Letter Health Consultation

Vapor Intrusion Investigation

BAREFOOT DISPOSAL SITE
Hollidaysburg, Blair County
Pennsylvania

September 19, 2016

Prepared by:

pennsylvania
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Health Consultation: A Disclaimer

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September, 19th 2016

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Re: Letter Health Consultation, Barefoot Disposal Site – Vapor Intrusion Investigation

Dear Ms. Lindsey:

Thank you for requesting the Pennsylvania Department of Health (PADOH) to evaluate the potential health impacts from exposure to indoor chemicals due to vapor intrusion at Barefoot Disposal Site (the 'site') in Hollidaysburg, Blair County, Pennsylvania. The U.S Environmental Protection Agency (EPA) Region 3, collected vapor intrusion data in residences near the site where contaminated groundwater plume was detected in the past with several volatile organic compounds (VOCs) and metals, which could have contaminated in indoor air through vapor intrusion pathway. The PADOH's top priority is to ensure residents living near the site have the best information to safeguard their health.

Based on our review, the PADOH concludes that the levels of chemicals detected such as: trichloroethylene (TCE); 1,4 dioxane; and 1,2-dichloroethane (1,2-DCA) in indoor air are not expected to harm the health of the residents. The concentrations in the sub-slab results were less than concentrations measured in the indoor air. This indicates the source is not likely from vapor intrusion. Therefore, the PADOH concludes that the source of the chemical contamination is most likely from indoor sources such as cigarette smoking, nail polish, carpeting floor, and plug in air fresheners, etc. Hence, PADOH recommends that EPA conduct health education for these residents to prevent chemical exposure from indoor sources.

Background and Statement of Issues

The site is located on 44 acres of land at the top of Catfish ridge. Prior to 1971, the site was used as an unpermitted disposal facility for industrial and metal finishing wastes and untreated domestic wastes (Figures 1 and 2). EPA began environmental investigations near the site in the late 1980's. On-site soils were shown to contain lead, mercury and other metals and VOCs were also found in the groundwater near the site. In 1991, three homes (R-01, R02, & R14) with VOC detections in private well water were offered bottled water and a granulated-activated carbon filtration system. In 2003, one more additional home (R-01A) also received a treatment system, based on VOC detections. In 2013, PADOH evaluated additional residential well sampling data collected by EPA at 14 private drinking water wells near the site. Based on the review of additional residential well water data, PADOH would not expect exposures to harm people's

health. However, PADOH recommended EPA consider collecting indoor air sampling near the site to ensure vapors were not migrating into homes [PADOH 2013].

Overview of the Residential Vapor Intrusion Sampling

In November 2014 and April 2015, EPA conducted vapor intrusion sampling near the site. Initially, three homes (R01, R01A, and R02) near the site were targeted for the investigation, but only two home owners (R01 and R01A) provided a signed access agreement. Prior to the sampling, the EPA removed all of the potential sources of VOCs from the basements of the sampled homes. All air samples were collected in certified-clean 6-liter summa canisters equipped with 24-hour regulators. All samples were collected at the breathing zone height, approximately 3 to 5 feet (except for the crawl space samples).

To account for seasonal variability, the EPA conducted the vapor intrusion investigation in the fall and spring of November 2014 and April 2015, respectively. Sampling at R-01 in 2014 included two indoor air samples (basement and living room), one outdoor sample and one sub-slab sample. In 2015, vapor intrusion sampling for R-01 included four indoor air samples (two from the basement, one from the crawl space and one from the living room) and one outdoor sample. A sub-slab sample not collected during the 2015 event because water was entering the Tedlar bag from the sub-slab gas well. In lieu of this sample, EPA collected an additional indoor air sampled near the sub-slab location. Due to the close proximity of the residential homes, one ambient air sample was collected in the 2015 sampling event near the R-01 residence. The 2014 sampling at R-01A consisted of three indoor air samples (basement, dining room and bedroom) and one outdoor sample. A sub-slab sample not collected during the 2014 event because of technical difficulties in installing sub-slab soil gas wells at R01A as the thickness of the sub-slab was greater than the length of the available drill bit. In 2015, EPA collected four indoor air samples (basement, dining room and bedroom) and two sub-slab air samples.

Basis for Decision

To determine the potential for vapor intrusion and health risks to these residents near the site, the PADOH compared the sampling results to chemical-specific, health-based screening levels developed by ATSDR and EPA for cancer and non-cancer effects [ATSDR's minimal risk levels (MRLs), EPA's reference concentrations (RfCs), Regional Screening Level (RSL) and ATSDR's cancer risk evaluation guides (CREGs)] [ATSDR, 2005]. The PADOH evaluated indoor air, crawl space air, basement, and sub-slab soil gas sampling results. Indoor air contaminant results were compared directly to indoor air screening levels. The sub-slab soil gas screening levels were derived from indoor air screening levels, using EPA's recommended sub-slab soil gas vapor intrusion Attenuation Factor (AF) of 0.03[EPA 2015].

As shown in Table 1, only 1,2-DCA in indoor air at both the residences R01 and R01A have exceeded the screening level. Although, the sub-slab soil gas concentration of 1,2-DCA at R01A exceeded the sub-slab screening level, it should be noted that the detected sub-slab soil gas level (2.6 $\mu g/m^3$) is much lower than the maximum indoor level detected (5 $\mu g/m^3$). When indoor air concentrations of VOCs exceed the sub-slab concentration, it generally indicates the source is not from vapor intrusion and is likely due to an indoor sources such as consumer products.

Moreover, based on previous health consultation, this chemical was not detected in well water sampling results at these locations [PADOH 2013]. Also, the ambient (outdoor) air sample detections were at low levels and no compounds exceeded the EPA Region 3 screening levels. Hence, it is unlikely that the source of this contamination is from vapor intrusion.

Table 1. Maximum indoor air and sub-slab soil gas concentrations at residences R01 and R01A near Barefoot Disposal Site, Hollidaysburg, Blair County, PA (2014-2015)

Location and chemicals	Indoor Air Concentration ($\mu g/m^3$)		Sub-slab soil gas ($\mu g/m^3$)		Health based screening levels ($\mu g/m^3$)	
	2014	2015	2014	2015	Indoor Air	Sub-slab soil gas
R01						
TCE	ND	0.18	1.1	NA	0.2 CREG 2 ATSDR cMRL	6.6 CREG 66 ATSDR cMRL
1,4-dioxane	ND	0.13	ND	NA	0.35 CREG 110 ATSDR cMRL	11.5 CREG 3,630 ATSDR cMRL
1,2-DCA	ND	**0.18**	ND	NA	0.038 CREG 2400 ATSDR cMRL	1.2 CREG 79,200 ATSDR cMRL
R01A						
TCE	ND	0.053J	NA	ND	0.2 CREG 2 ATSDR cMRL	6.6 CREG 66 ATSDR cMRL
1,4-dioxane	ND	0.11	NA	0.99	0.35 CREG 110 ATSDR cMRL	11.5 CREG 3,630 ATSDR cMRL
1,2-DCA	**4.7**	**5.0**	NA	**2.6**	0.038 CREG 2,400 ATSDR cMRL	1.2 CREG 79,200 ATSDR cMRL

TCE – trichloroethene; 1,2-DCA - 1,2-dichloroethane; CREG – Cancer Risk Evaluation Guide; ATSDR cMRL – Agency for Toxic Substances Disease Registry chronic Minimum Risk Level; ND- Not Detected; NA- Not Available; technical difficulties in installing sub-slab soil gas wells due to thickness of sub-slab and/or encountering water in sub-slab soil gas sample; J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample; values in bold exceeded screening levels; Sub-slab soil gas screening level ($\mu g/m^3$) = Indoor air screening level ($\mu g/m^3$) ÷ Attenuation Factor (AF), where AF = 0.03.

Public Health Implications

1,2-Dichloroethane (1,2-DCA)

The contaminant 1,2-dichloroethane (1,2-DCA), is a manufactured chemical that is not found naturally in the environment. It is a clear liquid and has a pleasant smell and sweet taste. The most common use of 1,2-DCA is in the production of vinyl chloride which is used to make a variety of plastic and vinyl products including polyvinyl chloride pipes, furniture and automobile upholstery, wall coverings, housewares, and automobile parts. It is also used as a solvent and is added to leaded gasoline to remove lead. In homes, some cleaning solvents, pesticides, glues, varnishes, and strippers can contain 1,2-DCA. Sampling has also shown that 1,2-DCA was present in newly purchased molded plastic items and was not the result of contamination by vapor intrusion in residences [W.J. Doucette 2009]. In addition, 1,2-DCA has been found in

groundwater and soil near landfills and industries using large chemical quantities [K. Hughes 1994].

Non-cancer Health Effects of 1,2-DCA

Acute and chronic inhalation exposure to high levels of 1,2-DCA in humans can result in respiratory symptoms, irritation of the mouth, throat, lungs, and nose; nausea, vomiting, headache, and dizziness; and liver and kidney damage [ATSDR 2001]. Repeated exposure to high concentrations of 1,2-DCA can cause liver damage, kidney damage, lung injury, loss of appetite, dizziness and nervous system problems. Animal studies suggest that 1,2-DCA may damage the immune system. Studies indicate that 1,2-DCA has not been associated with birth defects or miscarriages.

The maximum indoor air concentration of 1,2-DCA detected at residences R01 (0.18 $\mu g/m^3$) and R01A (5.0 $\mu g/m^3$) were well below the ATSDR's cMRL of 2,400 $\mu g/m^3$. The maximum indoor levels of 1,2-DCA were approximately 480 times lower than the ATSDR cMRL. Therefore, non-cancer health effects are not expected at either location.

Cancer Risk Health Effects of 1,2-DCA

Animal studies have shown 1,2-DCA causes stomach, lung, breast, and other types of cancer. 1,2-DCA may also cause cancer in humans. Human studies examining whether 1,2-DCA can cause cancer have been considered inadequate [ATSDR 2001]. In animals, increases in the occurrence of stomach, mammary gland, liver, lung, and endometrium cancers have been seen following: inhalation, oral, and dermal exposure. The Department of Health and Human Services/National Toxicology Program has determined that 1,2-DCA may reasonably be expected to cause cancer in humans [ATSDR 2001]. The EPA has determined that 1,2-DCA is a probable human carcinogen and the International Agency for Research on Cancer considers it to be a possible human carcinogen.

The maximum indoor concentrations of 1,2-DCA detected at residences R01 and R01A (0.18 $\mu g/m^3$, 5.0 $\mu g/m^3$ respectively) were above the CREG value of 0.038 $\mu g/m^3$. Specifically in 2015 sampling, 1,2-DCA was detected in R01 above the CREG value of 0.038 µg/m3 in indoor air at various locations (basement (0.12 $\mu g/m^3$), crawlspace (0.15 $\mu g/m^3$) and living room (0.18 $\mu g/m^3$)) ranging from 0.12 – 0.18 µg/m3. For R01A, in 2014 and 2015, the maximum values detected for 1,2-DCA was above the CREG value in all locations (sub-slab soil gas (2.6 $\mu g/m^3$), basement (4.0 $\mu g/m^3$), dining room (4.9 $\mu g/m^3$) and bedroom (5.0 $\mu g/m^3$)) ranging from 0.22 – 5.0 $\mu g/m^3$. The public health implications of these levels are discussed below.

Table 2 below shows the estimated cancer risk from exposure to 1,2-DCA in indoor air at the maximum concentration of 5.0 $\mu g/m^3$. The estimated cancer risks were calculated using EPA's inhalation unit risk factor of 2.6×10^{-5} $(\mu g/m3)^{-1}$ and the following equation:

Estimated Cancer Risk$_{1,2\text{-DCA}}$ =

Maximum Indoor Air Concentration × Inhalation Unit Risk Factor (IUR) × Number of year of exposure where, IUR = 2.6 x 10^{-5} (µg/m3)$^{-1}$ and number of years of exposure for adults is 33/78 and number of years of exposure for children is 21/78.

The estimated cancer risk for the highest concentration detected (5.0 µg/m^3) in R01 is 5.5x10^{-5} for adults and 3.5x10^{-5} for children. The estimated cancer risks value for both adults and children from exposure to 1,2-DCA in the indoor air are low and fall within EPA's target cancer risk range of 1x10^{-6} to 1x10^{-4} (i.e., 1 in 1,000,000 to 1 in 10,000) [EPA 2005]. The values represent an estimated increased cancer risks of 5 excess cases in a population of 100,000 exposed to the same concentration over a lifetime for adults and 3 excess cases in a population of 100,000 exposed to the same concentration over a lifetime for children.

Table 2. Estimated cancer risk from potential exposure to 1,2-DCA in residential indoor air, near Barefoot Disposal Site, Hollidaysburg, Blair County, PA (2014-2015)

Chemical	Maximum Concentration (µg/m^3)	CREG (µg/m^3)	IUR (µg/m^3)$^{-1}$	Cancer Risk	Highest Increase in Incidents of Cancer
1,2-DCA	5.0*	0.038	2.6 x 10^{-5}	5.5 x 10^{-5} (Adult) 3.5 x 10^{-5} (Child)	5 cases in 100,000 people 3 cases in 100,000 people

1,2-DCA - 1,2-dichloroethane; CREG – Cancer Risk Evaluation Guide; IUR - Inhalation Unit Risk Factor
*Maximum concentration of 1,2-DCA detected in the indoor air of R01A

Conclusions and Recommendation

Based on our review of the data, we conclude that the levels of chemicals detected in indoor air are not expected to harm the health of the residents at both R01 and R01A locations. Also, we conclude that the source of the chemical contamination is most likely from indoor sources such as cigarette smoking, nail polish, carpeting floor, and plug in air fresheners. Hence, to protect the current and future health of individuals, we recommend that EPA conduct health education to these residents to prevent chemical exposure from indoor sources.

The PADOH appreciates the opportunity to collaborate with the EPA, to protect the health of Commonwealth citizens. If you have any additional questions about our public health review, please feel free to contact me.

Sincerely,
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Reference

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Figure 1

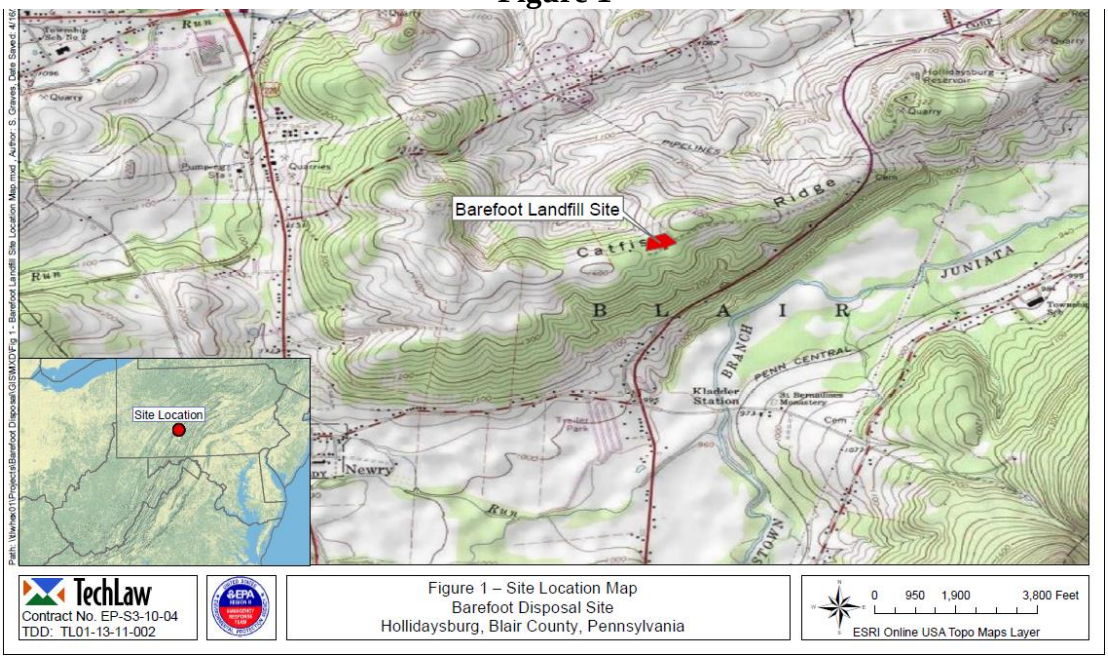

Figure 2