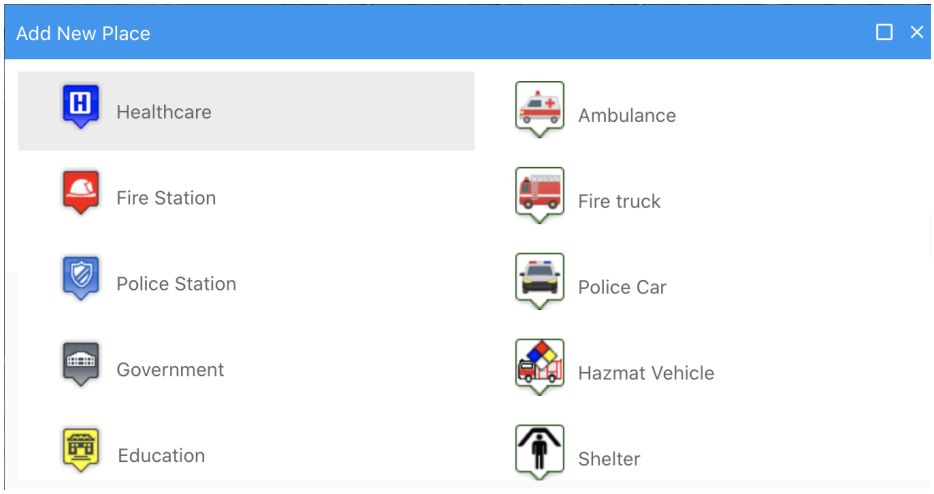
Share incident location, product IID (Initial Isolation Distance) or scenario details with one click.
The recipient launches a model in parallel or continues modeling the shared scenario and returns the results.
This process can continue indefinitely to support true response collaboration.





ICS Map Receptors

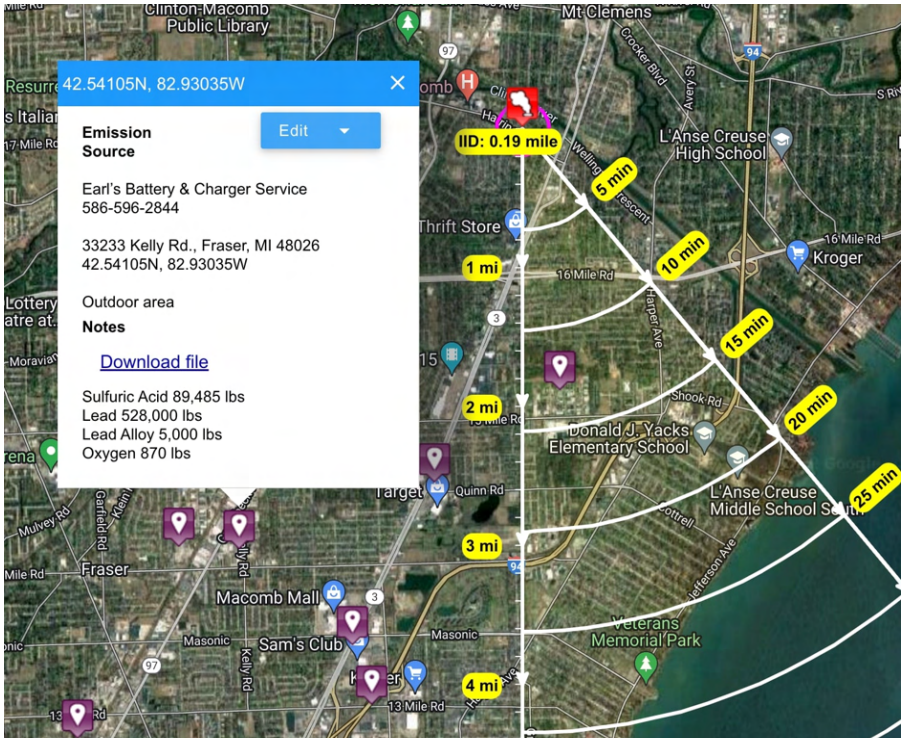
Preset and custom Incident Command map markers (police car, fire truck, ambulance, command post, road blocks, and custom icons) have been added to the map objects tool.



Chemical Emergency Response E-Service

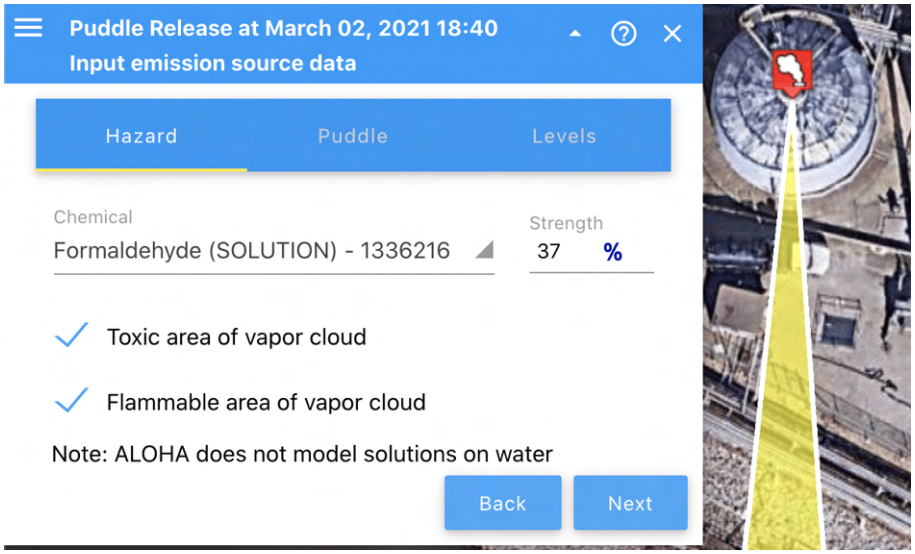
New ! - Import SEVESO, RMP E2 or US Tier II Data (EPCRA Chemical Facilities)

Import SEVESO , RMP, E2 or Tier II company data, with address, location and contact information. CERES generates predefined scenarios based on the chemical inventory on site. Save precious time when responding, improve situational awareness, and increase visibility of additional (potential) hazards.



Formaldehyde Solution Puddle Modeling

Formaldehyde solution properties have been added to ALOHA chemical database to enable puddle modeling.



Wide area transportation emergency response

Wide area map / system coverage to support running manual input and pre-defined scenarios for transportation emergency response.