CERES

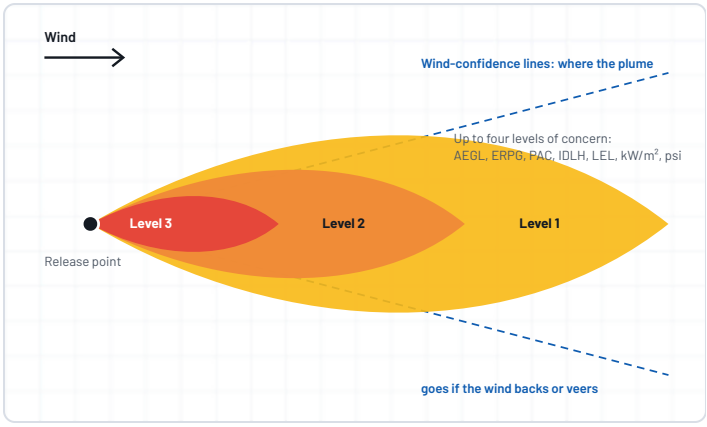
Chemical Emergency Response E-Service
Capability sheet

For modelers, EHS engineers and anyone who has to defend a number

Every model CERES runs, and where it comes from.

CERES runs the US EPA and NOAA ALOHA algorithms natively and adds the fire, explosion, radiological, smoke and indoor models a hazmat team or a plant needs. Each one is documented with its published basis, takes the same weather and site data, and draws on the same map with the same levels of concern.

- **ALOHA 5.4 source terms and dispersion, checked run for run against ALOHA output**
- **More than twenty further models, each documented with its basis, from Baker-Strehlow-Tang and Kingery-Bulmash to INERIS, Glasstone-Dolan, HotSpot and SCICHEM**
- **One output vocabulary: zones, time cone, wind-confidence lines, threat at a point, population**



The output vocabulary shared by every model: release point, up to four levels of concern downwind, the time cone, and where the zone moves if the wind shifts.

Dispersion

Source term and cloud in one run. The free sources cover the everyday release; Pro models cover what ALOHA cannot represent.

Model	What it answers	Basis	Tier
Gaussian dispersion	Downwind concentration of a neutrally buoyant gas or vapor cloud, indoors and outdoors.	ALOHA, US EPA and NOAA	FREE
Heavy-gas dispersion	Dense clouds that hug the ground and spread crosswind: chlorine, ammonia, LPG, refrigerated liquids.	ALOHA, DEGADIS-based	FREE
Terrain along the plume	The ground charted along every plume, on screen and in the report, from USGS and national lidar heights; an elevation profile on the ruler; a side view of heavy-gas clouds; a warning when the ground is too uneven for a flat-ground model.	CERES; USGS 3DEP, lidar, Copernicus	PRO
Direct source	An instantaneous or continuous release of a known amount, by mass or volume, at any height.	ALOHA	FREE
Puddle	An evaporating or boiling pool on land or water, from spilled or spreading liquid.	ALOHA	FREE
Tank	Liquid, gas or two-phase release from a vessel through a hole or valve, with the RAILCAR 4 mist-pool source term for pressurized liquids from tank cars.	ALOHA; RAILCAR 4, DHS Jack Rabbit tests	FREE
Gas pipe	Release from a ruptured gas pipeline, connected or isolated.	ALOHA	FREE

Model	What it answers	Basis	Tier
Release inside a building	A Direct, Puddle, Tank or Gas Pipe release in a room: the indoor concentration with the exhaust, presets for ammonia machinery rooms and refrigerants, and the outdoor plume the exhaust makes.	CERES; IIAR 2, ASHRAE 15	FREE
Liquid flow	A continuous liquid spill feeding an evaporating pool, release rate and pool growth computed together.	CERES, ALOHA puddle physics	PRO
Liquid pipe	A breached liquid pipeline: drain-down, flashing vapor and the cloud from what reaches the ground.	CERES	PRO
Stack and jet	Elevated stack or pressurized jet releases, with the ignited jet-fire case.	CERES	PRO
Elevated heavy gas	Dense vapor released at height: descent, touchdown distance and the ground-hugging cloud after it lands.	CERES	PRO
Binary reaction	Two chemicals mix and generate a toxic gas: the product, its release rate and its plume.	CERES, CAMEO reactivity	PRO
Water-reactive spills	Titanium tetrachloride, phosphorus trichloride, oleum: the acid-gas cloud from the reaction, not only evaporation.	CERES	PRO
Fire smoke and gases	The smoke of any fire as a map model: the PM2.5 soot plume, or one combustion gas at its AEGL levels, through the fire's rising plume, with the soot deposition footprint.	CERES; Products of Combustion	PRO
Petroleum and crude	Benchmark crudes and refined fuels with assay-grounded properties for pool-fire and smoke modeling.	CERES, published assays	PRO
Oil spill on water	A spill on a river, harbor or coast: on rivers the oil follows the flow past weirs and dams to the places downstream, each with its first arrival; on coasts the tide of the nearest NOAA station and the regional ocean model; booms, skimmers and dispersant as response actions.	CERES	PRO
Sensor-driven plume	Live detector readings set the release rate; the footprint updates as the detectors report.	CERES	HAZMAT TEAM
Locate source	Works back from the concentration pattern across the detectors toward the most likely origin.	CERES	HAZMAT TEAM
SCICHEM	Three-dimensional puffs that follow the live and forecast wind through shifts and calm air for up to eight hours, with particulates, soot deposition and vertical profiles.	SCICHEM, EPRI	HAZMAT TEAM option* LIVE FACILITY
SCICHEM complex terrain	The same puffs over the hills and valleys around your site, set up for it, with releases pre-planned under valley conditions.	SCICHEM, EPRI	HAZMAT TEAM option* LIVE FACILITY option*

* For HAZMAT Team, SCICHEM with wind shifts and complex terrain is one optional module; Live Facility includes SCICHEM, with complex terrain as an option at additional cost.

Fire and thermal radiation

Model	What it answers	Basis	Tier
Pool fire	Thermal radiation zones around a burning pool.	ALOHA	FREE
Jet fire	Flame length and radiation zones from an ignited pressurized release, with the flame's lift-off and tilt; a flammable gas burned as a flare.	ALOHA; Chamberlain	FREE
BLEVE fireball	Fireball diameter, duration and thermal dose zones from a tank failing in fire, the blast from the burst's expansion energy, and two fragment rings for the pieces of the tank.	ALOHA; CCPS; ERG 2024 BLEVE table	FREE
EV fire	Heat flux and safe separation distances around a burning electric vehicle, as a scenario on the map.	UL FSRI	FREE
Flash fire	The flammable area of a drifting cloud at fractions of the lower flammability limit.	ALOHA	FREE
Pool-fire radiation	Thermal zones with validated flame geometry and smoke obscuration for large pools.	POOLFIRE6-class	PRO
Liquid-pipe jet fire	Jet-flame geometry and radiation zones from an ignited liquid pipeline release.	CERES	PRO
Boilover	Time to boilover of a crude or fuel-oil tank fire, French regulatory thermal-dose rings and the burning-fuel ejection zone, plus the smoke plume.	INERIS Omega-13	PRO
BESS battery fire	Radiant heat-flux rings from a grid-scale lithium-ion fire scaled from the stored energy, the toxic HF plume and the vent-gas explosion case.	CERES, published BESS tests	PRO

Explosion

Model	What it answers	Basis	Tier
Vapor cloud explosion	Overpressure zones when a flammable cloud ignites.	ALOHA	FREE
Vapor cloud explosion in congested areas	Overpressure rings at 8, 3.5 and 1 psi for a cloud that ignites in a congested area, standalone or from a live dispersion run.	Baker-Strehlow-Tang	PRO
Solid blast	Overpressure rings and two fragment rings from a solid explosive charge or a TNT-equivalent mass.	Kingery-Bulmash; UN IATG fragment distances	PRO
Gas cylinder burst	Blast rings from the catastrophic rupture of a pressurized cylinder, plus two fragment rings for its pieces.	Molkov-Kashkarov; published burst tests	PRO

Radiological and nuclear

Model	What it answers	Basis	Tier
Nuclear detonation	Blast, thermal, radiation and flash zones by yield and height of burst, with the downwind fallout footprint.	Glasstone-Dolan; WSEG-10 fallout	PRO
Dirty bomb	Blast zone and the downwind dose and contamination plume of a radiological dispersal device.	HotSpot method	PRO

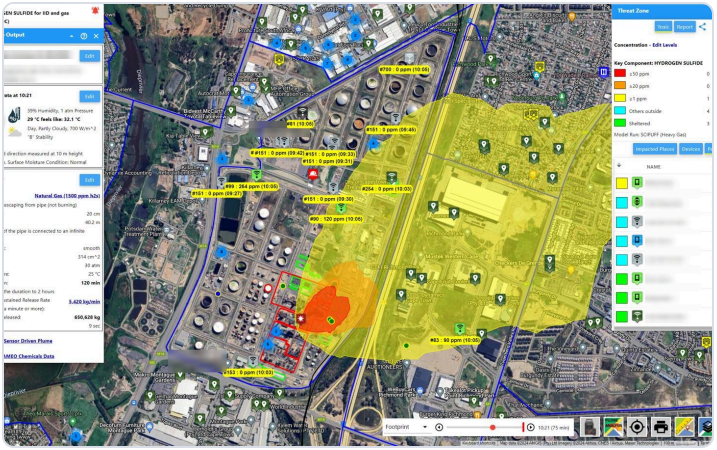
Emergency Response Guidebook events

The full ERG 2024, oriented to the live wind and drawn on the map with the receptors inside the distance.

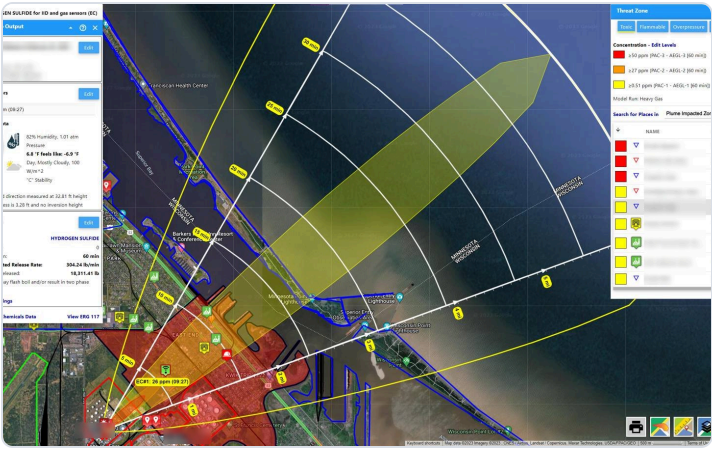
Event	What it draws	Basis	Tier
Hazmat	Initial isolation and protective-action distances by material, container, day or night and fire, from Tables 1 and 3, with the guide page and the CAMEO data.	ERG 2024	FREE
IED	Evacuation distances by device, from the pipe bomb to the semi-trailer.	ERG 2024, DHS-ATF	FREE
BLEVE	Evacuation distances for LPG containers in fire by tank size.	ERG 2024	FREE
Chemical-warfare agents	Isolation and protective-action distances for the agent classes.	ERG 2024	FREE
Pipeline	Evacuation distances for natural-gas pipeline events by pressure and diameter.	Pipeline ERG	FREE

What every run draws, and what it needs

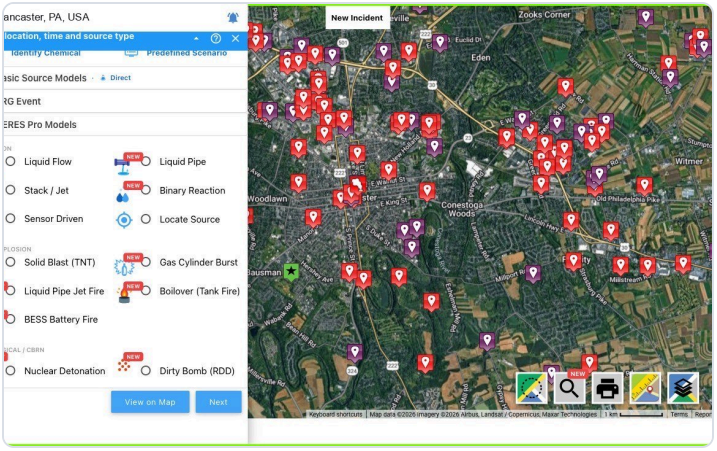
Threat zones	Up to four levels of concern from AEGL, ERPG, PAC, TEEL or IDLH, fractions of the LEL, thermal flux in kW/m^2 or overpressure in psi (heat levels also as the surface temperature they bring an exposed surface to), or your own values; on the map, in the report and in the KMZ.
Wind uncertainty	Wind-confidence lines from the stability class, so the zone shows where it moves if the wind backs or veers; a 360-degree vulnerability zone for the planning case.
People and places	Census or LandScan population inside each zone, by day and at night, or your own headcount for a drawing (a stadium on match night); impacted places, zones, neighborhoods, roads, railroads and pipelines identified automatically and sorted by distance; infiltration analysis for many receptors in one report.
Detectors	Detector Coverage maps where your detectors would and would not catch a design leak; a sensor placement study sites new detectors from your predefined scenarios and the wind rose (enabled on request); live readings compared with the model on the same map; sensor-driven refresh with HAZMAT Team.
Chemical data	1,300+ chemicals, solutions and mixtures from the ALOHA and CAMEO libraries, NIOSH, CHRIS, DOT, OSHA, EPA CompTox and Dutch intervention values; custom mixtures with key-component modeling; every property labeled with its source.
Validation	The ALOHA algorithms run natively in CERES and are checked run for run against ALOHA output; every Pro model links to its guide with references. Results are decision-support estimates; the help's limitations page says where each model stops applying.
Time	Snapshot and footprint views on a time slider in five-minute steps; the downwind time cone from the wind speed; scenario history for every run.
Threat at a point	Indoor and outdoor concentration and dose over the first hour at any point, by building type, so shelter-in-place against evacuation is a number.
Ground	Heights from USGS and national lidar services first; the ground charted along the plume on screen and in the Word report; a warning when the ground inside a zone varies more than a flat-ground model allows (30 m for a heavy gas, 60 m otherwise).
Weather inputs	Live conditions and forecasts from The Weather Company, nearest station first; your own met station; manual entry; automatic stability class; forecast fields for SCICHEM.
Exports	PDF and Word reports with map imagery; KML/KMZ, Shapefile and CAP; hot, warm and cold control zones suggested from a run, and a CAP 1.2 public alert drafted from its zones; scenario import from ALOHA; share links for the run.



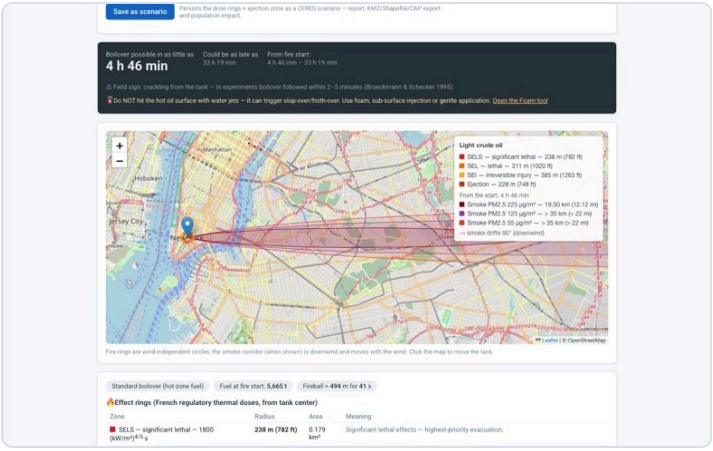
A hydrogen sulfide gas-pipe release run with SCIPUFF heavy-gas: the time slider replays the footprint and the People tab counts who is outside and who is sheltered.



A hydrogen sulfide scenario at a harbor from one detector reading: heavy-gas zones, wind-confidence lines and the downwind time cone over the water.



One picker: basic sources, ERG events and the Pro models, chosen at the release location on the map.



Boilover: time to boilover, INERIS thermal-dose rings, the ejection zone and the smoke plume, saved as a scenario.

Try the free models at ceres.vlahi.com. For the Pro model guides or a validation discussion, write to sales@vlahi.com or call +1 832-356-6669.

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Model results are decision-support estimates and are no substitute for measurements, training and judgment on scene. Screenshots show demonstration scenarios; real addresses, dates and names in them are blurred. ALOHA and CAMEO are developed by the US EPA and NOAA. SCICHEM is developed by EPRI. The ERG is published by US DOT PHMSA, Transport Canada and Mexico's SICT. CERES is a trademark of Vlahi Systems LLC. Revised October 2026. © 2017–2026 Vlahi Systems LLC.