

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

Manisha Juthani, MD
Commissioner



Ned Lamont
Governor
Susan Bysiewicz
Lt. Governor

Environmental Health Section

Date: May 10, 2022

To: File

From: Meg Harvey, Epidemiologist 4 *MJH*

Thru: Jim Vannoy, Section Chief

Subject: Data Evaluation and Technical Assistance regarding Fuel Oil Spill at Bacon Academy, Colchester, CT

Background

On February 16, 2022, the CT Department of Energy and Environmental Protection (DEEP) notified CT DPH that a significant release of fuel oil (ultra-low sulfur diesel) had occurred in the mechanical room of Bacon Academy (a public high school) located at 611 Norwich Avenue in Colchester, CT. The spill was noticed during the late evening of February 15, 2022. The source of the release was a 20,000 underground storage tank that was pumping fuel oil to a 75-gallon tank in the mechanical room. The overflow alarm had been disabled and the fire department estimated that before the spill was discovered, 1,700-1,900 gallons of fuel oil were released to the floor of the mechanical room. The mechanical room is located at ground level in the rear portion of the school. The floor of the mechanical room has two 12-inch drains that lead to a storm drain and then to a small stream that empties into a wooded wetland area behind the school. A strong fuel oil odor was present in the area in and around the mechanical room and in some areas of the school building. Visible fuel oil was present in the stream and wetland area behind the school. There are 5 homes with private well water located less than 1,000 feet from the release area. Water supplying the school does not come from an on-site well. As a precautionary measure, the town of Colchester closed the Bacon Academy school on February 16, 2022. The school remained closed until February 22, 2022.

DEEP's Hazardous Materials Spill Unit and contractors hired by DEEP and the Town initiated many immediate actions during the night of February 15 and the following days. These



Phone: (860) 509-7101 • Fax: (860) 509-7111
Telecommunications Relay Service 7-1-1
410 Capitol Avenue, P.O. Box 340308
Hartford, Connecticut 06134-0308
www.ct.gov/dph

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activities included (1) using Vac trucks to clean oil from the mechanical room floor and floor drains and skim oil from the stream, (2) deploying booms in and around the storm drain outfall pipe, (3) boring holes through the concrete floor to assess fuel oil migration beneath the floor, (4) measuring school indoor air for volatile organic compounds (VOCs) and combustible gases using a photoionization detector (PID), (5) using fans to increase ventilation and reduce fuel oil odors in the school indoor air, (6) sealing off the mechanical room with plastic sheeting to minimize fuel odors from permeating other areas of the building, and (7) sampling indoor air using the EPH/VPH/APH sampling and analytical method.

Involvement of the CT DPH ATSDR unit in this incident began when DEEP requested our participation in a meeting on February 17, 2022 with DEEP, the Director of Health for Chatham Health District, Bacon Academy administrators, and Colchester town officials. CT DPH's ATSDR unit staff were specifically asked for advice about (1) what data should be collected to support a decision to safely reopen the school, (2) what criteria should be used to evaluate indoor air data, (3) health messaging for school staff, teachers, students and parents and (3) health messaging for the nearby private well owners.

During a series of virtual meetings and follow-up emails and discussions, we provided health messaging to the Chatham Health District that they used in an informational letter to school staff, teachers and parents about the fuel oil release incident and a letter to private well owners encouraging them to allow the Chatham Health District to test their well water. We also provided school and Town officials and the Chatham Health District with advice about indoor air testing that should be conducted and the health-based criteria that should be met to ensure that there are no fuel oil constituents in the school's indoor air at levels of public health concern. We also advised that before school reopened, no detectable odors should be present in any spaces occupied by students, teachers or staff.

Environmental Data and Exposure Potential

In response to our advice, consultants hired by the town tested indoor air at the school using the sampling and analytical methods described in the DEEP/DPH 2012 Technical Support Document (CT DEEP and CT DPH, July 2012, Petroleum Hydrocarbons Using the EPH/VPH/APH Analytical Methods and Criteria Development). Air samples were collected for approximately 60 minutes and were analyzed by Phoenix Environmental Laboratories in Manchester CT using the Air Phase Hydrocarbon Method which is a GC/MS Modified EPA TO-15 analysis. Sample locations were selected to represent the worst case concentrations based on odors and proximity to the source of the fuel oil spill (mechanical room in the basement).

The 2012 Technical Support Document includes inhalation toxicity values and risk-based target indoor air concentrations (TACs) for different petroleum fractions based on residential exposures. CT DPH identified that the toxicity value (Reference Concentration; RfC) underlying the TAC for the C5-C8 range is outdated. The 2012 Technical Support Document uses n-hexane as the surrogate chemical for the C5-C8 range and there is a 2005 EPA RfC available for n-hexane that is 3.5-fold less stringent than the RfC used in the 2012 Technical Support Document. The more current RfC is 0.7 mg/m³ versus the outdated toxicity value of 0.2 mg/m³ (EPA RfC from 1990). To evaluate indoor air data from Bacon Academy, CT DPH modified the

TAC for the C5-C8 fraction using the current RfC for n-hexane of 0.7 mg/m³. This yields a TAC of 400 ug/m³. CT DPH's calculations underlying the modified TAC for C5-C8 is provided in the Appendix. Table 1 below summarizes the indoor air results from Bacon Academy and the TACs used to evaluate the data. None of the results exceed the TACs. In addition, it should be acknowledged that the TACs assume exposure every day because the TACs are intended for use in a residential setting. Assuming that indoor air exposure occurs every day is an overly conservative assumption for a school setting. If CT DPH had modified the TACs to account for a lower exposure frequency in a school setting, the TACs would be higher.

The Chatham Health District obtained samples from 3 of the 5 private wells located within 1,000 feet of the fuel oil release. They were unable to obtain samples from two residents due to lack of response. The samples were analyzed for Extractable Total Petroleum Hydrocarbons and VOCs by the CT DPH Laboratory and all results were below reporting limits. Chatham Health District communicated the results to each resident.

Table 1. Air Phase Hydrocarbon Results for Indoor Air Samples Collected from Bacon Academy, Colchester CT on 2/20/22 by Mystic Air Quality Consultants, Inc.

Sample Location	Hydrocarbon Fraction	Concentration (ug/m ³)	Target Air Concentration (ug/m ³)
Basement Hallway, East End	C5-C8 aliphatic	140	400 ^a
	C9-C10 aromatic	None detected (PQL ^b = 10)	15
	C9-C12 aliphatic	35	115
Main Office (above mechanical room)	C5-C8 aliphatic	150	400 ^a
	C9-C10 aromatic	None detected (PQL = 10)	15
	C9-C12 aliphatic	90	115
Basement Hallway outside mechanical room	C5-C8 aliphatic	370	400 ^a
	C9-C10 aromatic	None detected (PQL = 10)	15
	C9-C12 aliphatic	67	115

^aTAC calculated by CT DPH using the current Reference Concentration for n-hexane, the surrogate chemical used for the C5-C8 aliphatic fraction.

^bPQL = practical quantitation level

Conclusions and Recommendations

The Town of Colchester, School Administration and the Chatham Health District followed our advice to collect indoor air samples and analyze them using the EPH/VPH/APH analytical methods described in the DEEP/DPH 2012 Technical Support Document. CT DPH evaluated the air results using risk-based TACs concluded that concentrations of petroleum in the indoor air of spaces likely to be worst case did not exceed the TACs. Before the school reopened, Chatham Health District along with school and town administrators confirmed that odors were not present in the school in spaces that would be occupied by teachers, students or school staff. CT DPH's activities related to this incident were documented in a series of incident reports prepared at the time the response was ongoing.

References:

July 2012. CT DEEP & CT DPH, Petroleum Hydrocarbons Using the EPH/VPH/APH Analytical Methods and Criteria Development

EPA Integrated Risk Information System. https://iris.epa.gov/ChemicalLanding/&substance_nmbr=486

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Author:

Meg Harvey, MPH
Epidemiologist 4
Unit Supervisor, Toxic Hazards Health Assessment
Environmental Health Section
CT Department of Public Health

CT Department of Public Health Reviewers:

Jim Vannoy, Section Chief, Environmental Health Section.
Sharee Rusnak, MSPH, ScD
Epidemiologist 3
Toxic Hazards Health Assessment

Appendix

Target Indoor Air Concentration for C5-C8 aliphatic petroleum hydrocarbon range.

$$TAC = (HQ * RfC * AT) / (CVFnc * EF * ED)$$

Equation from 2012 DEEP/DPH Technical Support Document

$$TAC = (1 * 700 \text{ ug/m}^3 * 10950 \text{ days}) / (1.75 * 365 * 30 \text{ years})$$

$$TAC = 400 \text{ ug/m}^3$$

Variable	Description	Value	Units
TAC	Target indoor air conc.	400	ug/m3
HQ	Hazard quotient	1	None
ED	Exposure duration	30	Years
EF	Exposure frequency	365	Days
RfC	Reference concentration	700	ug/m3
CVnc	Children's vulnerability factor, non-carcinogen	1.75	None
AT	Averaging time	10950	Days