Weather Forecast Office use of HYSPLIT

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ARL Research to Application

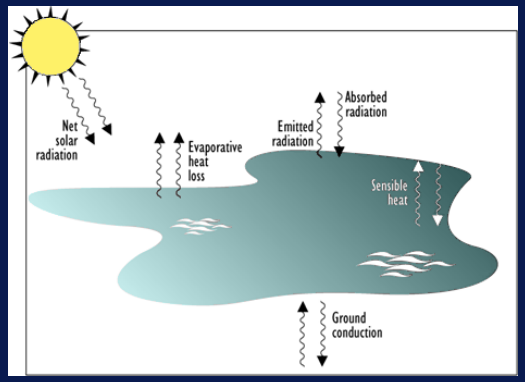
- ARL supports the 122 local NWS Weather Forecast Offices (WFOs) with the development of HYSPLIT atmospheric dispersion products to assist them with their decision support role in the local community.

- A web-based HYSPLIT system was developed through a cooperative effort with the National Ocean Service's (NOS) Office of Response and Restoration (OR&R), developers of the CAMEO/ALOHA software suite, and the NWS.

- This system allows WFOs to model the release of hazardous chemicals to the atmosphere by combining the strengths of both the ALOHA and HYSPLIT models.

ALOHA Background

Tank



Puddle

Gas Pipeline

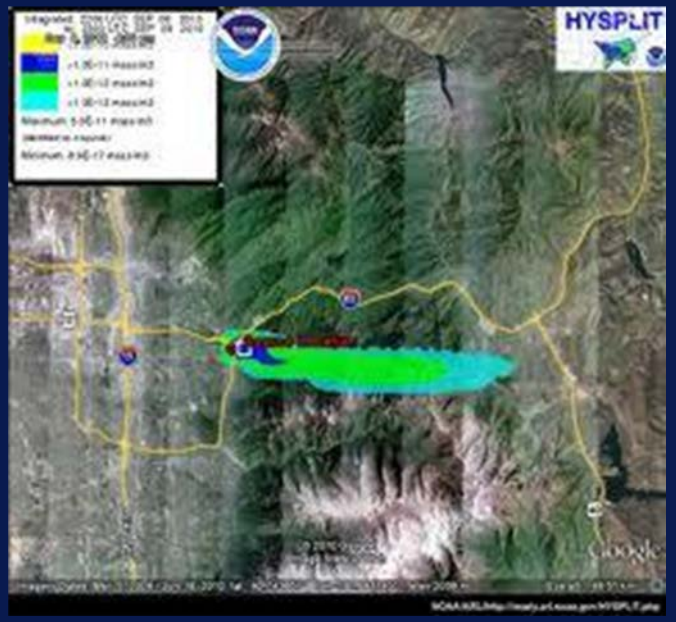
- Areal Locations of Hazardous Atmospheres (ALOHA) is one of five software programs that make up the CAMEO software suite used to plan for and respond to chemical emergencies
- Designed for short-duration (< 60 min), short-range (< 10 km) incidents (no account for changes in wind direction/speed)
- Its strength is its multiple time-dependent chemical source models (tank, puddle, gas pipeline, and direct release to the atmosphere)
- Used by thousands of first responders around the world

HYSPLIT Integration with ALOHA

- WFO enters information on the chemical being released provided by the local emergency responder.
- ALOHA estimates how the chemical cloud escapes from the source over time.
- Linking ALOHA with HYSPLIT, driven by high-resolution NWP data, meets WFO requirements of farther-downwind dispersion predictions compared to that using the constant wind in ALOHA alone.
- Output product shows a map of “Level of Concern” contours familiar to emergency managers.
- Training provided to the WFOs through video conferencing and the development of COMET study modules (University Corporation for Atmospheric Research).

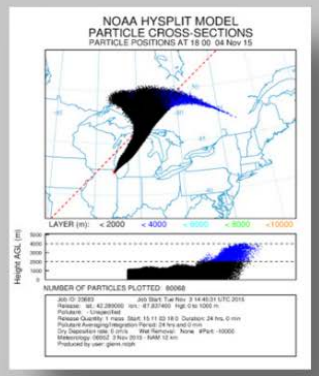
The more information you can provide to us, the better

- Who is asking for the run?
- Where (Lat/Long helpful)?
- When did it start?
- What chemicals/gas ?
- Cylinder, piping, rail car, etc. ?
- How much has leaked?
- How Long?
- Format – Google Earth or Google Maps?

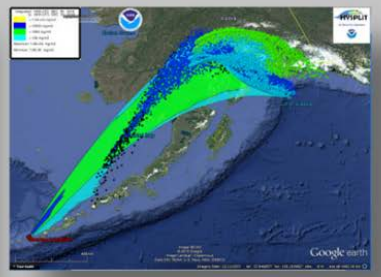


HYSPLIT Has Many Uses

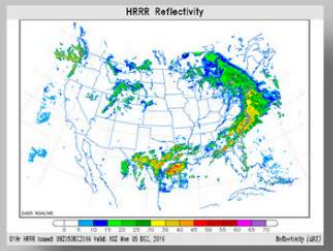
HYSPLIT Model



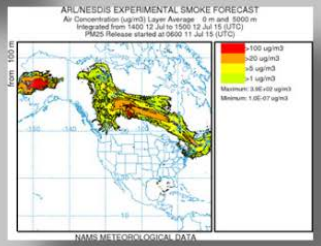
Volcanic Ash

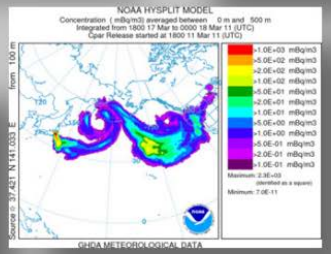


Current & Forecast Meteorology



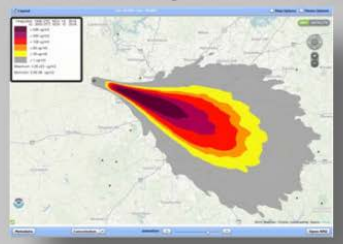
Wildfire Smoke Forecasting

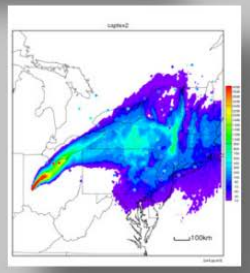




Emergency Assistance

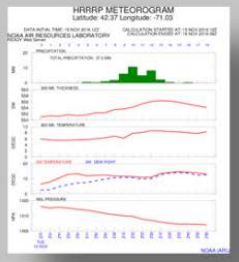
Air Quality Products



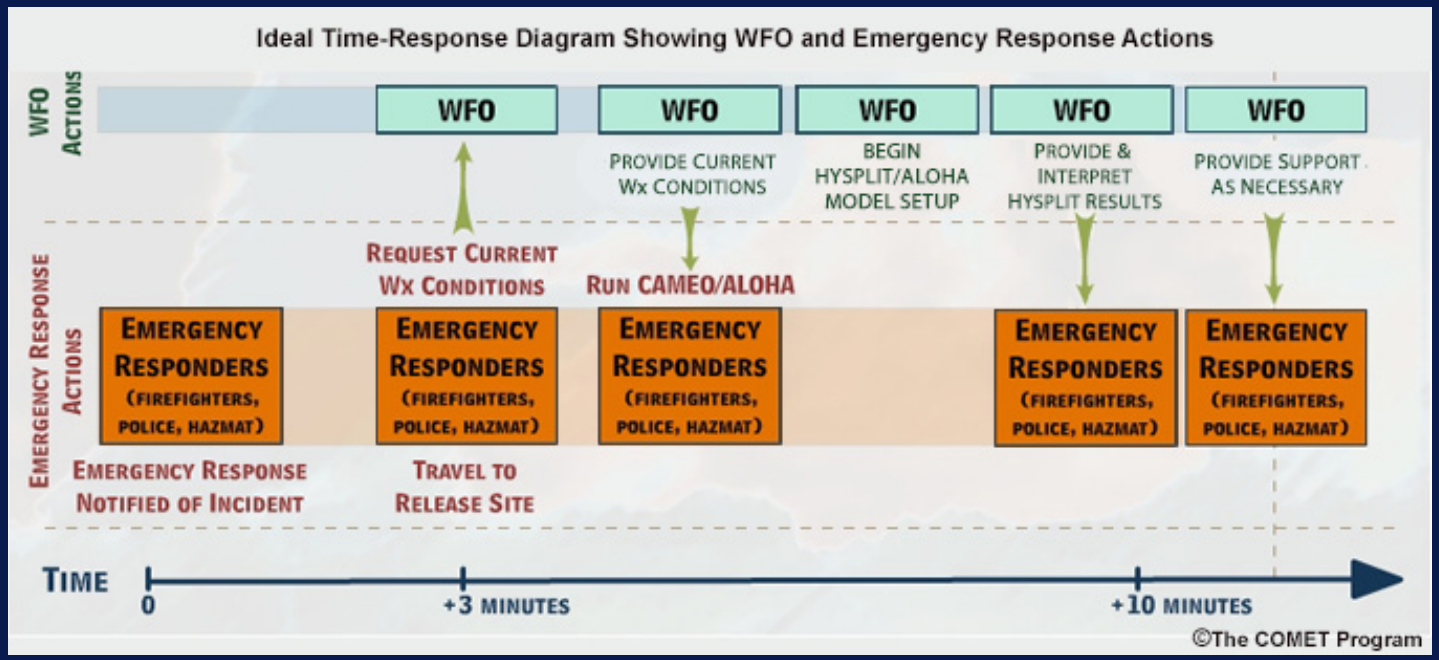


DATEM Tracer Verification

Archived Meteorology



Emergency Assistance - Response Timeline

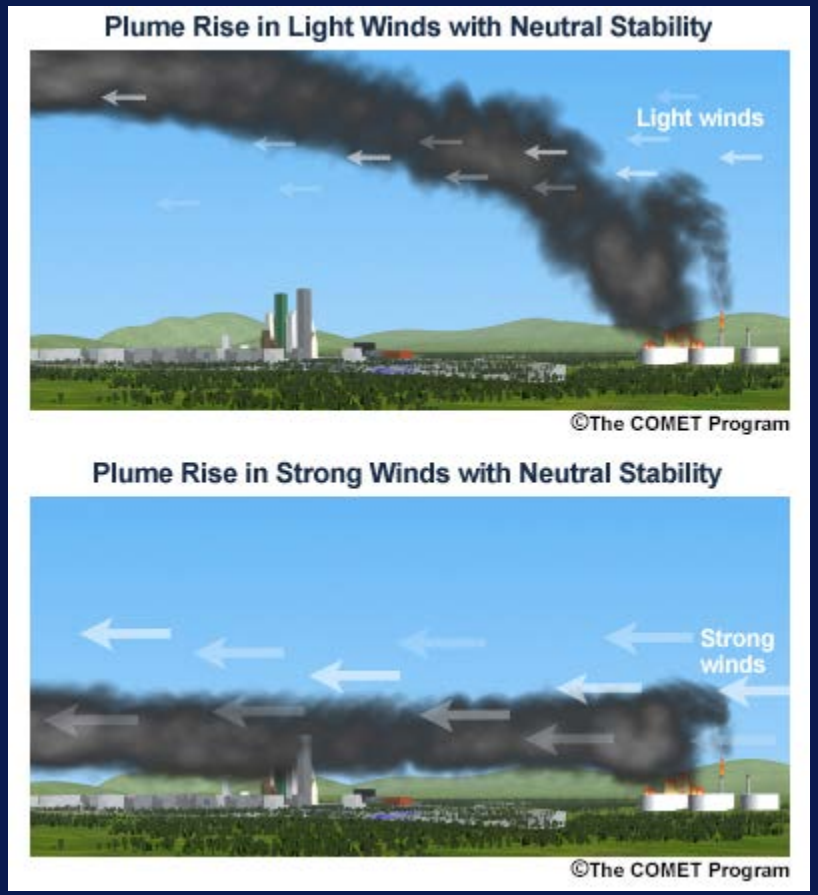


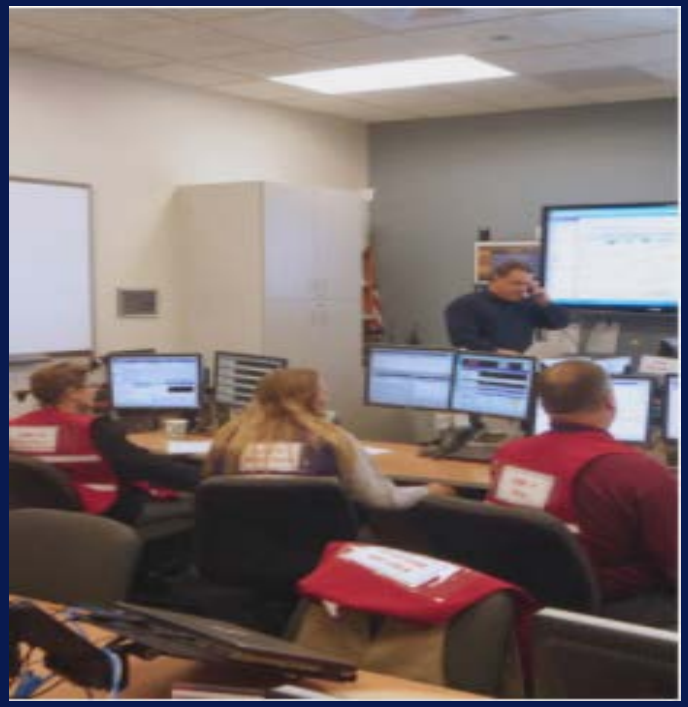
Wildfires

Chemical Accidents

Industrial Fires

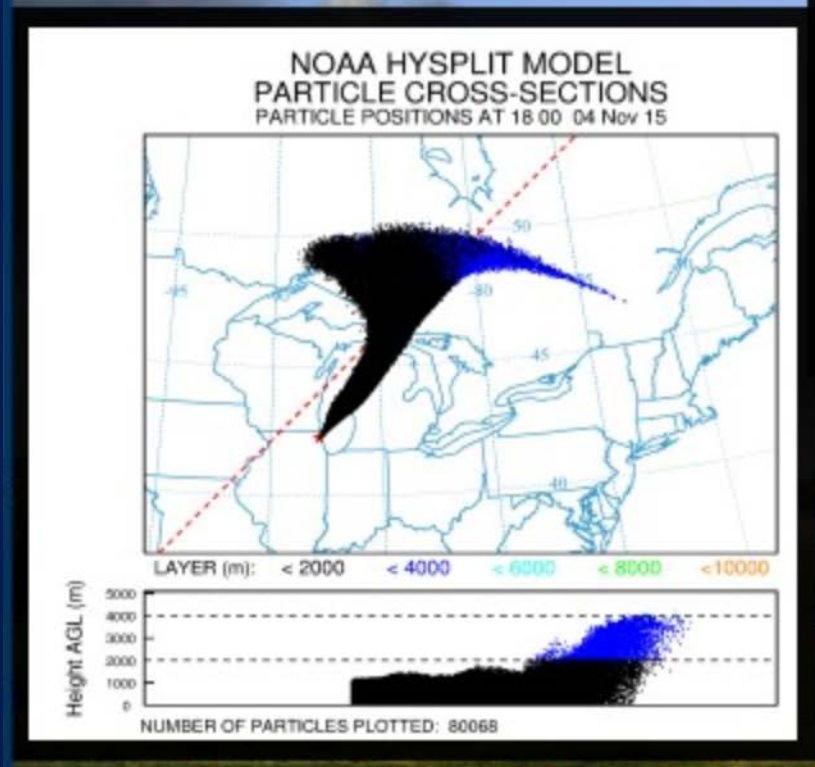
Having the right information is key





Can help determine the level of state/local officials response, such as if evacuations or shelter in place is needed

HYSPLIT Transport & Dispersion Model



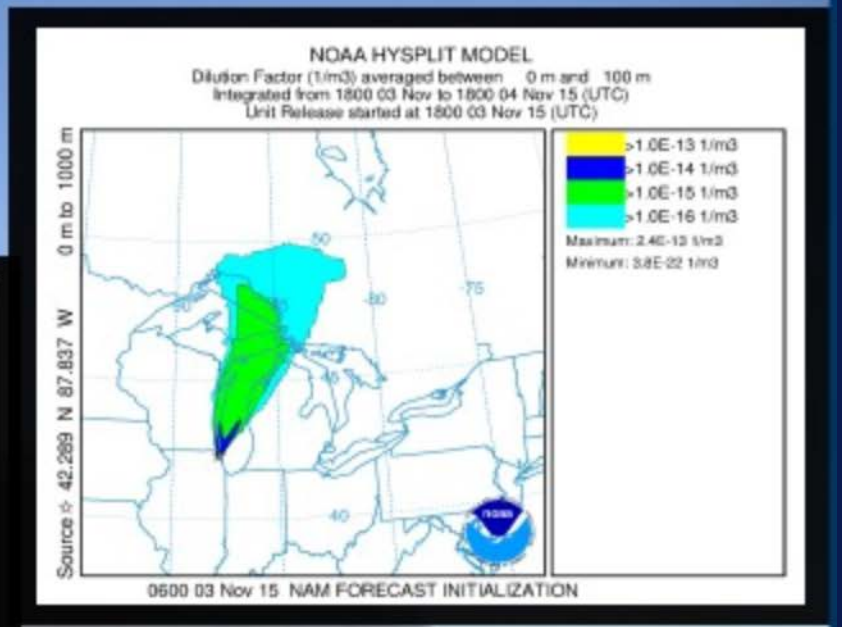
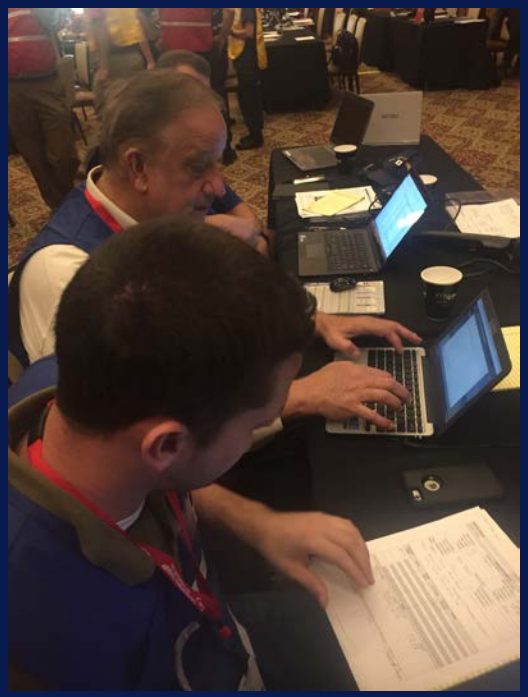


Image by Jason Rogers from St Albans, UK (Clear skys apart from the normal) [CC BY 2.0 (http://creativecommons.org/licenses/by/2.0)], via Wikimedia Commons

On-site Support

- When requested, NWS forecasters can be deployed outside of the office to provide onsite support/exercises.



Phillips 66 Oil Spill Exercise
in Lake Charles, LA

Super Bowl 2018
Minneapolis, MN

Waste Isolation
Pilot Plant (WIPP)
"New Dawn" FSE
Midland, TX

HYSPLIT runs can be made for high profile events

Recently Supported Major Events

- Final Four Basketball Event – San Antonio, TX this weekend
- Natural gas leak from well near Houston, TX - March 14, 2018
- Scrapyard fire near Portland, OR - March 12, 2018
- Super Bowl - February 4, 2018
- NYC New Year's Eve in NYC - December 31, 2017
- Chlorine railcar release near Woodlands, WV - August 27, 2016
- October 2015 - World Series
- September 2015 - Papal Visit to USA

IDSS – HAZMAT Incident

Woodlands, WV:

- A chlorine gas leak occurred at the Axiall Chemical Plant at approximately 9:00 a.m. Saturday, August 27.
- Two injuries were reported.
- Residents were evacuated within 2-3 miles of the plant.

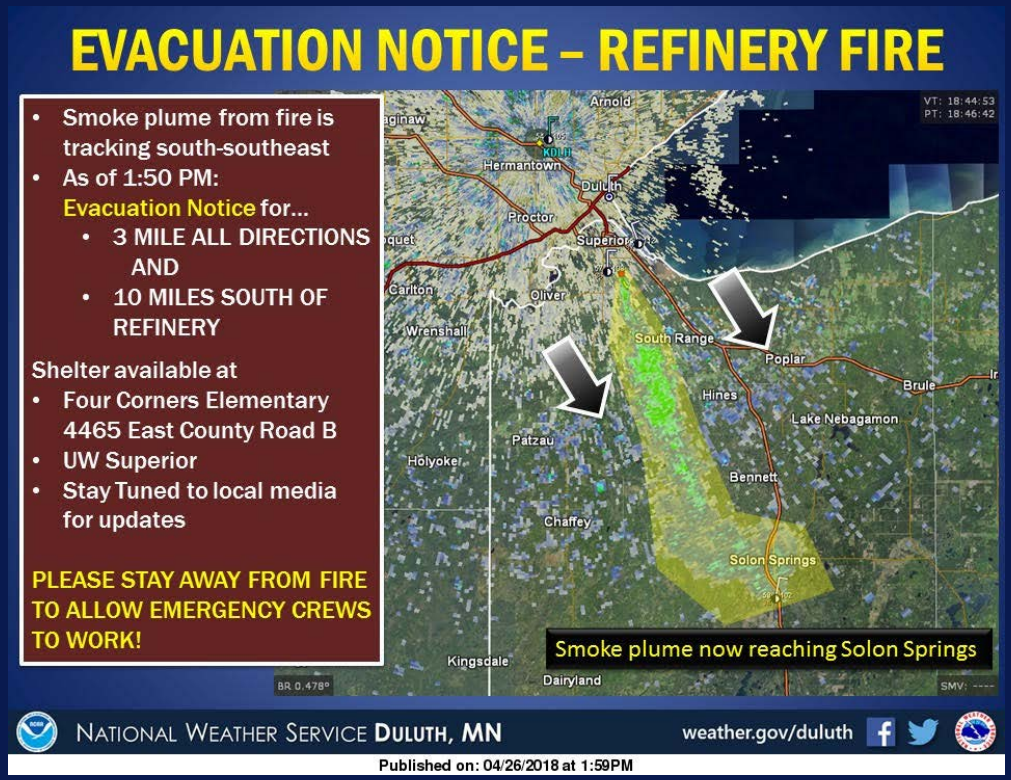
Credit: WTRF Television

WFO Pittsburgh:

- Provided a HYSPLIT run for the emergency manager.
- Phone briefing for the emergency manager about HYSPLIT results, observations and potential impacts from the morning inversion.

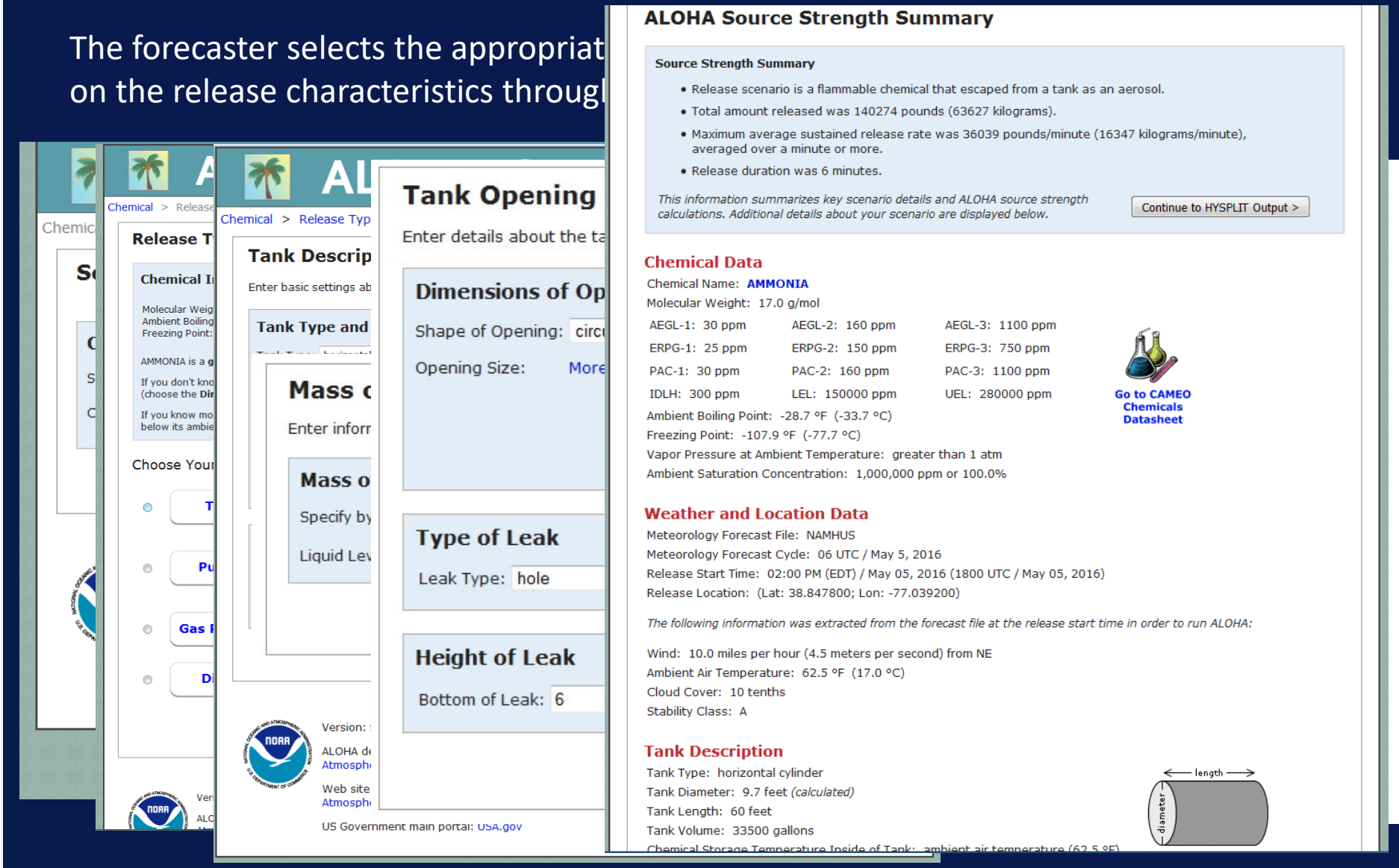
Superior Refinery Fire - Wisconsin

NWS talked with the Duluth PD representative during a conference call after the event. He said that the NWS was very helpful with the event, especially the forecast of the winds and smoke plume. The city of Superior fire department has a the capability to run dispersion models for certain chemicals, but not for smoke dispersion.

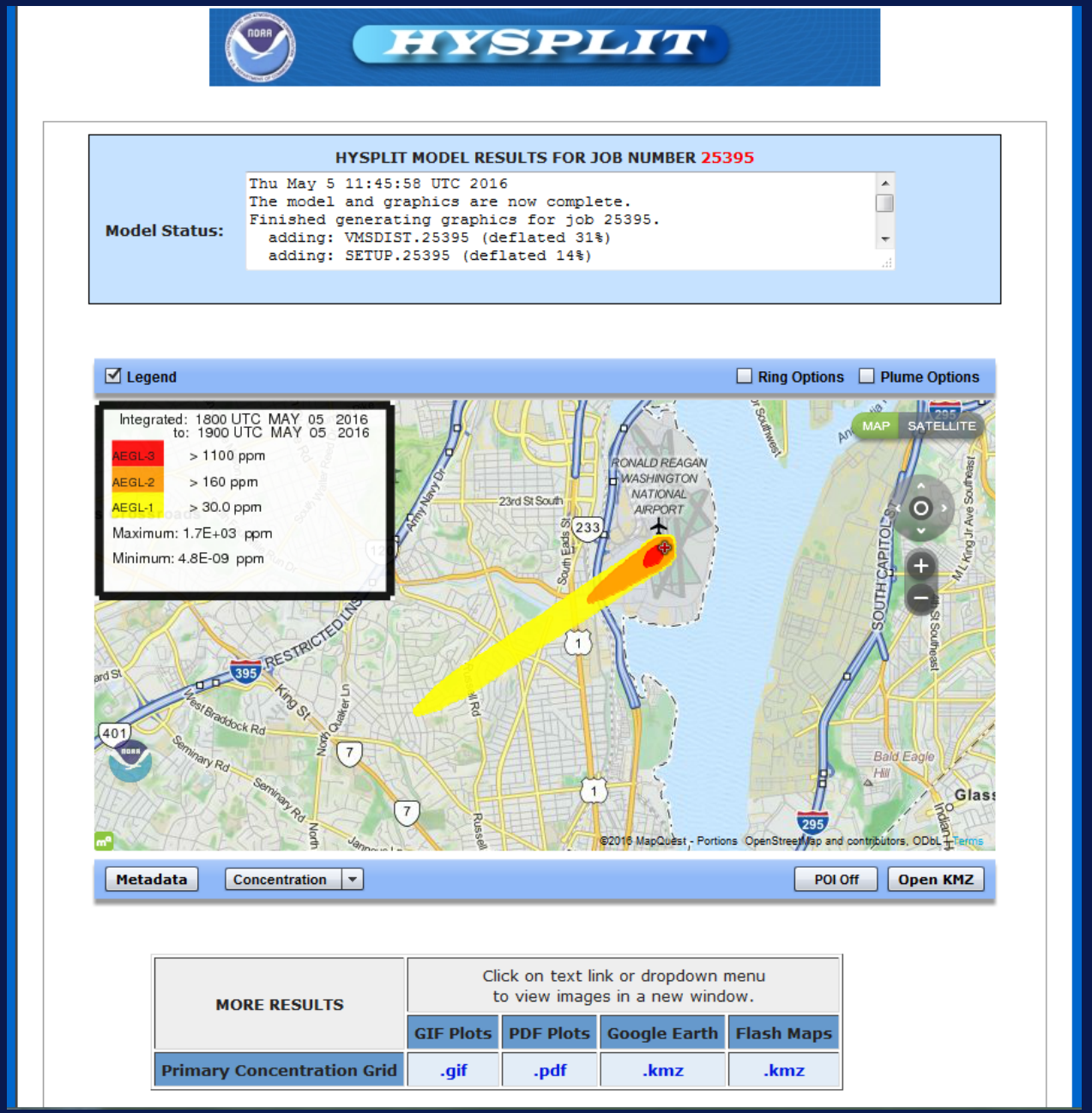


Model Inputs for Hypothetical Event

The forecaster selects the appropriat
on the release characteristics throug



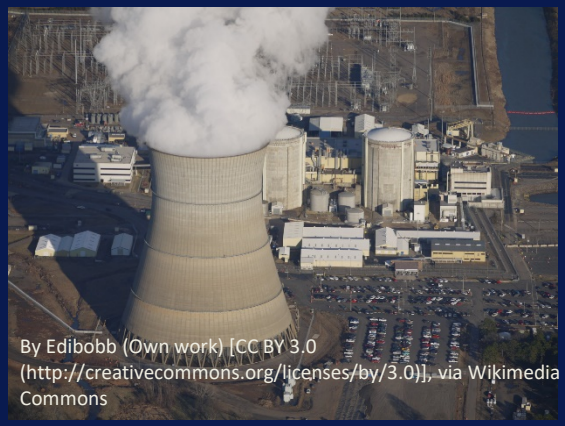
Model results showing Acute Exposure Guideline Levels (AEGLs) for Ammonia



Additional WFO HYSPLIT Support

HYSPLIT is also used by WFOs routinely for:

- Prescribed burns
- Local event planning (sporting events, large public presence, national major event , etc.)
- Local and State Exercises (nuclear power plants, what if scenarios - drills, tabletops, full function exercises)
- Weather forecasting (cold air outbreaks, heavy rain/moisture)



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NOAA Support to IMAAC

- The **Interagency Modeling and Atmospheric Assessment Center** (IMAAC)
  - coordinates and disseminates Federal atmospheric dispersion modeling and hazard prediction products.
- Led by FEMA, the IMAAC is a partnership among seven Federal agencies, each with supporting capabilities and/or responsibilities for plume modeling: DoD, DOE/NNSA, HHS, EPA, NOAA, NRC.
- The IMAAC provides emergency responders with plume model predictions associated with significant hazardous atmospheric releases to aid in the decision making process to protect the public and the environment.
- NOAA has recently begun providing real-time situational awareness to the IMAAC when WFOs provide dispersion products to emergency responders for situational awareness. HYSPLIT may be incorporated into IMAAC's first plume scenario run before other agency models are made and compared to initial slide deck.