

Letter Health Consultation

DAVISON PROPERTY SITE

TOWN OF HILLSBOROUGH, NEW HAMPSHIRE

**Prepared by
New Hampshire Department of Environmental Services**

OCTOBER 4, 2012

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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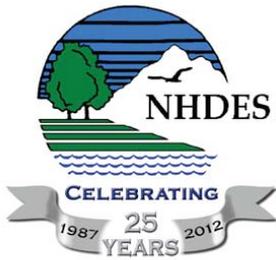
LETTER HEALTH CONSULTATION

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The State of New Hampshire
Department of Environmental Services

Thomas S. Burack, Commissioner

*Celebrating 25 years of protecting
New Hampshire's environment.*



October 4, 2012

Janis Tsang, On-Scene Coordinator
Environmental Protection Agency, Region I
Emergency Response Branch
5 Post Office Square- Suite 100
Boston, MA 02109-3912

Dear Ms. Tsang:

This letter is in response to your request to evaluate the public health implications of exposure to contaminants in soils at the Davison Property Site in Hillsborough, NH following EPA's removal action in spring 2011 (1). Specifically, you requested that we evaluate soil data for polycyclic aromatic hydrocarbons (PAHs), antimony and arsenic remaining in on-site soils. The New Hampshire Department of Environmental Services (DES), Environmental Health Program (EHP) evaluated post-excavation soil data collected on May 6, 2011 in order to determine if conditions at the site would constitute a health hazard for an individual accessing this property.

Discussion

The Davison Property Site (site) is located at 471 2nd New Hampshire Turnpike (Rte. 31) in the Town of Hillsborough. The site is a former residential property comprising approximately one-acre of land. It is bounded to the south by 2nd New Hampshire Turnpike, to the north by wooded areas and to the east and west by residential properties. The property formerly contained a colonial style house, several sheds, a partial cinderblock wall building, camper trailer, chicken coop and numerous piles of household and commercial debris. A small, intermittent stream flows through the property from a culvert beneath 2nd New Hampshire Turnpike and discharges into an unnamed stream located on an adjacent residential property. The site is located in a rural section of the community; there are an estimated 150 people living within a 0.25 mile radius of the site (2).

Approximately 15 years ago, the former property owner began operating what has been described as an ongoing flea market/yard sale at the site (2). Reportedly, this individual began hoarding yard sale items and items collected from neighbors, local residents and the Town Transfer Station. Piles of broken household and commercial electronics equipment and wood and metal debris were stored throughout the site. Title to the property passed to the owner's son in 2001. The debris piles were still present on the property in 2010 when local residents had expressed concern about the accumulation of materials at the site and requested the Town's assistance in removing these debris piles (2).

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A detailed discussion of the conditions and EPA's involvement at the site can be found in the report, "Removal Program Preliminary Assessment/Site Investigation Report for the Davison Property, Hillsborough, Hillsborough County, New Hampshire" by Weston Solutions, Inc. dated October 2010. Briefly, in May 2010 DES conducted a site visit and began documenting conditions on the property. At the same time, the Town of Hillsborough submitted a Brownfields application but was unable to secure funding for the property. DES then requested that the EPA evaluate the Davison Property for a removal action. Subsequent to these actions, the property was abandoned by the owner. The Town of Hillsborough foreclosed and assumed control of the property in November, 2010 (3).

EPA Involvement

The EPA conducted an extensive site reconnaissance in September 2010. Piles of broken household and commercial electronics equipment (computer components, TVs, stereos, etc.), metal and wood debris were observed throughout the site. In addition, a number of 55-gallon steel and polyethylene drums, and smaller sized containers were present. The steel drums were found to be empty; the polyethylene drums contained debris or old electronics components; the smaller buckets and containers were either empty or appeared coated with residual products such as paints, solvents, cleaners and waste oil. Photographic documentation of site conditions can be found in the Preliminary Assessment/Site Investigation Report (2).

In June, 2010 EPA collected a number of surface soil samples from different locations, and at different substrata down to 24 inches, throughout the Davison Property. Laboratory analysis indicated levels of polycyclic aromatic hydrocarbons (PAHs), in surface soil samples that were above DES regulatory standards (2). An action memorandum was signed in December 2010 in which EPA committed to conducting a removal action at the property (3).

EPA mobilized on the Davison Property in spring 2011 to begin removing the on site structures, debris piles and other wastes. In addition, EPA excavated surface soils throughout the area where debris and recycled materials had been located. Following the excavation, EPA collected a number of surface soil samples (0"-3" depth) on April 20, 2011. Sampling results indicated spot contamination of surface soils with PAHs above their respective ATSDR and DES comparison values (4). Surface soils were again excavated (top 6" of soils removed and the area was graded) and the contaminated soil was removed. Additional soil samples, this time on a more limited basis, were collected on May 6, 2011 (5). PAHs and antimony were found at 12-18 inches depth. The results of the sampling are included in Table 1. At the conclusion of the sampling, the entire area was seeded to provide vegetative cover for stabilization and to prevent soil erosion (6).

Public Health Implications

The site is located in a predominantly rural area, and the Town has indicated that it will not allow the property to be redeveloped in the future. EHP evaluated an adult trespasser exposure scenario. This scenario is applicable to a non-residential area where there is no designated site use but where human access to the property is still possible. Soil samples collected on May 6, 2011, found elevated levels of PAHs, including benzo(a) pyrene (26 parts per million or ppm) and antimony (22 ppm) at 12-18 inches depth. Arsenic (20 ppm) was

found to exceed its DES soil comparison value during the initial round of sampling but was not detected in surface soils during subsequent sampling. Antimony slightly exceeds its respective ATSDR and DES comparison values and does not pose a risk to a future trespasser. EHP evaluated potential exposure to PAHs via ingestion and dermal contact. Groundwater and ambient air were not sampled during the removal action because these potential exposure pathways were not considered to be pathways of concern (7). EHP has therefore limited its analysis to the evaluation of PAHs in soil at the site.

Due to the limited available sampling data representing site conditions at the conclusion of the removal action, EHP used the maximum detected concentrations of PAHs to evaluate the health risk associated with potential exposure to soil contaminants remaining at the site. Benzo(a)pyrene [B(a)P] was used to assess the relative toxicity of the carcinogenic PAHs (cPAHs) classified by EPA as probable human carcinogens. To determine the toxicity of the mixture of PAHs, the maximum detected concentration of each cPAH was multiplied by a Relative Potency Factor (RPF) in order to determine its toxicity relative to that of B(a)P (Table 1). The sum of the weighted concentrations was then used to evaluate the overall toxicity of the PAH mixture (8). The maximum detected concentration of B(a)P, expressed as B(a)P-RPF, was 55 ppm.

EHP typically considers a lifetime (70 years) theoretical cancer risk in excess of 1.0×10^{-6} to be significant for exposure to a single contaminant and 1.0×10^{-5} for exposure to multiple contaminants (9). EHP estimated the lifetime cancer risk for an adult exposed to contaminated soil, assuming an average number of 28 days per year exposed. Using the RPF for the combined cPAH identified for this analysis, there would be a low to moderate estimated increased lifetime cancer risk of 1.53×10^{-5} (approximately 1.5 cases of excess cancer per 100,000 people exposed over a lifetime) associated with the incidental ingestion of PAH-contaminated soil (Table 2). This determination is very conservative and probably greatly overestimates any actual carcinogenic risk because 1) the contaminated soil is not accessible and 2) it is unlikely that a trespasser's exposure would occur at this one location even if the subsoil was to become accessible (7). The estimated lifetime cancer risk is probably much lower than what has been calculated.

Polycyclic Aromatic Hydrocarbons. PAHs comprise a group of some 100 different chemicals that are formed during the incomplete combustion of coal, oil, gas and wood. PAHs are usually found as a mixture of at least two or more of these chemicals. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but they are also found in a number of pharmaceutical products and in the manufacture of certain dyes, plastics, and pesticides. Diesel exhaust contains significant amounts of PAHs. They are commonly found in the environment at low levels in ambient air, water, and soil. Surface soils contain measurable amounts of PAHs, primarily from airborne fallout from motor vehicle exhaust, residential wood burning, and industrial sources. Levels in surface soils in urban areas and near industrial sites typically range between 1 to 2 ppm; levels found in soils in rural areas tend to be much lower (10).

PAH concentrations in the environment are generally very low and, because of their low degree of acute toxicity to humans; usually do not present a risk for non-cancer health effects. The carcinogenicity of certain PAHs has been well established in laboratory animals. Researchers have reported increased incidences of skin, lung, bladder, liver, and stomach cancers, in exposed laboratory animals. In humans, increased incidences of lung, skin, and bladder cancer have been associated with occupational exposure. Due to the complexity of PAH

mixtures, the most toxic compound, benzo(a)pyrene [B(a)P], is used as the indicator compound in evaluating toxicity.

Conclusions

Exposure to surface soil remaining at the Davison Property Site following EPA's removal action is not expected to harm people's health.

Recommendations

Soil cover over the former disposal area needs to be maintained.

Conditions at the site may need to be re-evaluated should there be any change in use of the property that could result in the excavation of underlying soils.

Public Health Action Plan

Actions Taken

EPA conducted a removal action in 2011 to remove numerous waste containers, old consumer electronics equipment, and piles of metal and wood debris from the site. EPA also removed contaminated soils and had them transported to an off-site licensed facility for proper disposal.

Please contact me at tel. (603) 271-6909 or e-mail me at dennis.pinski@des.nh.gov if you have any questions.

Sincerely,

Dennis Pinski, Section Supervisor
Environmental Health Program
NH Department of Environmental Services

References

- (1) United States Environmental Protection Agency (USD EPA). E-mail communication with Janis Tsang, On-Scene Coordinator EPA Region I. June 10, 2011.
- (2) US EPA. Removal Program Preliminary Assessment/Site Investigation Report for the Davison Property, Hillsborough, Hillsborough County, New Hampshire by Weston Solutions, Inc. dated October 2010.
- (3) US EPA. Request for a Removal Action at the Davison Property Site, Hillsborough, Hillsborough County, New Hampshire-Action Memorandum. EPA Region I. December 16, 2010.
- (4) US EPA. E-mail Communication with Janis Tsang, On-Scene Coordinator EPA Region I. September 19, 2011.
- (5) US EPA. E-mail Communication with Janis Tsang, On-Scene Coordinator EPA Region I. August 23, 2011.
- (6) US EPA. Personal communication with Janis Tsang, On-Scene Coordinator EPA Region I. July 19, 2011.
- (7) US EPA. Telephone communication with Janis Tsang, On-Scene Coordinator EPA Region I. August 31, 2011.
- (8) US EPA. 2010. Development of a Relative Potency Factor (RPF) Approach for Polycyclic Aromatic Hydrocarbons (PAH) Mixtures. US Environmental Protection Agency. February, 2010.
- (9) New Hampshire Department of Environmental Services. 1998. Contaminated Sites Risk Characterization and Management Policy. NH DES, Concord, NH. January, 1998.
- (10) Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). U.S. DHHS. Atlanta, GA. August, 1995.

TABLES

Table 1- Summary of Soil Sampling Data Results (12-18 in. depth) for May 6, 2011.
 Davison Property Site Hillsborough, NH.

Contaminants Of Concern	Maximum Detected Concentration (mg/kg)	Frequency of Detects	Number Exceeding ATSDR Comparison Values	ATSDR Comparison Values * (mg/kg)	State Regulatory Criteria ** (mg/kg)
Polycyclic Aromatic Hydrocarbons					
benzo(a)pyrene	26	4/4	4/4	0.1 ¹	0.7
benzo(a)anthracene	28	4/4			1
benzo(b)fluoranthene	13	4/4			1
benzo(k)fluoranthene	20	4/4			1.2
indeno(1,2,3-c,d)pyrene	10	3/4			1
anthracene	4.2	2/4			1,000
benzo(g,h,i)perylene	10	4/4			960
chrysene	30	4/4			120
acenaphthalene	5.5	2/4			340
fluoranthene	42	4/4			960
fluorene	1.1	2/4			77
phenanthrene	13	4/4			960
pyrene	51	4/4			720
Metals					
antimony	22	2/4	1/4	20/300 ²	9
arsenic	ND	0/4	0/4	20/200 ³	11
lead	150	0/4	0/4	400 ⁴	400

mg/kg = milligrams per kilogram (equivalent to parts per million)

* ATSDR Soil Comparison Values (November 2011)

** New Hampshire Risk Characterization Management Policy (Soil Remediation Standards)

¹ Cancer Risk Evaluation Guide (CREG)

² Reference Dose Media Evaluation Guide (RMEG) Child/Adult

³ Chronic Environmental Media Evaluation Guide (EMEG) Child/Adult

⁴ US EPA Soil Screening Level

Table 2- Davison Property Site Hillsborough, NH
 On-site Surface Soil (12-18 inches) PAH-RPF Calculations for Carcinogenic PAHs

Contaminants Of Concern (PAHs)	Maximum Detect (mg/kg)	PAH-RPF	PAH conc. Relative to B(a)P (mg/kg)			
benzo(a)pyrene	26	1	26			
benz(a)anthracene	28	0.2	5.6			
benzo(b)fluoranthene	13	0.8	10.4			
benzo(k)fluoranthene	20	0.3	6			
indeno(1,2,3-c,d)pyrene	10	0.07	0.7			
benzo(g,h,i)perylene	10	0.009	.09			
chrysene	30	0.1	3			
fluoranthene	42	0.08	3.36			
Total PAH Conc. Relative to B(a)P (carcinogenic)			55.2			

PAHs – Polycyclic Aromatic Hydrocarbons
 EPC- Exposure Point Concentration
 PAH-RPF- Polycyclic Aromatic Hydrocarbons- Relative Potency Factor
 ug/kg- microgram/kilogram

Table 3- Davison Property Site Hillsborough, NH
 Cancer Risk (Ingestion) - Adult Trespasser

Contaminants Of Concern	EPC (mg/kg)	Comparison Values * (mg/kg)	Dose (mg/kg/day)	CSF (mg/kg/day) ⁻¹	ELCR (Adult receptor)
Total PAH Conc. Relative to B(a)P-RPF	55.2	0.1	2.15 x 10 ⁻⁶	7.3	1.53X 10 ⁻⁵

BaP-RPF- Benzo(a)pyrene Relative Potency Factor
 EPC- Exposure Point Concentration
 * - NH Risk Characterization and Management Policy, S-2 Soil Standards
 CSF- Cancer Slope Factor
 mg/kg- milligram/kilogram
 mg/kg/day- milligram/kilogram/day
 ELCR- Elevated Lifetime Cancer Risk

CALCULATIONS

CANCER RISKS

Adult Recreator

1. Adult - Ingestion

Chemical	[Soil](mg/kg)	Conv. (kg/mg)	IR (mg/day)	F(day/yr)	D(yrs)	BW (kg)	AP (days)	LADD ingestion (mg/kg/day)	CSF (mg/kg/day)- 1	Ingestion ELCR
BaP-RPF	55	1.0E-06	100	28	25	70	25550	2.15 x10 ⁻⁶	7.3	1.53x10 ⁻⁵

Equations:

Ingestion:

Conc. (mg/kg) * Conv. (kg/mg) * IR (mg/d) * F (d/yr) * D (y) * 1/BW (kg) * 1/AP (d) = LADD (mg/kg-day)

7.90 mg/kg * 1.0E-06 * 100 mg/day * 28 days/year * 25 years / 70 kg * 25550 days = mg/kg/day

LADD (mg/kg/day)* CSF (mg/kg/day)-1 = ELCR (Ingestion)

mg/kg/day * 7.3E-01 mg/kg/day =

Where:

[soil] = contaminant concentration in soil, mg/kg

Conv. = conversion, kg to mg or kg/ug

IR = soil ingestion rate (mg/day)

F = exposure frequency (days per year)

D = exposure duration (years)

BW = body weight (kg)

AP = averaging period; acute: 1 day, chronic: 2555 days, cancer: 25550 days (365*70)

CSF = oral cancer slope factor, risk per mg/kg-day

ELCR = Excess Lifetime Cancer Risk

LADD=lifetime average daily dose