

# **Using Airborne Dispersion Models in Planning a Response to a Chemical Release**

## **Introduction**

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Time Requirement: 2-3 hours

Number of Instructors: 1 or more, consistent with ratio shown in Minimum Criteria

A broad range of electronic resources are available to emergency responders and increasingly used in the Incident Command structure to understand hazards and plan a response.

This exercise involves accessing some of these tools for hazard assessment, using a model to predict geographical areas that will be affected by the release and planning a response.

## **Objectives**

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When complete, participants will better be able to:

- Access electronic tools for risk assessment information
- Identify the geographical region where there may be an impact from the release using plume modeling software
- Plan a response

## **Materials**

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- Participant Guide
- Laptops and tablets to access the internet
- Whiteboard or equivalent; markers
- A method to project maps of the area for class viewing
- Websites could include, but are not limited to:
  - CAMEO <https://www.epa.gov/cameo>
  - Emergency Response Guidebook (ERG)  
<https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg>
  - NIOSH Pocket Guide online <http://www.cdc.gov/niosh/npg/>
- Other appropriate resources, such as:
  - IAFF <https://www.iaff.org/>
  - OSHA Occupational Chemical Database  
<https://www.osha.gov/chemicaldata/>
  - **C.H.R.I.S** (Coast Guard Hazard Response Information System)
  - New Jersey Right to Know Fact Sheets:  
<http://www.nj.gov/health/eoh/rtkweb/>
  - International Chemical Safety Cards (ICSCs):  
<http://www.ilo.org/dyn/icsc/showcard.home>
  - SAFER mobile response app
- Copies of materials, as appropriate
  - NIMS forms
  - SDS
  - Site Safety and Health Plan Template
  - Site Safety and Health Plan (for contract programs)

## **Minimum Content Requirements**

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- Use electronic tools for risk assessment
- Use plume modeling software to predict a plume
- Plan a response to an incident

## **Facilitator Preparation**

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Prepare multiple laptops and tablets for participant use.

Download any software that will be used. Check all links beforehand to ensure that they are still working and all updates have been installed.

Ensure internet access is available.

The class may be split into small groups for this exercise.

Develop a scenario using the following considerations:

1. Identify a high hazard facility in the area or utilize the facility that you are working with, a nearby facility, or an example provided by regional responders.
2. Develop a chemical hazards worst case list for that facility based on personal knowledge or TRI data or use previous accidents or near-misses to develop a scenario.
3. Use a spill scenario with a chemical release plume developed using CAMEO or other software.
4. Note that changes in weather conditions or the characteristics of the leak may change the plume.
5. Include information on chemical storage sites, processes which might be harmful in certain situations, location of offices, ponds and other potential hazardous situations on the facility grounds or nearby which could affect or be affected by the incident or contribute to its outcome.
6. Consider vulnerable populations in the area, and transportation routes.

Or use one of the following scenarios:

### **Rail Car Scenario**

A DOT 111A rail car carrying a bulk load of N,N-dimethylformamide (DMF) (or company/site specific chemical) left Facility ABC the day before yesterday bound for the XYZ manufacturing facility in Findlay, OH. At approximately 8:15 a.m. today, while the car was involved in a switch near Center St. in Findlay, OH switch yard, one of the railroad employees noticed a chemical odor originating from the car and upon investigating, also noticed a narrow liquid stream running down the side of the car. Norfolk Southern reported the incident to CHEMTREC which issued a report to the Corporate ER Department for follow-up. You were contacted by Corporate ER and asked to assemble a team and respond to the scene.

- Residential and business area surrounds the site in a major throughway through the center of town at the split of Center St. and Tiffin Avenue in Findlay, OH (latitude 41°02'38.62"N, longitude 83°38'39.26"W). Downtown is approximately 5 blocks to the west and a major shopping area approximately ½ mile to the east. The local water treatment plant and the Blanchard River are just up the road.
- There is a southeast wind with all other weather conditions as they exist during training.
- The train is carrying N,N - Dimethylformamide (or company/site-specific product).

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### **Industrial Site Release Scenario**

The release originates from an abandoned steel mill in Braddock, Pennsylvania. The site, weather conditions and release are selected by the facilitator. The plume is displayed on Google Earth as in the image shown on the next page. Conditions to note include:

- River traffic passes on the river shown in the image.
- An amusement park is located across the river from the release point and is in the path of the plume (small green symbol on the image next to the plume).
- The plume crosses railroad tracks and Route 837.

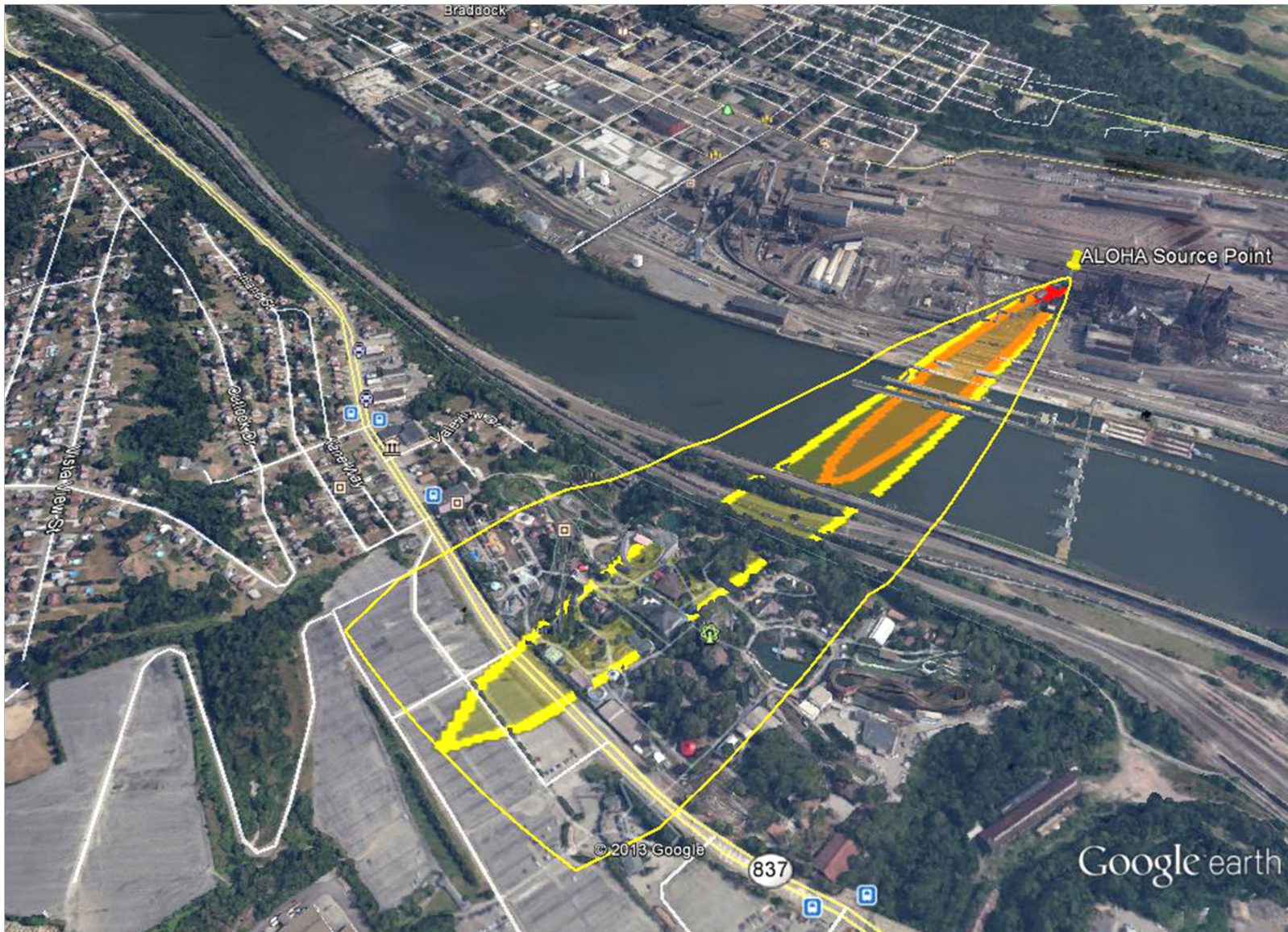
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Develop additional information that you will provide participants, such as changes in weather, monitoring data for the entry team, the availability of needed supplies that the team may request. For example, if using the rail car scenario, the following might be considered:

- The incident command location should be established in an upwind location.
- There is product running down the side of the car from the dome area. The product is shipped with a 10 psi nitrogen pad on it.
- The team will need to confirm that the product contained in the tank car is DMF (or other chemical tailored for specific client preferences). There are multiple monitoring techniques for DMF that the group can choose to do this and/or for the product used. Instructor will have to provide monitoring readings to the entry team.
- The team will need to identify the source of the leak. The source of the leak will be a bad gasket on the dome lid.
- A new gasket is available but the team must ask for it to get it.

Prepare expected answers and run through the entire exercise using all electronic resources that will be needed.

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## **Presentation of the Exercise**

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### Risk Assessment

Discuss the uses and applications of electronic resources for Incident Command for hazardous substance releases or other incidents. Discuss open source databases which could prove useful for hazmat incidents.

Demonstrate tools that will be used in the exercise.

Help participants begin to assemble the risk assessment data. If there are several small groups, report backs may be used to share different aspects of the risk data collected.

### Map the Facility

Use Google Earth for the address or zip code. Record longitude and latitude to use in the plume predication.

### Predict the Plume

To create the plume map, use CAMEO

1. Open the ALOHA program and enter the location information.
2. To enter a new location in ALOHA, click SiteData on the menu bar, then select Location. Click “Add” in the dialog box. Then enter a name, coordinates, and click the state. The location is now added to the list. Select it. Next, select SetUp on the menu bar, and choose “Chemical”. This will bring you to a list of chemicals. Select your chemical from the list.
3. Click SetUp again, and choose “Atmospheric”, then “UserInput”. Enter the weather conditions and click “OK”.
4. Click SetUp again, and select “Source”, and then “Direct”. In the dialog box, enter 10 pounds per second, or other scenario amount.
5. Click “Display” in the menu bar, and then “Threat zone”. A chemical plume will be generated. Click “File”, and then “Export Threat Zones”. Choose KML, and then enter the latitude and longitude. Save the file. Do not close ALOHA.
6. Open Google Earth. Click “File” and then “Open”. Select the file you just saved to display the plume on a satellite image of the area of the leak. Participants may be surprised at the size of the plume and the areas potentially impacted by the release, such as roads, businesses, homes, etc.
7. For variations on the plume pattern, click ALOHA’s SetUp again, and change the weather conditions, conditions of building and surroundings, or size and type of the release. Save the file under a different name. Display the plume on Google Earth again.

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Project an image of the facility on the map.

### Plan a Response

In planning the response, consider the following:

- Chemical identification
- Characteristics of the chemical
- Instruments that will detect the chemical
- Evacuation distances from the Emergency Response Guidebook
- Need for outside resources, such as police for blocking traffic, fire department, hazardous waste cleanup company, etc.
- Supplies and equipment needed
- Health and Safety Plan

Using an Incident Command structure, identify evacuation needs, site access control, company liaison needs. Be mindful of chemical storage areas, hazardous locations, worker/contractor normal travel patterns, situations on or off-site which might contribute or be severely affected by such an incident.

Discuss current conditions of the hazards and defensive measures which will be utilized by the responders. The map can be used to decide any evacuation needed, security lines, set-up of zones and identification of other hazards which might cause issues in our response.

### Debrief/Discuss:

- What went well?
- What did not go well?
- What instruments, materials or equipment were unavailable that were needed?
- What would you do differently if you could do it over again?
- In a real emergency response, what would happen after the leak was stopped? Consider cleanup, decon, notifications, waste disposal, resupply, etc.

Keep these notes to share with other instructors and to refine your scenario.

*Developed by trainers from the University of Illinois and the University of Findlay*