Letter Health Consultation

O'SULLIVAN'S ISLAND SITE

DERBY, CONNECTICUT

Prepared by
Connecticut Department of Public Health

JUNE 5, 2015

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

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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 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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DERBY, CONNECTICUT

Prepared By:

Connecticut Department of Public Health
Environmental and Occupational Health Assessment Program
Under a cooperative agreement with the
Agency for Toxic Substances and Disease Registry

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

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Commissioner

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Environmental Health Section

Arthur Bogen
Valley Council of Governments
Main Street Railroad Station
Derby, CT 06418

June 5, 2015

Dear Mr. Bogen;

On September 11, 2014, the CT Department of Public Health (CT DPH) met by conference call with representatives from Valley Council of Governments (VCOG), Naugatuck Valley Health District (NVHD), CT Department of Energy and Environmental Protection (DEEP), and HRP Associates to discuss the potential health implications of soil sampling results from the O'Sullivan's Island site in Derby, CT. Valley COG requested that CT DPH review the soil data and answer the question: *Do the concentrations of contaminants detected in soil at the O'Sullivan's Island Site pose a public health concern?*

Access to soil at the O'Sullivan's Island Site by recreational visitors is currently restricted by fencing and signage but there is evidence that restricted portions of the site are being accessed by trespassers for purposes of fishing. In addition, City of Derby employees have been accessing the site for lawn mowing. Both these activities could result in exposure to surface soils via dermal contact and inadvertent ingestion. Therefore, these current exposure pathways were evaluated in this document. When the site was completely open to the public, people accessed the site for a variety of recreational activities and could have come into contact with surface soil and sediment. Past recreational exposures to surface soil were evaluated in this document but exposure to sediment was not evaluated because there are no sediment data. Exposure to soils at depth is unlikely under current and past uses and was not evaluated. Inhalation exposure to surface soil via windblown dust was not evaluated because there are no large areas of bare soil. Unrestricted, paved portions of the site are used heavily for access to fishing. During a site visit in January 2014, CT DPH observed that its statewide fish consumption advisory signage was not posted and recommended that the NVHD and the City of

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Derby immediately post the advisory signage. This was done within several days following the site visit.

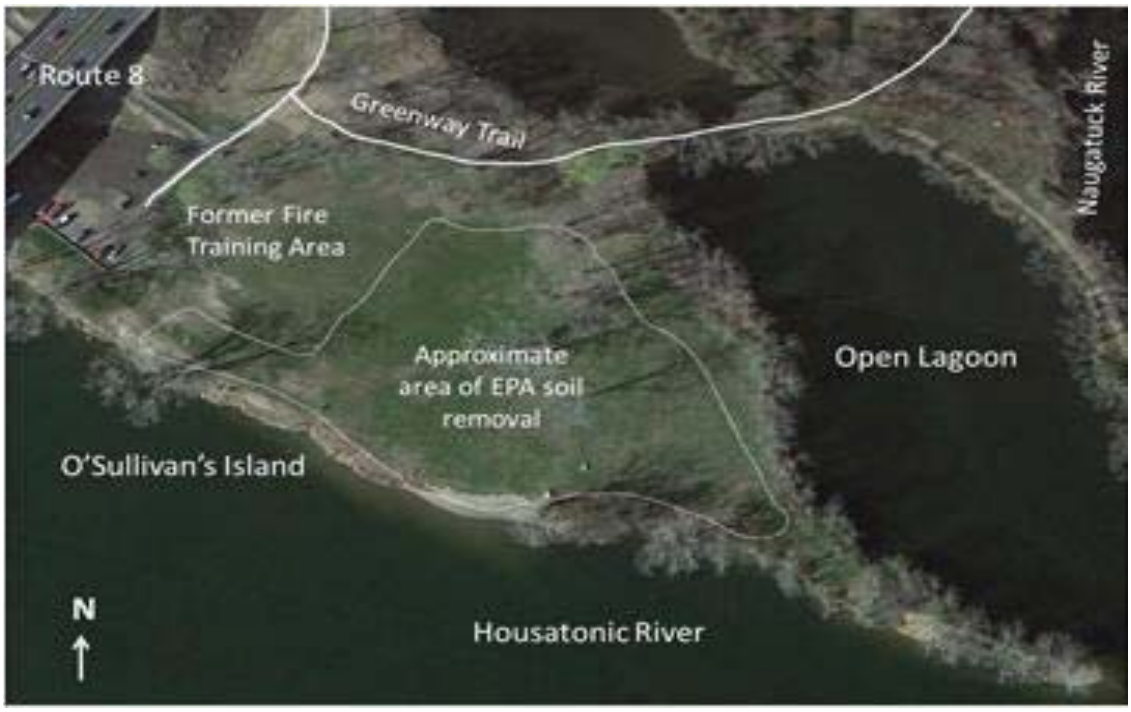
Based on the soil data provided to CT DPH for review, exposure to contaminants in surface soil are unlikely to harm people's health because exposure doses are not high enough to cause harmful health effects and cancer risks are not elevated. Concentrations of some contaminants in deeper soils at the site exceed CT's Soil Cleanup Standards and the site may not meet requirements imposed by the Environmental Protection Agency's cleanup program for polychlorinated biphenyls (PCBs). This indicates that further assessment and/or remedial actions may be needed in order for the site to meet applicable state and federal cleanup requirements. CTDPH also recommends that fish tissue and sediment testing be considered in order to determine whether site-related contamination has impacted these media. Finally, the site should be reopened for full public access as soon as practicable, provided the City of Derby can ensure that the public does not come into contact with soils deeper than 1 foot below ground surface. Given the likely need for further site assessment and/or remediation activities, it is understood that as a practical matter, the site may need to remain closed until after such activities are completed.

Background and Statement of Issues

O'Sullivan's Island (the site) comprises the southwestern portion of a peninsula located in Derby, CT, where the Naugatuck and Housatonic Rivers join together (see Figure 1). From the 1950s until 2000, the northern portion of the site was used for fire training by the Valley Fire Training School. In 2007, the fire training buildings were demolished. Contaminants detected in soil in this portion of the site include petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), arsenic and lead.

In the 1970s and early 1980s, the southern portion of the site was used as a source of sand and gravel. In 1983, digging to remove sand and gravel uncovered rusted and leaking 55-gallon drums. From 1983-1985, the US Environmental Protection Agency (EPA) removed approximately 900 drums and a large amount of contaminated soil from the southern portion of the site. Contaminants included volatile organic chemicals (VOCs), polychlorinated biphenyls (PCBs) and unknown substances. At the conclusion of their work in 1985, EPA fenced two piles of PCB-contaminated soil because there was no disposal site available. Over the next 20 years, access to the site by the public was restricted. In 2008, EPA returned to remove the piles of contaminated soil and conduct additional PCB testing across the site. EPA also removed an additional 50 drums (some of which contained VOCs and unknown products) and removed a large amount of PCB-contaminated soil from the southern and eastern portions of the site. Approximate limits of EPA's 2008 removal action are shown in Figure 1. EPA placed a marker barrier and clean soil over all the excavated areas, and planted grass and trees. In 2009, the City of Derby opened the area to the public. A paved greenway trail completed in the spring 2013 extends from the parking lot across the northern portion of the site (see Figure 1).

Figure 1. Aerial view of O'Sullivan's Island Site, Derby CT.



Since 2009, the site has been used by adults and children for recreation. Recreational uses include fishing, picnicking, walking, wading and biking. In January 2014, the City of Derby closed O'Sullivan's Island when questions were raised about whether the remediation EPA did in 1983 and 2008 had made the site clean enough for recreational use. At the request of VCOG and NVHD, CT DPH did a site visit in January 2014 and reviewed historic data for the site. In February 2014 after consultation with CT DPH, the City re-opened the paved greenway trail. CT DPH recommended that: (1) soil testing be done on unpaved portions of the site (with a focus on surface soil testing in heavily used paths along the southern beach area and eastern spit of land), (2) the unpaved portions of the site remain closed pending the results of the soil testing, and (3) the CT Statewide Freshwater and Saltwater Fish Consumption Advisory signs be posted in the area. At this time, the statewide advisories are the appropriate advisories for this area because we do not have site-specific fish tissue data. The statewide advisory signs were posted in January 2014, several days after our site visit.

In February 2014, CT DPH prepared a fact sheet summarizing the site history, explaining the decision to partially re-open the site, and detailing the soil testing recommendations and next steps (see Attachment A). DPH and NVHD presented the factsheet at a City Board of Aldermen meeting in February 2014 and answered health questions. Soil testing was completed at the site in August 2014 and was provided to CT DPH for review on September 11, 2014. Public access to the parking lot and paved greenway trail is currently permitted. Access to other parts of the site is restricted by snow fencing and signage. City employees have been accessing the site on a regular basis to mow the grass in the center portion of the site. Verbal reports from

the City indicate that some fishermen have been disregarding the fencing and signage and accessing the site to fish.

Discussion

Exposure Pathways

In summary, the opportunities for direct contact exposure to surface soil at the site under *current* site conditions are: (1) lawn mowing by city employees and (2) trespassing by adults and children for purposes of fishing. Exposure to soil could occur via direct contact with the soil (dermal contact) and inadvertent ingestion. Inhalation of windblown soil particles is not considered a significant exposure pathway because the site does not have large areas of bare soil and the site is not excessively dry or dusty. Exposure to soil at depth (deeper than 6 inches below ground surface [bgs]) is not considered a complete pathway because there is no evidence of digging at the site and the activities occurring at the site would be unlikely to disturb deeper soils. Finally, there are no plants on the site that are consumed by humans. Therefore, exposure to contaminants in the soil through plant uptake and plant ingestion is not a complete pathway.

Prior to January 2014 when the site was open for unrestricted recreational access, there were opportunities for direct contact with surface soil at the site. Children and adults could have had direct contact exposure with soil while visiting the site for a full range of recreational activities including walking, fishing, picnicking and biking. Additionally, wading by adults and children during fishing or other recreational activities could have occurred, which could have resulted in direct contact with sediment at the water's edge. Exposure to surface soil could have occurred via direct contact with the soil (dermal contact) and inadvertent ingestion. Inhalation of windblown soil particles is not considered a significant exposure pathway because the site does not have large areas of bare soil and the site is not excessively dry or dusty. Exposure to soil at depth (deeper than 6 inches below ground surface [bgs]) is not considered a complete pathway because there is no evidence of digging at the site in the past that could have disturbed deeper soils. Finally, there is no evidence that there were ever plants on the site that were consumed by humans. Therefore, exposure to soil contaminants via plant uptake and plant ingestion is not a complete exposure pathway in the past.

August 2014 Soil Sampling Event

HRP Associates (HRP 2014) was retained by VCOG to conduct the soil sampling. Soil borings were collected from the site at 50 foot grid intervals. The 0-1 foot depth interval was analyzed at almost every grid point (65 locations). At approximately half of the grid points (29 locations), soil intervals deeper than one foot bgs were analyzed. Depth intervals ranged from one to seven feet bgs. Decisions about which locations received analysis of deeper soil were made based on historical soil data and where EPA had conducted prior remedial actions.

All grid interval samples were analyzed for lead, arsenic and petroleum hydrocarbons (using Connecticut's Extractable Total Petroleum Hydrocarbons [ETPH] Method). Most samples were also analyzed for PCBs (Aroclor analysis) and PAHs. Select samples (19 locations) were tested

for VOCs. Four locations around a former burn pad in the center of the site were tested for dioxins. At one of these locations, soil at depth was also tested for dioxins. Soil was not tested for perfluorinated compounds (PFCs), which are ingredients in some fire-fighting foams.

In addition to the grid locations, surface soil samples from the 0-6 inch depth interval were collected from 22 locations. The surface soil sample locations were selected from the areas where recreational visitors are most likely to come into direct contact with soil. The areas where surface soil was sampled are the beach area along the southern edge of the site, a well-worn path along the southeastern spit of land, the eastern edge of the site along the open lagoon and the area bordering the greenway trail in the northern portion of the site. All of the 22 surface soil samples were analyzed for arsenic, lead, PCBs, and ETPH. These samples were not analyzed for dioxin, PAHs, PFCs or VOCs.

August 2014 Soil Results

Samples from soils deeper than 1 foot bgs had higher levels of contaminants than soils closer to the surface (0-1 foot and 0-6 inches bgs). Lead and arsenic were detected in every sample (surface and depth), but not at particularly elevated levels. PAHs were frequently detected as well, but concentrations were generally within typical background ranges. ETPH was detected in about half the samples and only the deep soils had elevated levels. PCBs were detected relatively infrequently. Aroclors 1260 and 1268 were the only PCBs detected. PCB concentrations were significantly elevated only in the deep soils. Dioxins were found at very low levels in the top foot and at a moderately elevated level in the one sample from 1-3 foot bgs depth interval. Data from soils deeper than one foot bgs indicate the presence of a variety of VOCs, all at low concentrations.

DPH calculated average concentrations of contaminants separately for the surface soil samples (0-6 inches bgs), 0-1 foot depth interval samples, and deeper samples (greater than one foot bgs). The average concentration is a reasonable estimate of the contaminant concentration that visitors to the site are likely to come into contact with over time. EPA's Pro UCL software was used to calculate 95% upper confidence levels (UCLs) for the arithmetic mean. Non-detect results were included in the data sets and were addressed using the statistical methods within Pro UCL. Where data were insufficient to allow calculation of a 95% UCL, the maximum detected concentration was used to represent the average. PCB data were evaluated by Aroclor, not as total PCBs.

For each contaminant, the 95% UCL (or maximum) was compared with a health-based screening value (comparison value). Comparison values are concentrations of contaminants in air, water, food, or soil that are unlikely to cause harmful health effects in exposed people. Comparison values are generated using conservative exposure scenarios (most typically residential). Comparison values are used as screening tools to select contaminants for further evaluation in the public health assessment process. Contaminants present at concentrations below comparison values typically do not need further evaluation.

Tables 1 and 2 provide a summary of the soil results. For the 0-6 inch soil data, Table 1 includes all contaminants detected at a concentration greater than the detection limit. For purposes of simplicity, contaminants present in deeper soils are only included in the tables if the concentration exceeds a comparison value. For each contaminant, the tables show the number of samples, the concentration range, the number of samples with a concentration above the detection limit, the 95% UCL, the comparison value, and the source for the comparison value. DPH selected comparison values from CT residential soil cleanup standards, EPA soil screening guidance and ATSDR soil screening guidance.

As shown in Table 1, the 95% UCL for Aroclor 1268 exceeds its comparison value in the 0-6 inch soil sample depth interval. In the 0-1 foot depth interval, Aroclor 1268 and Aroclor 1260 exceed comparison values. Table 2 shows that in deeper soils, 95% UCLs for ETPH, lead, dioxin, Aroclor 1268, and Aroclor 1260 exceed comparison values.

Health Implications

Surface Soil (0-6 inches bgs)

As shown in Table 1, the 95% UCL for Aroclor 1268 in surface soil (0-6 inches) exceeds its comparison value. Therefore, it needs to be further evaluated. As stated earlier, comparison values are based on conservative, residential-based exposure assumptions. This site is recreational, so exposures would be less frequent than at a residential property. Therefore, exposure to Aroclor 1268 in surface soil was evaluated for adult and child recreational site visitors. Dermal and ingestion exposure pathways were evaluated using the 95% UCL as the exposure concentration. Using recreational exposure assumptions that represent a higher than average, yet still realistic recreational use of the site, the estimated Aroclor 1268 dose to the most highly exposed group (very young children) is 5.5×10^{-6} mg/kg/day (0.0000055 mg/kg/day). This dose is well below the EPA Reference Dose (RfD) and the ATSDR chronic oral Minimal Risk Level (MRL) of 2×10^{-5} mg/kg/day. Therefore, non-cancer health effects are very unlikely from exposure to Aroclor 1268 in surface soil. Refer to Attachment B for the risk calculations and a listing of exposure assumptions.

Because PCBs are considered probable human carcinogens (EPA IRIS 2014), cancer risks to recreational visitors were also calculated. Aroclor 1268 is a highly persistent PCB mixture so the EPA cancer slope factor of 2 $(mg/kg/day)^{-1}$ for higher persistence PCB mixtures was used to estimate cancer risks (EPA IRIS 2014). Assuming higher than average, yet still realistic recreational exposure assumptions, long-term exposure to the 95% UCL concentration of Aroclor 1268 in surface soil suggests a *de minimus* (extremely minimal) cancer risk of 9×10^{-7} (nine excess cancers in 10 million exposed people), to recreational visitors. This risk level also is not elevated above the upper-end of EPA's generally acceptable risk range. Cancer risks greater than 1×10^{-4} (1 excess cancer in 10,000 exposed people) exceed the upper end of EPA's generally acceptable cancer risk range for when action to reduce exposures is warranted (EPA 1997).

With regard to lead in surface soil, even though the 95% UCL of 156 mg/kg did not exceed the comparison value of 400 mg/kg, lead exposures were further evaluated because there is no known safe level of blood lead (CDC 2014). EPA uses a model to estimate the contribution of soil lead to children's blood lead level (Integrated Exposure Uptake Biokinetic [IEUBK] model). This model estimates the percentage of children six months to seven years of age that exceed a specified blood lead level at specified soil lead concentrations. In using the IEUBK model, EPA recommends that the lead concentration in site soil does not result in a 5% or higher probability of exceeding a specified blood lead concentration (EPA 2002). The Centers for Disease Control and Prevention currently recommends a reference level of 5 micrograms per deciliter (µg/dL). This is the blood lead level at which public health actions are recommended (CDC 2014). EPA recommends using an arithmetic mean soil lead concentration as the exposure concentration in the model (EPA 2002). Using the arithmetic mean soil lead concentration of 102 mg/kg for the site and using default assumptions (very conservative for this site because the model assumes residential exposure, not recreational), the IEUBK model predicts that less than 5% of children will exceed a blood lead level of 5 µg/dL (results are shown in Attachment C).

0-1 Foot Depth Interval Soils

Soil results from the 0-1 foot depth interval do not represent true surface soil that recreational visitors would come into contact with on a regular basis. Therefore, it is not possible to make a definitive conclusion regarding health implications. However, if we assume that these soil concentrations accurately represent concentrations present in true surface soil, doses and risks to recreational visitors can be evaluated in the same way as described above.

Using the same exposure assumptions described above and the 95% UCLs for Aroclor 1260 and 1268, the estimated dose to the most highly exposed recreational visitor group (very young children) is 1.8×10^{-5} mg/kg/day. This dose is below the EPA RfD and the ATSDR chronic oral MRL of 2×10^{-5} mg/kg/day. Therefore, non-cancer health effects are unlikely from exposure to concentrations of Aroclor 1268 and 1260 in soil from the 0-1 foot depth interval. Using the same assumptions described above to estimate cancer risks, exposure to Aroclor 1268 and 1260 in soil from the 0-1 foot depth interval suggests a very low cancer risk of 3×10^{-6}.

Soils Deeper than 1 Foot

CT DPH did not evaluate exposure to contaminants found in deeper soils because there is not a completed exposure pathway for deep soils (no evidence of deep digging or other activities that would uncover deep soils). If there is no exposure, there is no risk of harm to public health.

Sediment

Sediment at the site has not been sampled so it is not known whether contaminants are present.

Conclusions

CT DPH evaluated soil data from the O'Sullivan's Island Site to determine whether concentrations of contaminants pose a risk to people who come into direct contact with surface soil on the site. Most of the site is currently closed to the public but there is evidence that people may be accessing closed portions of the site for fishing. City employees are also mowing the grass on the site and may be performing other light landscaping maintenance activities. When the site was completely open to the public, people accessed the site for a variety of recreational activities and could have come into direct contact with surface soil and sediment at the water's edge. Based on the data provided to CT DPH and these current and past uses of the site, we have reached the following conclusions:

1. Exposures (current and past) to contaminants in surface soil (0-6 inches below ground surface) are unlikely to harm people's health because exposure doses are not high enough to cause harmful health effects and cancer risks are not elevated.

2. If we assume that contaminant concentrations in the 0-1 foot depth interval are representative of true surface soils, exposures (current and past) are unlikely to harm people's health.

3. There is no evidence of digging at the site and the recreational activities occurring at the site would be unlikely to disturb deep soils. Therefore, under current site use and site conditions, there is no expected exposure to contaminants present in soils at depth (deeper than 1 foot below ground surface). Without exposure there is no risk of harm to people's health.

4. Concentrations of contaminants in soils at a number of locations across the site exceed CT's residential and commercial/industrial regulatory cleanup standards. This indicates that further remedial actions may be needed in order for the site to be consistent with CT's waste site cleanup regulations.

5. Concentrations of PCBs in soils at the site may not meet requirements imposed by the EPA's cleanup program for PCBs. This indicates that further assessment and remedial actions may be needed in order for the site to meet federal requirements.

Recommendations

1. CT DPH recommends that VCOG, in coordination with the City of Derby, work with CT DEEP, EPA, NVHD and CT DPH to develop a plan to enable the site to meet appropriate and applicable state and federal waste site cleanup regulations.

2. CT DPH recommends that the City of Derby reopen the site for full public access as soon as possible. However, given the likely need for further assessment and/or remediation

activities, it is understood that as a practical matter, the site may need to remain closed until after such activities are completed.

3. CT DPH recommends that fish testing for PCBs be conducted at this site so that CT DPH can assess whether the statewide fish consumption advisories are health protective for this site. CT DPH will work with the Fisheries Division of CT DEEP to get this site added to the locations that receive fish testing to support statewide fish consumption advisories.

4. Based on past land use as a fire training area and the potential for site contamination with PFCs, CT DPH recommends that the O'Sullivan's Island Site be included in future discussions of statewide fish testing for PFCs.

5. CT DPH recommends that VCOG, in coordination with the City of Derby, consider conducting sediment testing to determine whether contamination from the site has impacted sediment.

Please contact me at 860-509-7748 or Margaret.harvey@ct.gov if you have any questions.

Sincerely,

Margaret L. Harvey

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Margaret L. Harvey, MPH
Health Assessor
Environmental and Occupational Health Assessment Program

CC:
Karen Spargo, Director of Health, NVHD
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Anthony Gyasi, CT DEEP
Kim Tisa, EPA

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[HRP 2014] 2014 Soil Sampling Results and Sampling Location Map, Email from Brian Washburn, HRP Associates to Meg Harvey, CT DPH, September 10, 2014.

Table 1. Selected Soil Results (0-6 inch and 0-1 foot below ground surface), O'Sullivan's Island Site, Derby, CT, August 2014.

Contaminant	Number of Samples	Concentration Range; mg/kg; ppm	Number of detects	95% UCL* mg/kg	Health-Based Comparison Value; mg/kg	Comparison Value Source
0-6 inch depth interval						
Arsenic	22	1.5 – 9.4	22/22	NC	10 15	CT RDEC CREG
Lead	22	11 – 430	22/22	156^	400	CT RDEC, EPA RSL
ETPH	22	ND - 180	12/22	NC	500	CT RDEC
Aroclor 1268	22	ND – 1.9	4/22	0.474	0.35 1@	CREG CT RDEC
0-1 foot depth interval						
Arsenic	66	2.2 - 22	66/66	6.8	10 15	CT RDEC CREG
Lead	66	9 - 430	66/66	134	400	CT RDEC,EPA RSL
ETPH	66	ND - 960	46/66	166	500	CT RDEC
Aroclor 1260	64	ND – 0.46	1/64	0.46	0.35 1@	CREG CT RDEC
Aroclor 1268	64	ND - 10	16/64	1.1	0.35 1@	CREG CT RDEC
Benzo(a)pyrene	64	ND – 4.2	40/64	0.954	0.096# 1	CREG CT RDEC
Benzo(a)anthracene	64	ND – 3.8	40/64	0.898	1	CT RDEC
Benzo(b)fluoranthene	64	ND – 4.4	41/64	0.875	1	CT RDEC

mg/kg = milligrams per kilogram
ppm = parts-per-million
NC = not calculated because maximum detected concentration is below comparison value.
ETPH = Extractable Petroleum Hydrocarbons
*95% UCL = 95% Upper Confidence Level on the Mean
^Arithmetic mean is 102 mg/kg. The arithmetic mean concentration is used to evaluate exposures to lead.
EPA RSL = EPA Regional Screening Level for Residential Soil http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
@Value is for total PCBs.
CT RDEC = Residential Direct Exposure Criteria in Soil (CT Remediation Standard Regulations (RSRs), 2013).
CREG = ATSDR Cancer Risk Evaluation Guide for Soil.
#Value is below typical background concentrations (CT RSRs 2013)

Table 2. Selected Soil Results (greater than 1 foot below ground surface), O'Sullivan's Island Site, Derby, CT, August 2014.

Contaminant	# Samples	Concentration Range (mg/kg; ppm)	Number of detects	95% UCL*	Health-Based Comparison Value (mg/kg)	Comparison Value Source
Arsenic	29	1.6 - 20	29/29	8.6	10 15	CT RDEC CREG
Lead	29	4.5 - 1400	29/29	519	400	CT RDEC, EPA RSL
ETPH	29	ND – 16,000	11/29	4285	500	CT RDEC
Aroclor 1260	13	ND – 1.8	1/13	1.8	0.35 1[@]	CREG CT RDEC
Aroclor 1268	13	ND – 92	5/13	22.8	0.35 1[@]	CREG CT RDEC
Benzo(a)pyrene	13	ND – 1.1	5/13	0.560	0.096[#] 1	CREG CT RDEC
Benzo(a)anthracene	13	ND – 1.1	5/13	0.527	1	CT RDEC
Benzo(b)fluoranthene	13	ND – 1.1	5/13	0.543	1	CT RDEC
Dioxin (TEQ)	1	12.68 ng/kg	1/1	12.68 ng/kg	4.7 ng/kg 50 ng/kg	Site-specific Chronic EMEG

mg/kg = milligrams per kilogram
ppm = parts-per-million
ng/kg = nanograms per kilogram or parts-per-trillion
ETPH = Extractable Petroleum Hydrocarbons
*95% UCL = 95% Upper Confidence Level on the Mean
EPA RSL = EPA Regional Screening Level for Residential Soil http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
[@]Value is for total PCBs.
CT RDEC = Residential Direct Exposure Criteria in Soil (CT Remediation Standard Regulations (RSRs), 2013).
CREG = ATSDR Cancer Risk Evaluation Guide for Soil.
Chronic EMEG = ATSDR Chronic Environmental Media Evaluation Guide
Site-specific = concentration is a site-specific residential direct exposure criteria, approved by CT DPH for use at another site (CT DPH 2014).
[#]Value is below typical background concentrations (CT RSRs 2013)

CT Department of Public Health

March 2014

Questions & Answers about O'Sullivan's Island, Derby

This fact sheet was developed by the CT Department of Public Health and the Naugatuck Valley Health District to provide information and answer questions about the O'Sullivan's Island site in Derby. Please refer to the information at the end of this fact sheet to contact us.

Background

O'Sullivan's Island in Derby, CT is the southwestern portion of a peninsula located where the Naugatuck and Housatonic Rivers join together. It is directly south of Derby's downtown commercial district.

From the 1950s until 2000, the northern portion of O'Sullivan's Island was used for training by the Valley Fire Training School. In the 1970s and early 1980s, the southern portion of the site was used as a source of sand and gravel for cover material at the nearby Derby Landfill. In 1983, rusted, leaking 55-gallon drums were uncovered. From 1983-1985, the Environmental Protection Agency worked to remove 900 drums and a large amount of contaminated soil from the southern portion of the site. EPA fenced off two piles of contaminated soil they left behind because there was no disposal site available. Over the next 20 years, the site remained off limits to the public. In 2007, the fire training buildings were demolished. EPA returned in 2008 to remove the piles of contaminated soil and do additional PCB soil testing across the site. EPA also removed an additional 50 drums (some of which contained volatile chemicals and unknown products), and removed a large amount of contaminated soil from the southern and eastern portions of the site. EPA placed clean soil over all the excavated areas, and planted grass and trees. In 2009, the City opened the area to the public. A paved greenway trail completed in the spring 2013 extends from the parking lot across the northern portion of the site. The greenway cuts between the inner pond and the open lagoon and loops around the northeastern (Hogs Island) portion of the peninsula, along the Naugatuck River.

What chemicals have been found on the O'Sullivan's Island site?

The primary contaminants found on the southern portion of the site are volatile organic chemicals (VOCs) and polychlorinated biphenyls (PCBs). These contaminants were found in the portion of the site where the leaking drums were buried. PCBs were found in the soil across most of the southern portion of the site. Some of the drums that were removed by EPA contained VOCs. Because the drums were leaking, VOCs got into the soil too. The VOCs found at elevated levels in the soil include xylenes, toluene, chlorobenzene,

ethylbenzene, and vinyl chloride. EPA's cleanup work removed drums and a large amount of contaminated soil from this area.

The northern portion of the site is the area that was used as a fire training facility. Chemicals found at elevated levels in soil in this part of the site include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), arsenic and lead. These chemicals were also found at elevated levels in soil in the southern part of the site.

More information about all of these chemicals can be found at the end of this factsheet.

Why did the City close O'Sullivan's Island in January?

The City of Derby made the decision to temporarily close O'Sullivan's Island because questions had been raised about whether the cleanups EPA did in 1983 and 2008 had made the site clean enough for recreational use. To be extra cautious, the City wanted to restrict public access while they consulted with health officials to be sure that the area was safe for recreational visitors.

Is the greenway trail safe?

Yes. State and local health officials recommend to the City that the greenway trail could be re-opened. Unpaved areas of O'Sullivan's Island will remain closed until soil testing confirms that they are safe. Until this new testing has been completed, visitors should observe the snow fencing in place on O'Sullivan's Island and stay on the paved path.

When will the soil testing on O'Sullivan's Island be done?

The City of Derby is working with state and local health officials, the Department of Energy and Environmental Protection, the Valley Council of Governments (VCOG) and US EPA to develop soil testing plans.

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I frequently visited O' Sullivan's Island to fish and hike. Have I been exposed to something harmful? Will I get sick?

It is unlikely that anyone visiting the site has been exposed to chemicals in the soil at high enough levels to cause health problems.

Exposure to a hazardous chemical happens when you ingest (eat), breathe (inhale) or have direct skin contact with a chemical and it gets into your body. At the O'Sullivan's Island site, the only way you could be exposed is through direct contact with contaminated soil. This could occur from touching the soil or more importantly, getting contaminated soil on your hands/fingers and then putting your hands/fingers into your mouth. Breathing soil dust is another way to be exposed but because the area is vegetated, this is a less important way to be exposed.

If you were exposed to contaminated soil, it does not necessarily mean you will have a health problem. Health effects from exposure depend on:

- How long you were exposed
- How much contamination you were exposed to
- How you were exposed (skin contact, ingestion, inhalation)

Is there still Contamination at the O'Sullivan's Island site?

Yes. Although EPA's two cleanup actions removed a great deal of contamination from the site, we know that there is still some soil contamination in the area of the former Fire Training buildings (mainly PAHs, TPH, arsenic and lead). We also know that there is some PCB contamination remaining in soil below the ground surface in the southern portion of the site. There may be VOCs in deep soils as well. Again, we do not believe that the presence of residual contamination at the site poses a danger to recreational visitors.

Signs about consuming fish have been posted at O'Sullivan's Island. Is there a danger from eating fish I catch?

The signs contain Connecticut's advisories about consuming certain freshwater and Long Island Sound fish species. The advisories are not because of contamination specific to the O'Sullivan's Island site but are statewide advisories. Anyone consuming fish caught at O'Sullivan's Island access points should observe the advisories.

What are the next steps for the Site?

As stated previously, the City is discussing testing the soil in locations across the site. This includes the former fire training area, river banks and paths used for fishing/recreation, and the area where drums were buried. After the results of the soil testing are available, the City (in consultation with state and local health officials) will make a decision about re-opening the unpaved areas of the O'Sullivan's Island site. The City and DEEP are discussing whether additional testing and/or cleanup of soil is needed in order for the site to meet state hazardous waste cleanup laws. After this is resolved, the City, along with VCOG, will pursue plans to build a handicap-accessible fishing pier and boat launch.

More information about Site chemicals

The paragraphs below provide additional information about the main chemicals found in the soil at the O'Sullivan's Island Site. **The health effects described here are not expected at the O'Sullivan's Island site because exposures would not be high enough.**

PCBs are a family of chemicals that were primarily used as coolants and lubricants in electrical equipment. Workers exposed to very high levels can get acne-like skin conditions, rashes and liver damage. Some babies born to women with high PCB exposures from the workplace or from eating large amounts of PCB-contaminated fish had growth/development and immune system problems. PCBs are suspected to cause liver cancer.

Xylenes, toluene, chlorobenzene, ethylbenzene, and vinyl chloride are volatile organic chemicals. Their primary uses are as solvents and ingredients in other chemicals such as paints, gasoline and plastics. Exposure to high levels for a short period of time can cause dizziness, eye and throat irritation and liver and kidney damage. Vinyl chloride is known to cause liver cancer.

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals formed during incomplete burning of organic materials like coal, oil, wood tobacco or food Animal studies show that PAHs can affect the skin, blood, immune system and the ability to reproduce. These effects have not been reported in people. Some people who had long-term exposures to high levels of PAHs developed skin and lung cancer.

Lead is a naturally occurring metal in the environment. However, most high levels of lead found in the environment come from the use of lead in battery production, paints and gasoline. Lead exposure can affect a child's mental and physical growth. Exposure to high levels of lead can affect the brain and kidneys of adults and children. Lead has not been shown to cause cancer.

Arsenic is found in nature at low levels. The major uses of arsenic are as wood preservatives and agricultural pesticides. Long-term exposure to arsenic can increase the risk of skin, bladder, kidney, liver and lung cancer. Exposure to high levels of arsenic can also cause skin effects such as irritation and skin darkening.

TPH describes a large family of chemicals that originally come from crude oil. Everyone is exposed to TPH from many sources including gasoline pumps, spilled oil, and home or workplace chemicals. At high levels, some TPH chemicals can cause headaches, dizziness and numbness. Other TPH chemicals can harm the liver, kidney, blood, immune system, lungs, skin, and eyes.

What if I have more questions?

For Health Questions:		For Site Questions:
Karen Spargo, Director Naugatuck Valley Health District 98 Bank Street Seymour, CT 06483 203-881-3255 http://nvhd.org	Meg Harvey CT Dept of Public Health –EOHA PO Box 340308, MS # 11EOHA 410 Capitol Ave Hartford, CT 06134-0308 (860) 509-7740 www.ct.gov/dph/wastesites	Arthur Bogen Valley Council of Governments 12 Main Street Railroad Station Derby, CT 06418 (203) 735-8688 www.valleycog.org

Attachment B - Dose and Risk Assessment Assumptions and Calculations

Child and Adult Recreational: O'Sullivan's Island Site

RME Exposure Assumptions

Chemical	[soil] (mg/kg)	Conv. (kg/mg)	IR-a (mg/d)	IR-c (mg/d)	F(d/yr)	D-c	D-nc	BW c-nc	BW c-c	BW a-c	SA-a (cm2)	SA-c (cm2)	AF-a (mg/cm2-ev)	AF-c (mg/cm2-ev)	ABS	Event/D (ev/d)	Cancer AP (days)	Noncancer AP (days)	Ingestion LADD (mg/kg/d)	Ingestion ADD (mg/kg/day)	Dermal LADD (mg/kg/d)	Dermal ADD (mg/kg/day)	CSF (mg/kg/d)-1	oral RfD (mg/kg-day)	ELCR	HI	Total LADD	Total ADD
Aroclor 1268	0.474	1.0E-06	100	200	96	33	1	11.4	44.1	80	11015	4500	0.1595	0.49	0.14	1	28470	365	1.71E-07	2.19E-06	2.88E-07	3.38E-06	2	2.0E-05	9.17E-07	0.28	4.59E-07	5.56E-06
Aroclor 1268 and 1260	1.56	1.0E-06	100	200	96	33	1	11.4	44.1	80	11015	4500	0.1595	0.49	0.14	1	28470	365	5.63E-07	7.20E-06	9.47E-07	1.11E-05	2	2.0E-05	**3.02E-06**	**0.92**	1.51E-06	1.83E-05

Central Tendency Exposure Assumptions

Chemical	[soil] (mg/kg)	Conv. (kg/mg)	IR-a (mg/d)	IR-c (mg/d)	F(d/yr)	D-c	D-nc	BW c-nc	BW c-c	BW a-c	SA-a (cm2)	SA-c (cm2)	AF-a (mg/cm2-ev)	AF-c (mg/cm2-ev)	ABS	Event/D (ev/d)	Cancer AP (days)	Noncancer AP (days)	Ingestion LADD (mg/kg/d)	Ingestion ADD (mg/kg/day)	Dermal LADD (mg/kg/d)	Dermal ADD (mg/kg/day)	CSF (mg/kg/d)-1	oral RfD (mg/kg-day)	ELCR	HI	Total LADD	Total ADD
Aroclor 1268	0.474	1E-06	50	100	96	12	1	11.4	29.46		11015	4500	0.1595	0.49	0.14	1	28470	365	6.51E-08	1.09E-06	2.01E-07	3.38E-06	2	2.0E-05	5.32E-07	0.22	2.66E-07	4.47E-06
Aroclor 1268 and 1260	1.56	1E-06	50	100	96	12	1	11.4	29.46		11015	4500	0.1595	0.49	0.14	1	28470	365	2.14E-07	3.60E-06	6.61E-07	1.11E-05	2	2.0E-05	**1.75E-06**	**0.74**	8.76E-07	1.47E-05

Attachment B - Dose and Risk Assessment Assumptions and Calculations

Equations:

Ingestion:

[soil] (mg/kg) * Conv. (kg/mg) * IR (mg/d) * F (d/yr) * D (y) * 1/BW (kg) * 1/AP (d) = **ADD or LADD (mg/kg-day)**

Dermal

[soil] (mg/kg) * Conv. (kg/mg) * Skin SA (cm2) * AF (mg/cm2-ev) * ABS * F (d/yr) * D (y) * ev D (ev/d) *1/BW (kg) * 1/AP (d)

Exposure Assumptions and Terms

Term	Abbrev.	Value	Units	RME or CT	Source
Soil Conc.	[soil]	chemical specific	mg/kg		site specific, 95% UCL or maximum
Conversion	Conv.	1.0E-06	kg/mg		
Soil Ingestion Rate child	IR-c	100	mg/d	CT	ATSDR 2014 EDG
Soil Ingestion Rate child	IR-c	200	mg/d	RME	ATSDR 2014 EDG
Soil Ingestion Rate adult	IR-a	50	mg/d	CT	ATSDR 2014 EDG
Soil Ingestion Rate adult	IR-a	100	mg/d	RME	ATSDR 2014 EDG
Exposure Frequency	F	2 d/wk*12 mo = 96	d/y	RME	site specific
Exposure Duration-cancer	D-c	33	y	RME	ATSDR 2014 EDG
Exposure Duration-cancer	D-c	12	y	CT	ATSDR 2014 EDG
Exposure Duration-noncancer	D-nc	1	y	RME	ATSDR 2014 EDG
Body Weight child-noncancer, age 1<2 years	BW-c-nc	11.4	kg	CT & RME	ATSDR 2014 EDG
Body Weight child-cancer, age 1-12	BW-c-c	29.46	kg	CT	ATSDR 2014 EDG
Body Weight child-cancer, age 1<21 years	BW-c-c	44.1	kg	CT & RME	ATSDR 2014 EDG
Body Weight adult-cancer, age 21+	BW-a-c	80	kg	CT & RME	ATSDR 2014 EDG
Adult skin surface area exposed to soil	SA-a	11015	cm2	CT	Recreational Visitor Adult, 60% of total body (head, arms, hands, legs, feet), EPA 2011
Child skin surface area exposed to soil	SA-c	4500	cm2	CT	Recreational Visitor Child, 60% of total body (head, arms, hands, legs, feet), EPA 2011
Adult Skin-soil adherence factor	AF-a	0.1595	mg/cm2-event	RME	Highest AF for adult (hands), EPA 2011
Child skin-soil adherence factor	AF-c	0.49	mg/cm2-event	RME	Highest AF for child (hands in sediment) EPA 2011
Dermal relative absorption factor	ABS	0.14	unitless		for PCBs, EPA 2004
Soil contact events per day	Ev/d	1	ev/d		
Averaging Period-noncancer	AP-nc	1	y		ATSDR 2014
Averaging Period-cancer	AP-c	78	y		ATSDR 2014
Reference Dose	RfD		mg/kg-day		
Hazard Index	HI		unitless		
Average Daily Dose	ADD		mg/kg-day		
Lifetime Average Daily Dose	LADD		mg/kg-day		
Cancer Slope Factor	CSF		risk per mg/kg-d		

Sources of CSF, RfD values used in risk calculations

Contaminant	hronic oral Rf	Source	oral CSF	Source
	(mg/kg-day)		$(mg/kg\text{-}d)^{-1}$	
PCBs	2 E-5 *	EPA IRIS	2 ^	EPA IRIS

*Aroclor 1254

^ Upper bound CSF for high risk and persistence PCBs

Attachment C - IEUBK Model Results

The graph below is the output of the IEUBK Model using a soil lead concentration of 102 mg/kg and all other exposure variables as default values for residential exposure. The graph shows that the soil lead concentration of 102 mg/kg results in an estimated 1.583% of children to exceed the CDC recommended blood lead reference level of 5 ug/dL. This is lower than the EPA recommended percentage of 5%.