



MassDEP F.A.S.T.

Commonwealth of Massachusetts
Department of Environmental Protection
Field Assessment and Support Team

**Saugus
Veteran's Memorial School
39 Hurd Avenue
Odor Issue
October 26, 2011**

Background

At about 9:30 AM on 10/26/11, strong "glue like" odors were noted inside the Veteran's Memorial School on 39 Hurd Avenue in Saugus. Reportedly, these odors were strongest within the gymnasium, as well as in two nearby second-story classrooms, including the Music Room.

This prompted an evacuation of the school complex and additional investigation by Fire Services personnel. MassDEP assistance was requested late in the morning, and the agency's mobile laboratory arrived at the site at around 1 PM.

Sewer Work

At the time the odors were noted, a sewer re-lining project was occurring directly in front of the school, at the manhole depicted in Figure 1. This process involves the insertion of a fabric impregnated with a resin, which is then steam-heated. This steam was reportedly vented from a stack constructed in the manhole in question.

Investigations

The Material Safety Data Sheet (MSDS) was obtained for the resin used by the sewer re-lining contractor. According to this document, the resin was approximately 31% Styrene.

At 1:15 PM, a 1-liter air sample was obtained from the school's gymnasium by Fire Services personnel. This sample was immediately analyzed in the MassDEP mobile laboratory on a HAPSITE gas chromatograph/mass spectrometer (GC/MS). Styrene was found to be present at a very low concentration of 1.2 ppbV (5.2 $\mu\text{g}/\text{m}^3$); no other contaminants of significance were noted.

At 1:25 PM, a sample was obtained of the air within the manhole in front of the school. By that point, sewer work had been halted. This sample was analyzed on the GC/MS and found to contain approximately 800 ppbV (3400 $\mu\text{g}/\text{m}^3$) of Styrene. Additional air samples were obtained and analyzed on-site during the afternoon hours. Data from these efforts are summarized in Table 1.

Table 1 – Site Data (Styrene)				
Location	Time of Sampling	Styrene Conc		Comments
		ppbV ¹	$\mu\text{g}/\text{m}^3$	
Gym	1:15 PM	1.2	5.2	
Sewer Manhole	1:25 PM	800	3400	
Gym	3:20 PM	7.8	33	
Music Room	3:25 PM	10.4	44	Prior to venting
Outdoor Air	4:55 PM	5.4	23	Ground level – near gym
Music Room	5:50 PM	4.1	18	Following venting

¹ppbV = parts per billion by volume



Figure 1 – Key Site Features

Discussion

It appears virtually certain that the odor observed in the school in the morning was related to the sewer re-lining work being conducted on Hurd Avenue. Vapors from this operation could have been transported into the school by either sewer gases or HVAC intakes. Based on the following lines of evidence, it is highly likely that the mechanism of transport was via the air and HVAC systems:

- the proximity of the steam/vapor discharge to the points of impact (gym, music room) in the school;
- the lack of drains or other sewer-gas entry points in the gymnasium;
- the fact that impacts occurred on the second floor classrooms; and
- reports from school personnel that the odor was discernable in air blowing from the vents in the gymnasium.

Although a stack was used to try to disperse the discharge from the sewer manhole into the air, unusual winds and/or atmospheric conditions apparently resulted in the movement of a concentrated stream of vapors in a south/southwesterly direction, where they were entrained in the HVAC air intake systems on the roof of the school building.

A further nexus to the sewer re-lining operations is the presence of high Styrene in the sewer manhole (800 ppbV), with low (but above typical) levels of Styrene in the school building. Moreover, the description of the odor as "glue like" is consistent with the odor of Styrene, which can be detected by 50% of the population at a concentration of 160 ppbV (some can detect lower levels; some can only detect higher amounts).

Styrene

The US EPA has established a short-term (8 hour) "Acute Exposure Guidance Level" for Styrene of 20,000 ppbV. Below this level, significant health impacts would be unlikely, and any mild effects (e.g., irritation, headaches) are thought to be reversible and not likely to pose long-term health concerns.

MassDEP has set a 5 year exposure limit for Styrene of 60 ppbV in a home, and 240 ppbV in a school (given that students and staff spend less time in a school than in their home). Over a lifetime, MassDEP has established a limit for Styrene of 10 ppbV in a home, and 40 ppbV in a school. Typical concentrations of Styrene within indoor air in homes and schools are in the range of 0.3 – 0.5 ppbV.

Test Results

Testing data obtained on the GC/MS indicated that Styrene was the only chemical of concern (though low levels of several contaminants associated with the air sampling bags and analytical system were also detected).

Low levels of Styrene were detected in both the outdoor air (5.4 ppbV), as well as in the school building (1.2 – 10.4 ppbV). It is noted that when the initial air sample was obtained from the Gym (at 1:15 PM), sewer re-lining operations had been stopped for a number of hours. When the second Gym sample was obtained (at 3:20 PM), it is believed that re-lining operations were re-initiated at another location on Hurd Street. This is the likely cause of the slight increase, as reflected by the 5.4 ppbV level of Styrene detected in the outdoor air at ground level near the Gym.

Conclusions

By the early afternoon, odors were no longer discernable in the building. While levels of Styrene in the outdoor and indoor air remained somewhat higher than typical values, concentrations are still very low, well below any applicable MassDEP guidelines. It is expected that these levels will return to a typical range in the coming days, as the sewer re-lining project is completed.