MassDEP Field Assessment and Support Team (FAST)

After Incident Report	DEP RTN 4-22,693
Foxboro Jet Fuel Tanker Spill	**June 2010**

BACKGROUND

At about 5 AM on Sunday, June 27, 2010, a tanker truck containing 11,000 gallons of Jet Fuel overturned on Route 95 in Foxboro, while turning onto the southbound exit to Route 495. The tanker was owned by C. White and Sons and was reportedly en route to T.F. Green International Airport in Warwick, R.I.

The tanker landed on its side, in a grassy area just off (southwest of) the ramp (see cover). Later in the morning, it was ascertained that all 11,000 gallons of fuel had spilled from the tanker. The fuel had discharged onto the ground, and flowed into a nearby catch basin. The catch basin discharged to a nearby manhole, which flowed into a culvert that discharged to a drainage ditch on the north side of the ramp (See Figure 1).

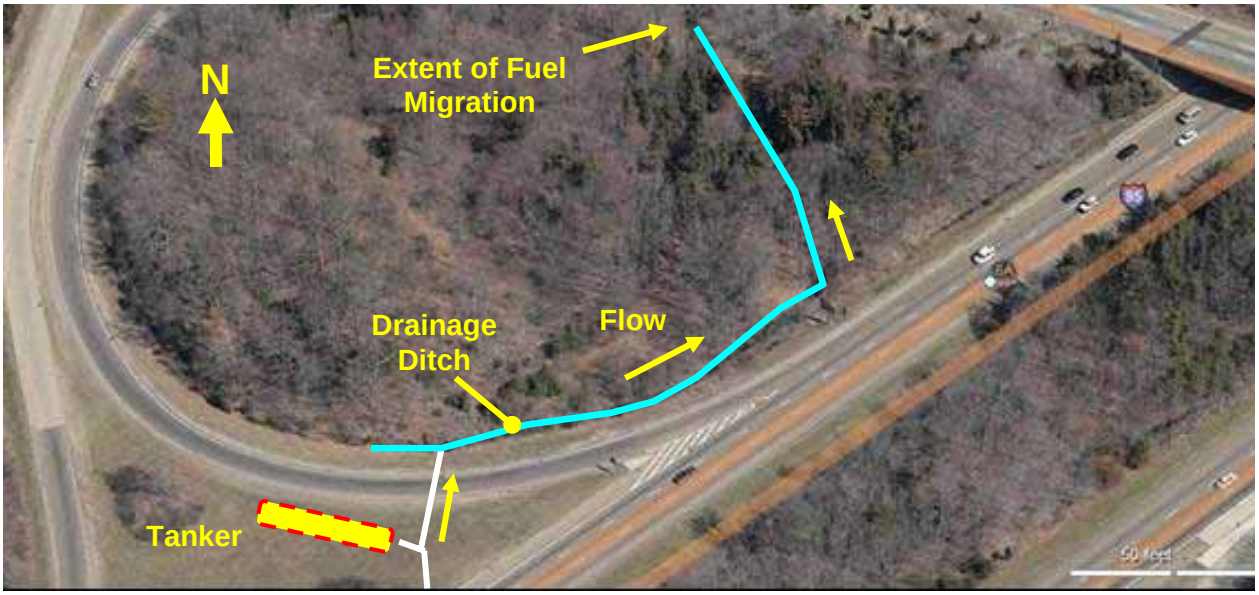


Figure 1 – Spill Site

Because there was virtually no flow of water in the culvert system or drainage ditches, the fuel did not migrate beyond the wetland within the "clover leaf" area proximate to the release (about 500 feet). Migration was also constrained by sediment within the culvert system, and timely booming by a response contractor.

A large number of fire and police resources were deployed to the site, as well as personnel from MassDEP and the US EPA. By about noon, however, the tanker truck had been righted, and soon thereafter Incident Command was stood down, most responders departed from the site, and several lanes of Route 95 south was re-opened to traffic.

FAST ACTIVATON AND DEPLOYMENT

The FAST Team Leader was paged at 5:57 A.M., and a FAST activation was requested at 6:30 AM. Two FAST staff and the mobile laboratory vehicle arrived at the site around 9:00 AM, and were briefed by the MassDEP On-Scene Coordinator (Dan Crafton, SERO/ER).

Potential Receptors

FAST generated orthographic maps of the site (22" x 34" and 11" x 17") for distribution to Incident Command and agency responders. Topographic and Resource maps were also generated to aid in the evaluation of proximate and potential down-stream receptors.

The orthographic maps indicated the presence of residential areas approximately 500 feet west of the site, and 1000 feet south of the site (see Figure 2).

Figure 2 – Nearby Residential Areas

Fortunately, the FAST on-board weather station was recording a wind direction out of the south/southwest (the best possible scenario), indicating that vapors (and odors) from the spill area were not being transported to sensitive receptors.

GIS maps of the surrounding area indicated the presence of a number of drinking water wells for the town of Mansfield to the southwest of the spill area, with the nearest Zone II boundary within ½ mile of the rollover. However, an examination of a topographical map indicated that surface water flow from the site was towards the southeast, away from the drinking water wells of concern (see Figure 3). Specifically, drainage ditches/streams from the spill site flowed to the northeast under Route 495, then easterly and southerly into Hodges Brook. No areas of concern were seen on or near Hodges Brook for at least one mile downstream of the site.

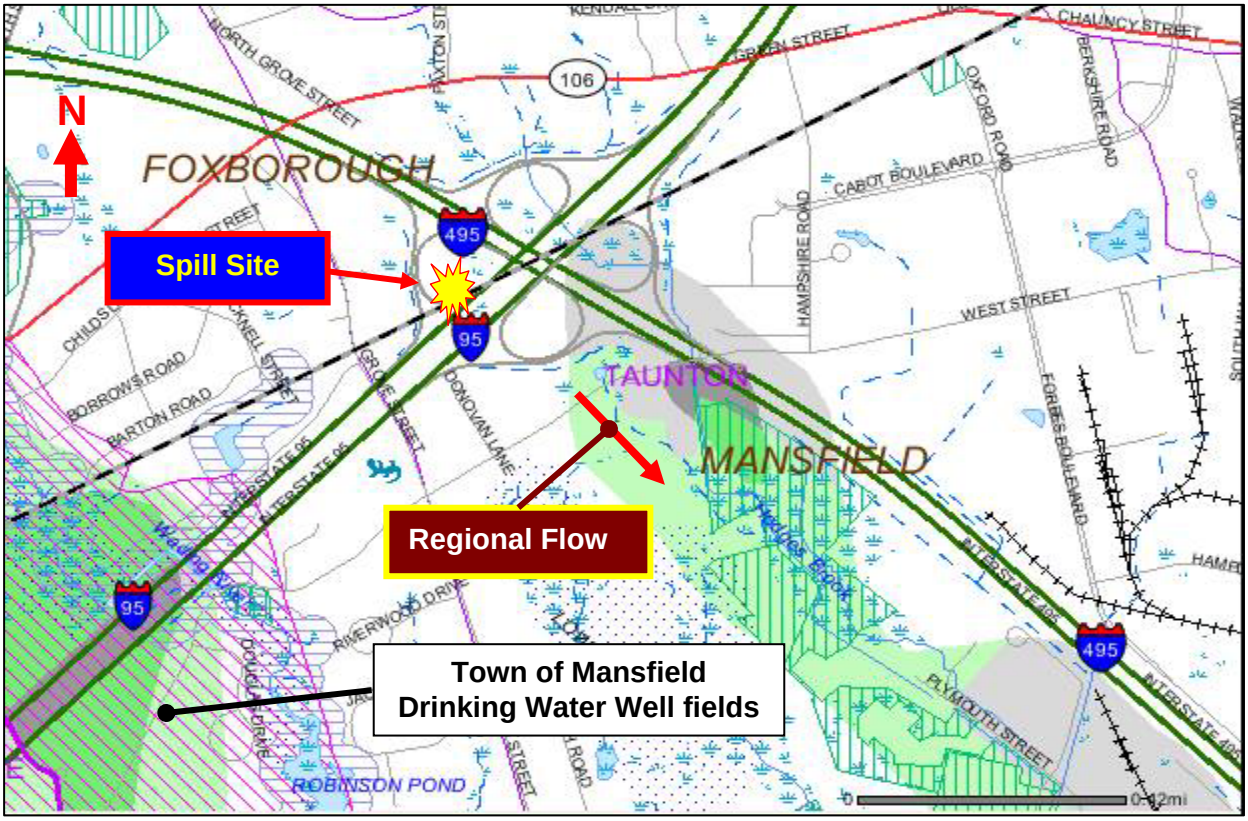


Figure 3 – Proximate Sensitive Resources

Air Monitoring

AreaRAE Unit

Four AreaRAE monitors were deployed within and near the impacted area. Each 8.5 pound unit is equipped with a 400 cc/minute pump that continuously samples air, for analysis by 4 (changeable) sensors. Readings are transmitted real-time by radio frequency to a receiver located in the FAST vehicle. Data from the receiver is wired to a laptop PC that continuously displays concentration readings, which are updated every 2 seconds. Exceeding a (programmable) action level for each sensor produces a visible and audible (voice recording) alarm. Data readings for each sensor are recorded and logged independently on each AreaRAE unit as well as in the laptop PC program.

The air contaminant of concern at this site was non-military jet fuel (i.e., "Jet A/JP-8"). This product, which is very similar to kerosene, is a complex mixture of hundreds of individual compounds, predominately C_6 – C_{18} aliphatic hydrocarbons. It is detectable on the photoionization detector (PID) sensor in the AreaRAE units, with a response factor on the units' 10.6 eV PID lamp of about 0.67 (relative to Isobutylene).

An MSA PID monitor was also used to spot-check AreaRAE readings, and survey various areas of the site.

Finally, 2 air samples were obtained at the site for analysis on two gas chromatographs located in the FAST vehicle, an SRI GC/PID/ELCD and an SRI GC/FID.

Groundwater Monitoring Wells

Two small-diameter-driven-wells were installed by FAST personnel in the grassy area where the tanker had overturned and released its contents. Both wells were 10 feet deep, with a 5 foot well screen. The purpose of these wells was to determine (a) depth to groundwater, and (b) whether separate-phase jet fuel was pooled at the water table interface. Such information is useful in determining the fate of the 11,000 gallons of fuel, and in scoping out soil excavation activities in the impact zone. The location of air and groundwater monitoring points is depicted in Figure 4.

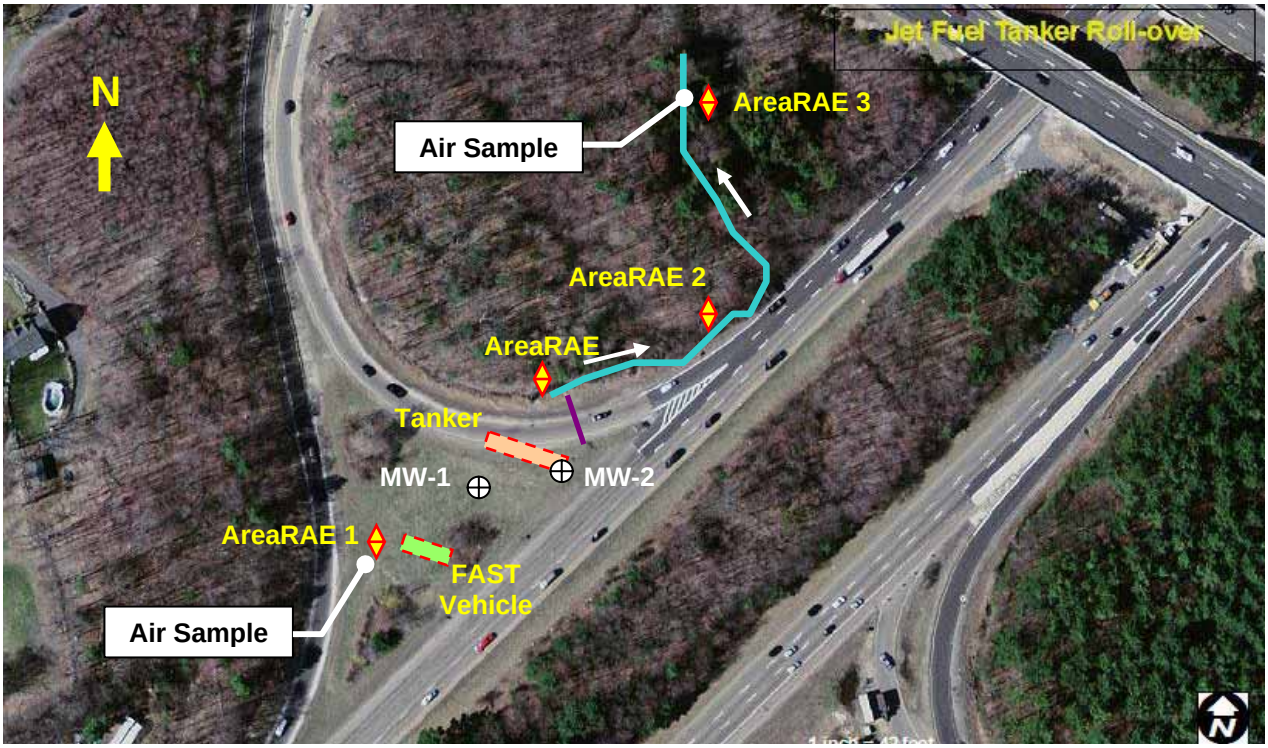


Figure 4 – FAST Sampling/Monitoring Locations

METROLOGICAL DATA

Metrological data from 6/27/10 from a weather station in Foxboro located 3.5 miles northeast of the site is provided in Figure 5. Observations from the on-board FAST weather station during the hours of deployment verified that on-site wind direction was consistent with data from this weather station.

HEALTH METRICS FOR KEROSENE/JET FUEL

Metric	ppmV	Explanation
PEL	35	Permissible Exposure Limit (OSHA) – 8 hours
REL	18	Recommended Exposure Limit (NIOSH) – 8 hours
AEGL-1	40	Acute Exposure Guidelines (EPA), mild/reversible effects, 8 hrs
AEGL-2	150	Acute Exposure Guidelines (EPA), serious effects, 8 hrs
Odor	0.08 – 1.0	Air concentration when an odor is discernable

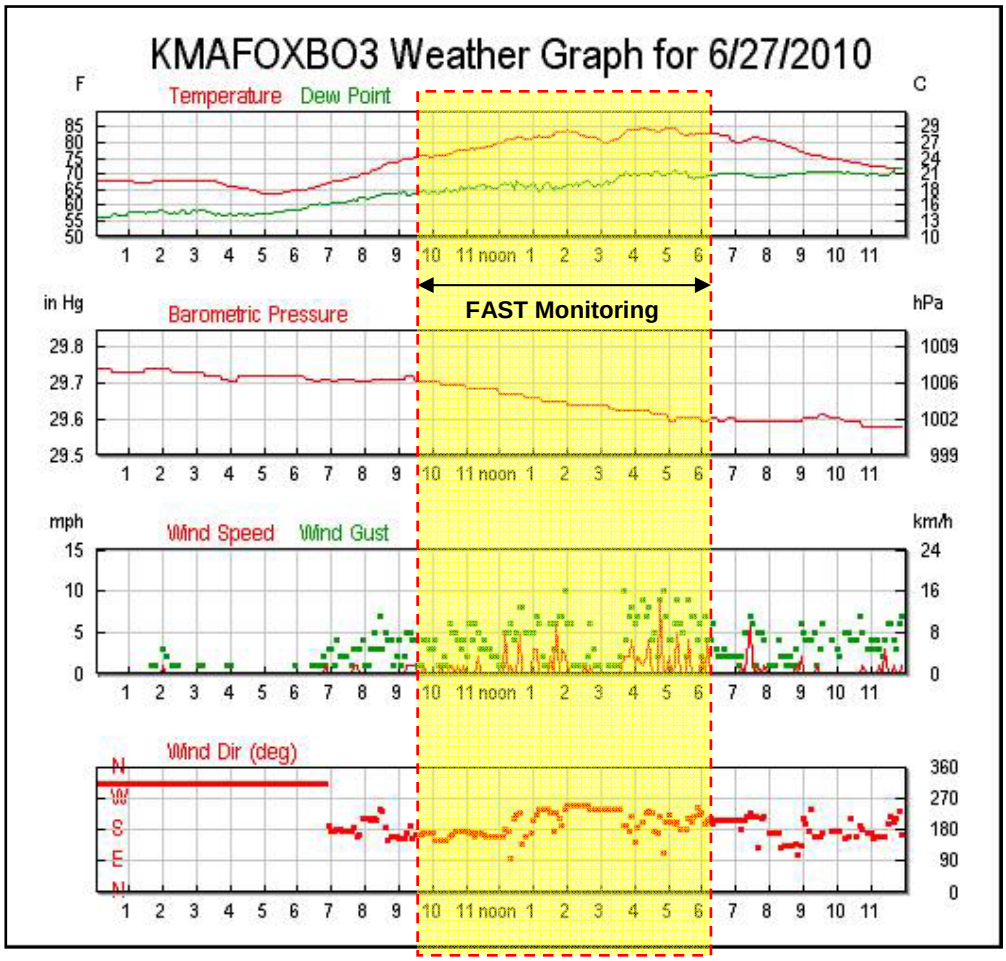


Figure 4 – Metrological Conditions for 6/27/10

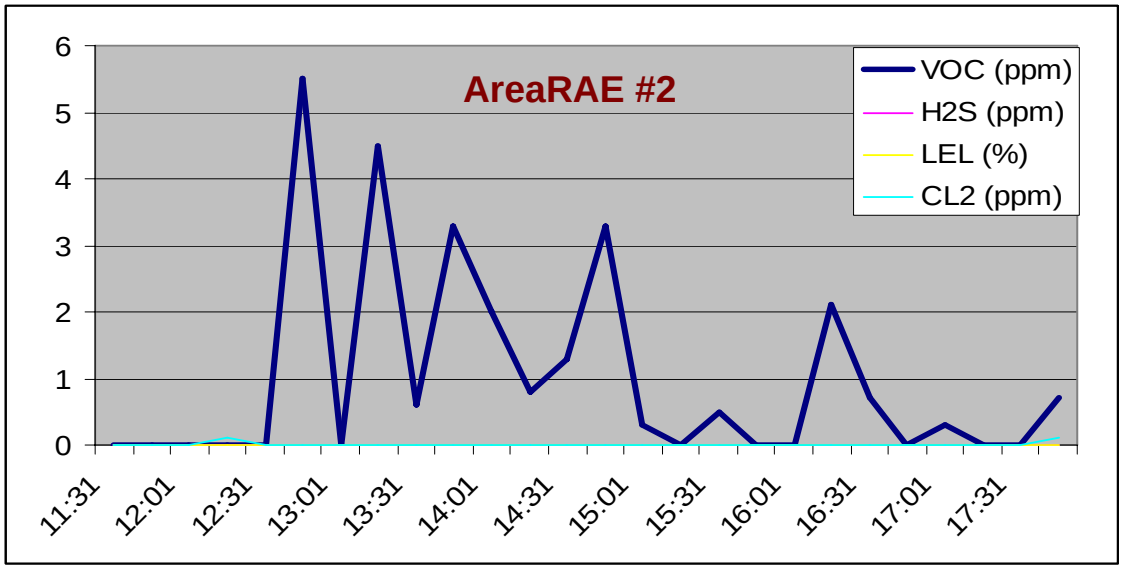
AIR MONITORING DATA

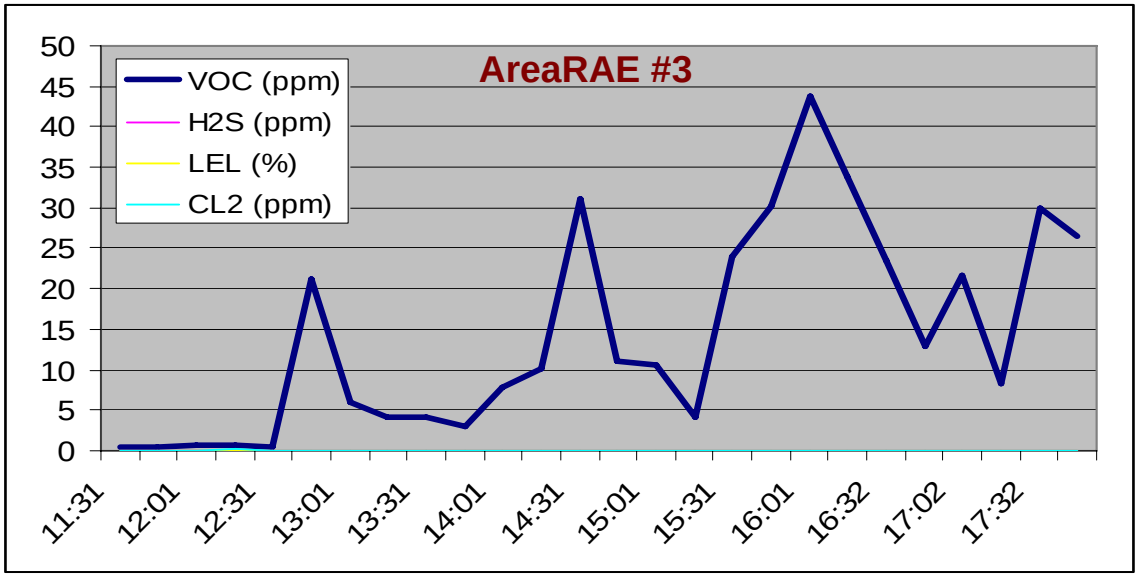
Data from AreaRAE unit #1 did not detect any levels of VOC hydrocarbons or any other contaminant during the time of monitoring (12:30 PM to 6:00 PM). This is not surprising, given its location upwind of the spill and work area. Data from AreaRAE Units 2, 3, and 4 are displayed in Figure 5, with data normalized over a 15 minute averaging period.

As can be seen in Figure 5, the highest concentrations of VOCs (i.e., volatile Jet Fuel Hydrocarbons) were seen in AreaRAE unit #3, which was located near where fuel oil was being recovered (via vac truck) from a wetland area. The highest 15-minute average concentrations of VOCs at this location were 45 ppmV at about 1620 hours (4:20 PM). Assuming a (isobutylene-to-jet fuel) correction factor of 0.67, this equated to about 30 ppmV of jet fuel hydrocarbons. While this value is approaching the 35 ppmV OSHA limit for occupational exposures, the 8 hour average concentration at this location appears to be less than 20 ppmV.

Lower levels of VOCs were recorded on AreaRAE units 2 and 4, also located in or near impacted areas. Consistent with its flash point (i.e., > 100º F), levels of vapors in the ambient air were no where near explosive levels (i.e., non-detect on the % LEL sensor).

Spot checks of air quality using an MSA PID revealed levels of VOCs along the highway near the impact area in the range of 1 – 10 ppmV, with occasionally heavy odors of jet fuel.





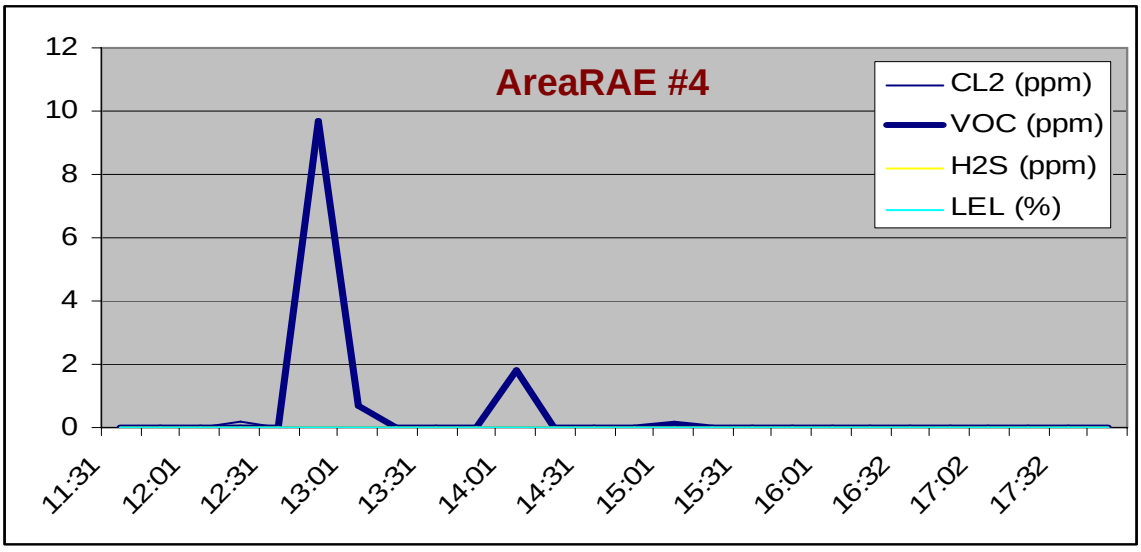


Figure 5 – AreaRAE Air Monitoring Data

The analysis of air samples near AreaRAE 3 on the GC/PID and GC/FID confirmed the presence of numerous hydrocarbon peaks in the C_6 – C_{12}+ range, consistent with the volatile portion of a jet fuel, at approximate concentrations of 3 to 7 ppmV total hydrocarbons.

As expected, the GC/PID and GC/FID chromatograms of an air sample obtained westerly of the spill area (near AreaRAE unit 1, in the direction of the nearest homes) did not reveal levels of hydrocarbons above background conditions.

GROUNDWATER OBSERVATIONS

The depth to groundwater in both wells was approximately 4.75 feet below ground surface. Groundwater obtained from each well did not contain a separate phase of jet fuel.

Based upon observations made during the installation and sampling of the direct-push wells, the soil appears to be a dense till or sand with a significant percentage of fine grain materials.

The lack of separate-phase jet fuel at the groundwater table interface suggest that most of the jet fuel released from the overturned tanker travel via overland flow into the nearby catch-basin, and then into the drainage ditches to the east via a storm water culvert.

CONCLUSIONS

A major spill of jet fuel occurred in an area with proximate residential populations and drinking water wells. Several conditions prevented what could have been significant public health and environmental impacts:

- a steady wind from the south/southwest, away from residential areas;
- a spill location just to the east of a watershed containing a number of drinking water wells; and
- a lack of rainfall preceding and during the event, which limited movement of jet fuel in downstream drainage ditches and wetland areas.

Air monitoring at the site by FAST during the initial phase of cleanup ensured that ambient and work area concentrations of petroleum hydrocarbons remained below levels of concern.