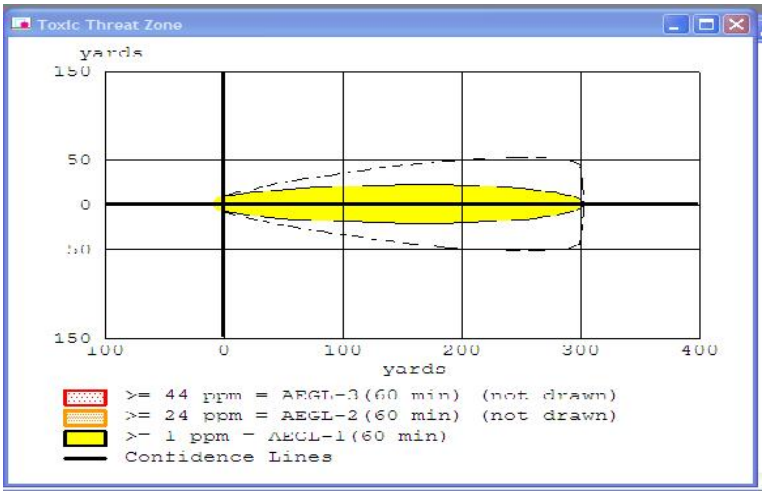
MassDEP Field Assessment and Support Team (FAST)

After Incident Report	DEP RTN 1-17917
Blandford Acid Spill Incident	**July 2010**



BACKGROUND

On Tuesday, July 27, 2010, a tractor trailer carrying approximately 40,000 pounds of waste acid pulled into the Blandford service plaza along the westbound lane of the Massachusetts Turnpike. The driver of the truck noticed liquid leaking from the back of the trailer, and notified State Police, who evacuated the area, and called in emergency response personnel, including the district haz mat team and MassDEP.

A number of 300+ gallon carboys containing the waste acid were removed from the trailer, and several were observed to be damaged. Steps were taken to transfer the contents of damaged carboys to new units, and to decontaminate the body of the trailer impacted by spilled acid.

A decision was eventually made to cut up the trailer body and ship it off site to a proper disposal location in water-tight containers

FAST ACTIVATON AND DEPLOYMENT

On Wednesday, July 28th, WERO requested assistance from FAST. Two FAST personnel arrived at the site at 3 PM, and worked with the on-scene WERO ER responder to assess site conditions and evaluate the adequacy of air monitoring operations.

The FAST on-board weather station was set up and activated. Priority resource and orthographic maps were produced and evaluated. Existing air monitoring data was reviewed and considered. Additional information was obtained on the chemistry and stability of the acid wastes.

Air Dispersion Modeling Efforts

An ALOHA air dispersion model (EPA/NOAA, version 5.4.1) was run based upon site conditions and real-time weather data from the on-board weather station. When the results of this effort indicated only minimal air plume migration and impacts (consistent with site monitoring data), a series of “worst case” scenario models were run, to establish the outer limits of contaminant transport and impacts, which was integral to decisions on the needed degree of air monitoring.

The worst case model assumed that one of the carboys was completely breached, releasing 300 gallons of waste acid onto the ground, with a 15 MPH wind condition.

Reportedly, each carboy contained about 70 - 80% sulfuric acid, with between 1 and 10% of Hydrofluoric Acid (HF), Nitric Acid, and water.

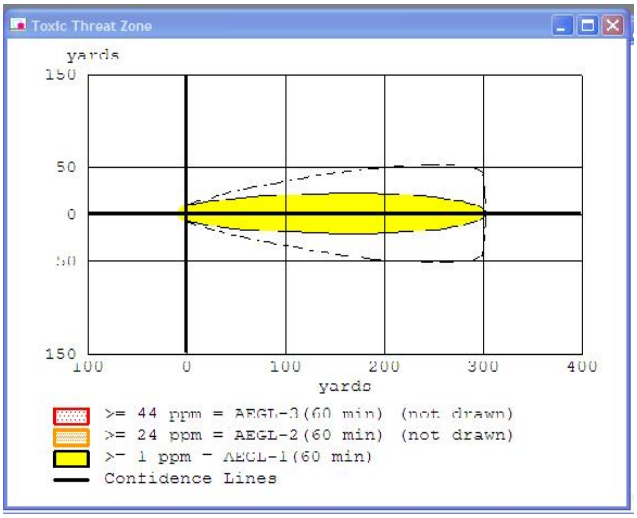
While a serious localized vapor concern, sulfuric acid, with a vapor pressure of only 1 millimeter Hg at 294°F, is not sufficiently volatile to migrate significant distances in the air at significant concentrations. As such, it is not even a listed chemical in the ALOHA program.

Accordingly, worst-case air modeling focused on HF and Nitric Acid solutions.

The ALOHA model contains inputs for solutions of HF in the range of 37 - 70%, and for Nitric Acid in the range of 69 – 99%. This is far more concentrated than the 1-10% range in the carboys. Importantly, the equations incorporated into the ALOHA model are not linear. However, based upon modeling iterations with these chemicals, with all other input parameters held constant, it was found that a 10% increase in solution concentration yield about a 30% increase in air plume length and concentration. Thus, assuming a proportional relationship would be highly conservative, and consistent with a "worst case" evaluation.

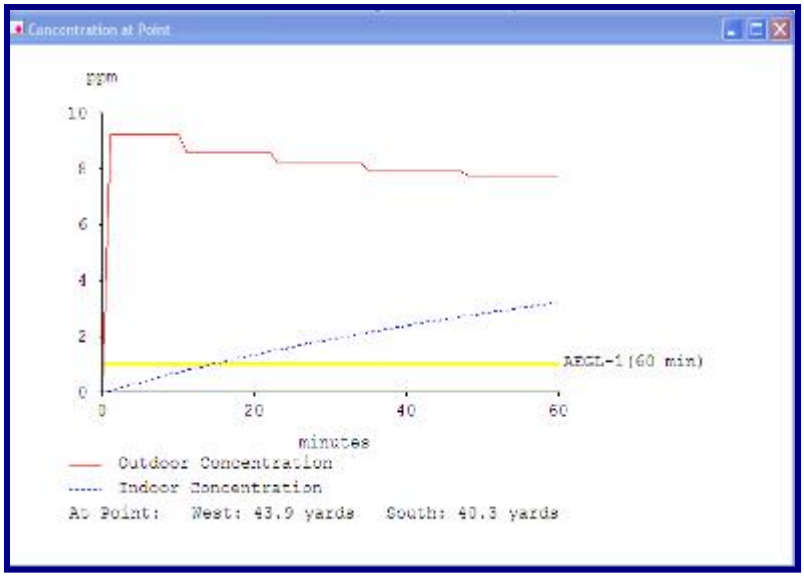
Worst Case HF Air Plume

Assuming a 37% solution of HF, the ALOHA Model predicted a plume containing 1 ppmV or more of HF in air could extent 300 yards (900 feet). Conservatively dividing by a factor of 3.7 (since the HF solution in the carboys could be no higher than 10%) indicates that levels above 1 ppmV could be ruled out beyond a distance of 250 feet.



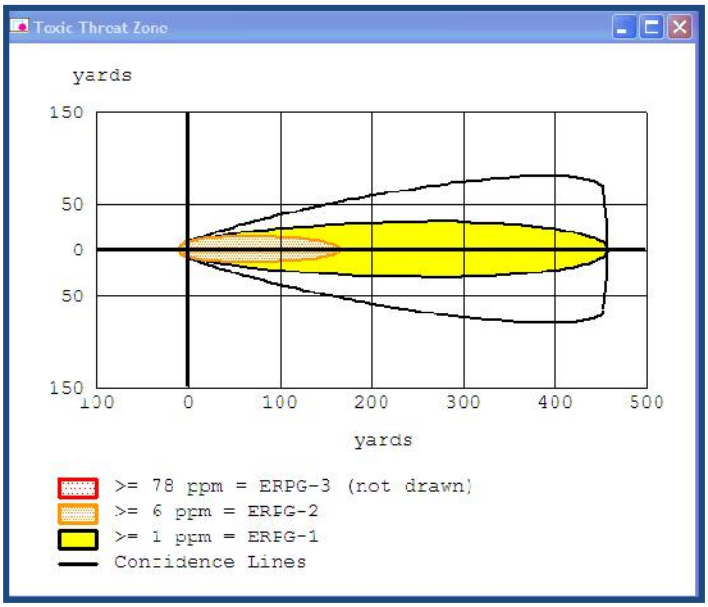
The 1 ppmV concentration is significant because it represents the 60 minute (and 8 hour) health metric of interest, known as an "AEGL -1". AEGL stands for *Acute Exposure Guidelines,* which have been derived by the US EPA for a number of chemicals for situations of this nature. Exceeding an AEGL-1 value will only result in mild, reversible health effects. Exceeding an AEGL-2 value could lead to serious, irreversible health effects, while exceeding an AEGL-3 value could result in life-threatening conditions. Ideally, exposures to the general public should be kept below the AEGL-1 value, and must be kept below the AEGL-2 and 3 concentrations.

The ALOHA model also allows the prediction of concentrations at a point in the air plume. Of interest at the site is the building complex containing the rest stop restaurants and other facilities, which was about 100 feet from carboy staging/processing area. Under the worst-case scenario, outdoor air levels would not be expected to exceed 2.5 ppm (9/3.7), exceeding the AEGL-1 level, but less than the AEGL-2. The concentration within the building (assuming a conservative indoor air exchange rage) would be unlikely to exceed 1 ppmV for at least 60 minutes.



Worst Case Nitric Acid Air Plume

Assuming a 70% solution of Nitric Acid, ALHOA predicted that 1 ppmV or more of Nitric Acid would be present in ambient air for 450 yards (1350 feet) from the hypothetical spill of 300 gallons of product. Conservatively dividing by a factor of 7 (to account for a less than 10% solution) yields a distance of about 200 feet.



Note that AEGL values have not been developed for Nitric Acid. Instead, the health-based metric used by ALOHA was ERPGs (*Emergency Response Planning Guidelines*, American Industrial Hygiene Association). Note also that an ERPG-2 value could be exceeded within about 60 feet of the spill incident (150/7). However, this was within an exclusion zone limited to site workers with proper protective equipment.

CONCLUSIONS

On the basis of information obtained at the site, including the computer modeling of worst-case scenarios, a conclusion was reached that public health, safety, and environmental impacts from the release and threatened release were minimal:

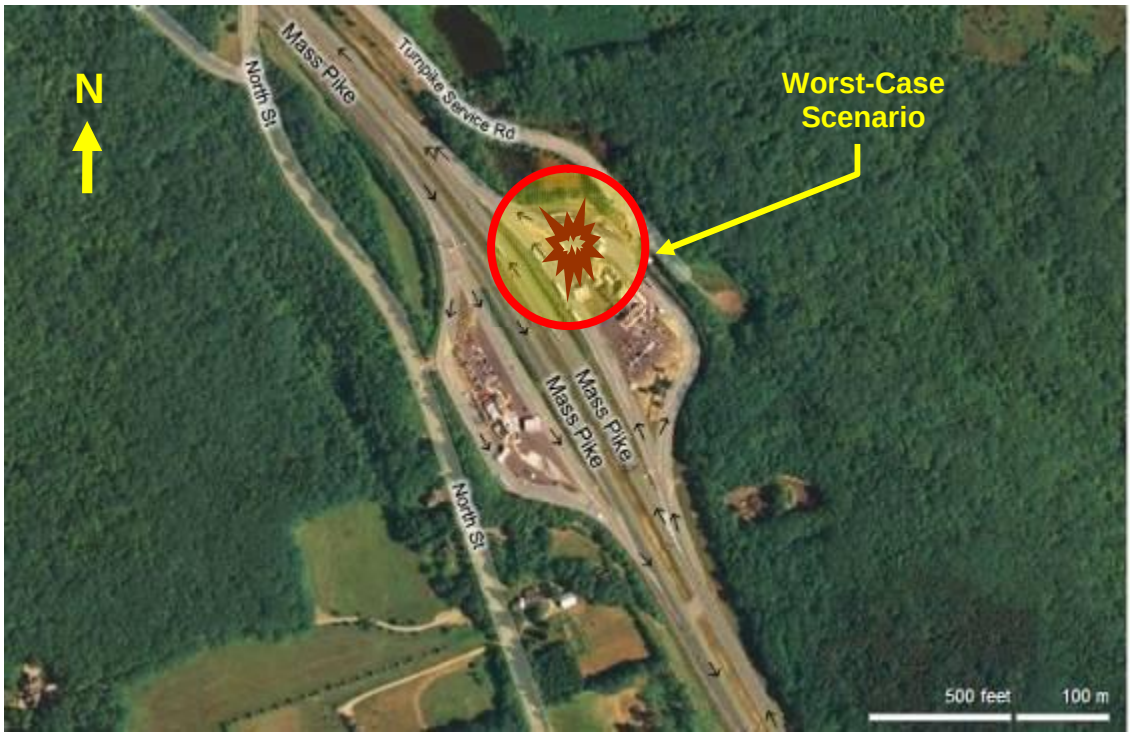
- Based upon discussions with a senior chemist for the responsible party, the acid mixture within the carboys was not shock-sensitive. Although transferring the contents of the carboy creates exothermic reactions, the temperature build up will not exceed 105°F, and will not lead to uncontrollable or unstable conditions. A build-up of pressure within the carboys due to such movement and/or placement in a sunny area can be safely relieved by venting the cap.

- The site location is not within a groundwater or drinking water resource area. Surface water flow from the site is towards the southeast, away from nearby surface water reservoirs.

- Air monitoring conducted by the response contractor (Clean Harbors) and by the US EPA prior to the arrival of FAST did not identify significant concentrations of acid gases, including Hydrogen Fluoride, down-wind of the site, and only low levels (3 ppmV) within the impacted trailer. The wind at the site was from the southwest during the entire FAST activation (i.e., blowing away from the highway and rest stop buildings), at speeds between 5 and 10 MPH.

- The site was located in a remote location, with the nearest residence more than 1000 feet from the spill and work area. Worst-case modeling of potential air impacts indicated that no significant concentrations of acids should be present in the air more than 250 feet from the work area. While the westbound rest area buildings were located within

this zone, they had been evacuated. While this zone extended onto the westbound lanes of the turnpike, any exposures would be minimal, given the speed of traffic and mixing of air within a vehicle.



On the basis of the above, a determination was made by FAST that continued air monitoring efforts were unnecessary, other than those efforts within the work/exclusion zone by the cleanup contractor, for worker health and safety purposes.

FAST departed the site at approximately 8 PM.