Interagency Modeling and Atmospheric Assessment Center (IMAAC)

The IMAAC serves as the single point for coordinating, producing, and disseminating atmospheric dispersion and water modeling prediction products representing the federal government during an actual or potential incident.

IMAAC Core Membership

Department of Homeland Security/Federal Emergency Management Agency (DHS FEMA), through its Office of Emerging Threats (OET), provides overall program management for the IMAAC program. OET works collaboratively with other participating agencies to develop incident-specific hazard prediction products.

Department of Defense (DoD) provides essential defense support to civil authorities in response to a crisis, natural disaster, or in support of a chemical, biological, radiological, or nuclear (CBRN) event.

Department of Energy (DOE)/National Nuclear Security Administration (NNSA) is the technical lead for atmospheric plume modeling for radiological/nuclear events, using the National Atmospheric Release Advisory Center (NARAC) as its primary modeling center.

Department of Health and Human Services (HHS) provides expertise to assess the impacts to public health infrastructure and services. HHS is responsible for decontamination and long-term population monitoring after an event.

Environmental Protection Agency (EPA) provides subject matter experts for chemical incident response and on-scene responders who supply ground-truth data to IMAAC models. EPA maintains the CAMEO/ALOHA modeling system for chemical incidents.

National Oceanic and Atmospheric Administration (NOAA) provides meteorological observations and expertise to designate the preferred model forecast to initialize IMAAC products. NOAA supports modeling for chemical incidents, radionuclides, volcanic ash dispersion, and field fire weather plume prediction.

The Nuclear Regulatory Commission (NRC) provides technical expertise for nuclear power plant releases and uses the Radiological Assessment System for Consequence Analysis (RASCAL) as the primary modeling source.

FEMA

Who We Serve

During actual or potential atmospheric and waterborne hazardous material (HAZMAT) incidents, IMAAC provides federal, state, local, tribal, and territorial first responders and decision makers with predictions of hazards associated with atmospheric releases. IMAAC coordinates and shares federal atmospheric dispersion modeling and hazard prediction products by its core member agencies to provide consistent federal plume modeling information.

Services at a Glance

Emergency Support

No-cost activation. IMAAC can be activated for real-world chemical, biological, radiological, and nuclear (CBRN) threats and/or large-scale hazardous material atmospheric releases, at no cost to the requestor.

Modeling products. IMAAC provides modeling products and technical expertise for threat hazard interpretation at a moment's notice, regardless of the time of day or year.

30-minute response. IMAAC strives to provide an initial model product within 30 minutes of activation during real world events, followed by a final, interagency-vetted product.

24/7 access to experts. A Technical Operations Hub at the Defense Threat Reduction Agency (DTRA) is staffed 24/7 by CBRN subject matter experts.

Consistent federal modeling. The Technical Operations Hub consults with, coordinates, and deconflicts all core member plume modeling products to ensure first responders and decision-makers receive consistent modeling information.

Wide range of product formats. IMAAC delivers modeling products in whatever form is needed by requestors, including geographic information system-portable formats (including Keyhole Markup Language (KML) and shape files), PowerPoint slide decks, and Portable Document Format (PDF) files.

Exercise and Planning Support

Models for notional threats. With advance notice (generally 30 days), IMAAC can support national- and local-level CBRN incident-planning activities and exercises by coordinating and producing models for notional threats.

Real-time training participation. IMAAC participates in training and exercises to simulate real-time interaction with emergency personnel.

How to Activate the IMAAC

Any FSLTT official can request an activation during current or potential real-world emergencies involving significant hazardous atmospheric and waterborne releases by calling 1-877-240-1187.

IMAAC In Action

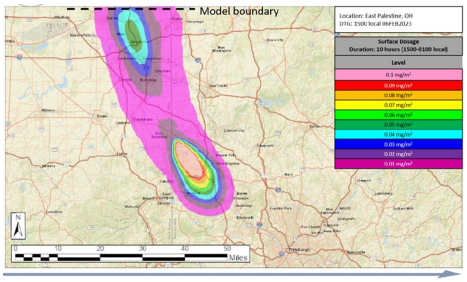

Figure 1. Norfolk Southern Train Derailment, East Palestine, Ohio
In February 2023, a train operated by Norfolk Southern carrying toxic chemicals, including vinyl chloride, derailed in East Palestine as it traveled from Madison, Illinois to Conway, Pennsylvania. 38 cars derailed and a fire that broke out damaged an additional 12 cars. IMAAC was activated by EPA Region 5. An agreement was made that vinyl chloride was likely the worst-case chemical and the Technical Operations Hub agreed to model the release of 5 railcars worth of burning vinyl chloride producing hydrogen chloride (HCL) and phosgene using stoichiometry to estimate the amounts. Over the course of four days, IMAAC provided a total of 10 modeling updates until it was deactivated.

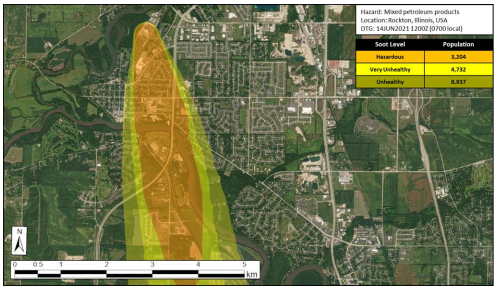

Figure 2. ChemTool Plant Explosion and Fire, Rockton, Illinois
In June 2021, an accidental release of mineral oil led to a fire and eventual explosion at the plant, which produced more industrial grease than any plant in the country. The massive black fire was visible for miles and forced an evacuation of residents within a mile of the plant and anyone within a 3-mile radius was asked to wear a mask. Fire suppression efforts took place for 9 days before the fire was fully extinguished. FEMA Region 5 requested IMAAC activation and IMAAC also supported the Illinois Civil Support Team, EPA Region 5, and state/local responders during the duration of the event. IMAAC first provided a product showing smoke plume and effects, based on EPA standards for soot exposure and health contours, and later provided models of sulfuric acid and hydrogen cyanide based on reports of potential releases of chemicals as well as models of the vertical extent of the hazards. In total, IMAAC produced 12 modeling products during the event.

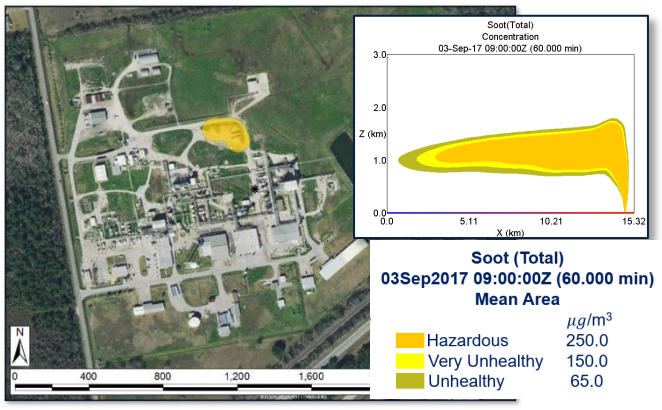

Figure 3. Arkema Chemical Plant, Crosby, Texas
In 2017, Hurricane Harvey flooded the Arkema Chemical Plant with several feet of water. The plant stored several organic peroxides that required cooling to prevent spontaneous instability. When the cooling system failed after flooding, IMAAC activated to support local first responders in preparing for potential hazards at the plant, including fire, explosions, and atmospheric releases of chemical agents. IMAAC provided direct technical support and recommendations to federal, state, and local responders and decision-makers as they acted to manage the incident. Over 6 days, IMAAC provided 9 updates based on changing threats and weather conditions to help prevent loss of life and property. Updates included evacuation zone corroboration and plume models for various chemical releases.

Contact IMAAC at imaac@fema.dhs.gov | To request an activation, call 1-877-240-1187

This document has been updated as of 7/20/2023 to reflect the realignment of the Chemical, Biological, Radiological and Nuclear (CBRN) Office to the Office of Emerging Threats (OET) and the "IMAAC in Action" information. No other changes were made to the document.