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To: File

From: Meg Harvey, Epidemiologist 4 MLH

Thru: Jim Vannoy, Section Chief

Subject: Data Evaluation and Technical Assistance regarding Fuel Oil Spill at a Hamden CT Residence

Background

In October 2022, the CT Department of Energy and Environmental Protection (DEEP) responded to an incident at a residence in Hamden, CT after #2 fuel oil was delivered to the wrong address. The fuel was delivered into the basement of the residence via an oil tank fill pipe that had not been removed when the home changed from oil to gas heat. Approximately 100 gallons of fuel oil was pumped into the basement of the residence. DEEP arranged for a cleanup contractor to remove the oil, clean the basement and ventilate. The Town of Hamden (Town) assumed responsibility for the incident because they had ordered the fuel as part of a fuel assistance program and had given the oil company an incorrect address for fuel delivery. The Town arranged for the family to be temporarily relocated to a hotel while the cleanup occurred. Before authorizing the family to reoccupy the home, the Town hired a consultant to conduct air testing inside the home. The town provided the indoor air results to Quinnipiack Valley Health District (QVHD) for interpretation but they did not have the expertise to interpret the data.

The Connecticut Department of Public Health Agency for Toxic Substance and Disease Registry Unit (DPH) began giving technical assistance with this incident on November 9, 2022, when QVHD staff requested help with interpreting the indoor air results from the home. DPH evaluated the indoor air data against Connecticut's health-based indoor air guidelines

appropriate for residential exposures. QVHD used DPH's evaluation as a basis for their recommendation to the Town of Hamden regarding whether the home was safe to reoccupy.

Environmental Data and Exposure Potential

Three rounds of indoor air samples were collected from two locations in the home by a consultant hired by the Town . Samples were collected for 24-hours via summa cannister and were analyzed for Air Phase Petroleum Hydrocarbon (APH) fractions and target APH analytes (1,3-butadiene, benzene, ethylbenzene, m, p-xylene, o-xylene, methyl tert-butyl ether, naphthalene and toluene). Samples were collected on November 3, 17 and 30, 2022. After sample rounds 1 and 2, the consultant conducted further remedial activities including additional cleaning of the basement floor, ventilating and operating a portable carbon filtration air cleaner.

Table 1 presents results from the three rounds of indoor air sampling and the comparison values used by DPH for evaluating the data. Table 1 includes results only for those chemicals that were detected at a concentration greater than the laboratory reporting level.

Table 1. Air Phase Hydrocarbon (APH) and Target APH Analyte Results for Indoor Air Samples Collected From Hamden Residence, November 2022 (All concentrations in µg/m^3)

Analyte	2nd floor N. bedroom			1st Floor Living Room			Comparison Value: Risk-Based Residential TAC
	Round 1 11/3/22	Round 2 11/17/22	Round 3 11/29/22	Round 1 11/3/22	Round 2 11/17/22	Round 3 11/29/22	
C5-8 aliphatics	**1200**	64	74	**1300**	59	71	400[a]
C9-10 aromatics	**360**	29	ND	**440**	28	ND	34[b]
C9-12 aliphatics	**2900**	**210**	30	**3500**	**200**	27	114[c]
Benzene	1.4	ND	0.79	1.48	ND	0.79	3.3[d]
Ethylbenzene	14.9	ND	ND	17.3	ND	ND	53[d]
Total xylenes	81.4	ND	ND	100.4	ND	ND	220[d]
Toluene	22.9	2.28	2.26	25.9	2.21	2.06	210[d]

TAC = Target indoor air concentration

Bold = result exceeds TAC

[a]Based on updated IRIS RfC of 0.7 mg/m^3 for n-hexane as a surrogate (EPA IRIS 2005). This value is an update of the TAC contained in the July 2012 Technical Support Document for Petroleum Hydrocarbons Analytical Methods and Criteria (DEEP & DPH 2012).

[b]Based on the updated IRIS RfC of 0.06 mg/m^3 for all three trimethylbenzene isomers as surrogates (IRIS 2016).

[c]From July 2012 Technical Support Document for Petroleum Hydrocarbons Analytical Methods and Criteria (DEEP & DPH 2012). TAC uses a MA DEP inhalation reference concentration of 0.2 mg/m3 for Dearomatized White Spirits as a surrogate.

[d]From Proposed Revisions - CT's Remediation Standard Regulations Volatilization Criteria, 2003 (DEEP 2003)

Residents of the home impacted by fuel oil spill were temporarily relocated when the spill occurred in order to prevent them from being exposed to contaminants in indoor air from the fuel oil. CT DPH evaluated the risk from exposure to indoor air by comparing the results of the three rounds of indoor air data with the residential Target Indoor Air Concentrations (TACs). Residential TACs are health-based guidelines developed to be protective for long term exposure of adults and children exposed to indoor air via the inhalation pathway. Residential TACs are based on assumptions of daily exposure to indoor air in the home for 350 days per year for 30 years and an inhalation rate of 20 m^3 per day for an adult. A child safety factor (either 1.75 fold or 2-fold, depending on when the TAC was developed) is included to ensure protection of children because of their greater inhalation rate as compared with adults. A two-fold adjustment is made to account for children's increased sensitivity to carcinogens and is applied only for genotoxic carcinogens. The TACs for petroleum hydrocarbon fractions use surrogate chemicals for toxicity values. The surrogate chemicals used for each fraction are identified in the footnotes of Table 1. The TACs consider both cancer and noncancer risks. Indoor air concentrations below the residential TAC are considered safe for residential exposures. References for the TACs used in this evaluation are provided in the footnotes in Table 1.

Conclusions and Recommendations

The bolded results in Table 1 indicate a concentration exceeding the comparison value. During sampling rounds one and two, there were chemicals present at concentrations exceeding health-based guidelines. However, the additional cleaning and ventilation that was performed after round two further reduced the indoor air concentrations. Results from round three sampling shows that chemicals in indoor air that were present at levels exceeding health-based guidelines are no longer present at concentrations of concern.

Chemicals present in indoor air at concentrations lower than the residential TACs will not pose cancer or noncancer exposure risks of concern to adult or child residents. Based on the round three indoor air results from November 29, 2022 being lower than the residential TACs, CT DPH advised the Town that residents could safely reoccupy their home. DPH also told the Town that if residents had questions or concerns about the indoor air results or their exposures, they should contact DPH. Based on DPH's recommendation, the Town allowed the residents to reoccupy their home.

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

CT DEEP, 2003. Proposed Revisions - CT's Remediation Standard Regulations Volatilization Criteria, March 2003.

EPA Integrated Risk Information System. Noncancer Assessment for n-hexane, 12/23/2005, accessed 3/6/23 https://iris.epa.gov/ChemicalLanding/&substance_nmbr=486

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