

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH





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To: Erik Bedan, Environmental Analyst, CT DEEP

From: Meg Harvey, Site Assessment and Chemical Risk Unit 

Through: Brian Toal, EOHA Program Supervisor 

Subject: Review of Human Health Risk Assessment, Former Lordship Gun Club, Stratford

Date: February 2, 2016

As requested by the CT Department of Energy and Environmental Protection (CT DEEP), I reviewed the Human Health Risk Assessment for the Former Lordship Gun Club in Stratford, CT. This risk assessment (dated September 14, 2008), was transmitted to CT DPH by CT DEEP on November 5, 2015.

My review focused on:

- Whether the approaches and assumptions in the exposure assessment are health protective, given how the site is used.
- Whether the input parameters used in the model to assess risks from lead exposure to adult and children receptors are health protective.

Site Background

The risk assessment was prepared by Gradient for the DuPont Corporate Remediation Group. It provides a very brief summary of the site history. The Lordship Gun Club is located on Stratford Point and is bordered by the mouth of the Housatonic River and the Long Island Sound. It operated as a trap and skeet shooting range from the 1920s until 1986. Operations resulted in the deposition of lead shot into surrounding waters and sediments. The site itself is fenced but is accessible to the public (during the day) via mowed upland paths. The site is accessible at all times via the beach on both the east and west sides. The beach shoreline is almost completely covered with water during high tide. It is possible to walk all the way around the point only at



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low tide. The beach is rocky and is challenging to traverse, even at low tide. Nevertheless, the area is reported to be heavily used for fishing.

Sediment samples used to evaluate risks were collected from a total of 27 locations. Locations are in the intertidal zone (between high tide and low tide) and the subtidal zone (between low tide and the line of 20-inch water depth at low tide). Samples were collected from a depth of 0 to 24 inches below ground surface and were sieved to 250 μm . Samples were analyzed only for lead because lead is the only contaminant of concern at this site. Additional data are available for the site (course-grained samples sieved to 2 mm, 73 locations, multiple depths including 0-6 inches). These additional data were only used in the uncertainty section and not to evaluate risks.

Overall, the course-grained sediments have much higher lead concentrations than the fine-grained samples. Course-grained sediments in both the subtidal area (water covered) and intertidal area (uncovered during low tide) have elevated lead. Risks to children from lead exposure were evaluated using the EPA IEUBK Model. Risks to adults were evaluated using EPA's Adult Lead Model.

Overarching Comments:

1. We disagree with some of the parameters used in the risk assessment. However, lead concentrations in fine grained sediments (250 μm) are quite low (95% Upper Confidence Limit [UCL] = 227 mg/kg). In order to determine whether using our preferred exposure parameters would change the conclusions of the risk assessment, we calculated risks to children from exposure to lead in fine-grained sediments using the modified exposure assumptions recommended in the bullets below and using the Centers for Disease Control (CDC) current reference level for lead of 5 ug/dL. Our calculations indicate that child exposures have a low probability (less than 5%) of exceeding the CDC blood lead reference level. Therefore, it is not necessary for DuPont to recalculate risks for the fine-grained sediments using our recommended parameters.
2. Lead levels in the course-grained sediment samples (2 mm) are much higher than in the fine grained samples (95% UCL of course-grained sediments in the intertidal zone = 3,161 mg/kg). As we did with the fine-grained sediment data, we calculated risks to children from exposure to lead in course-grained sediments using our preferred exposure parameters and using the CDC reference level for lead of 5 ug/dL. Our preferred exposure assumptions provide a reasonable estimate of site exposure. Using the 95% UCL (weighted for seasonal exposure as is done in the risk assessment) and using our preferred exposure assumptions, our calculations indicate that child exposures could result in an estimated probability greater than 50% of exceeding the CDC blood lead reference level.

Based on these findings, we are making two recommendations:

- The property owner should confirm that there are no visible lead fragments in sediments that are uncovered by water during low tide. If there are visible lead fragments, they should be removed.
- It would be prudent to post signs advising the public of the presence of lead at the site and to provide common sense suggestions about how to minimize exposure to sediments. These suggestions could include washing hands before eating and removing sand from feet and shoes before leaving the beach.

Specific Risk Assessment Comments:

1. There is not sufficient information provided in the risk assessment to support dividing the site into four exposure areas. Based on how the beach is described, using two exposure areas (intertidal and subtidal) or just one exposure area seems more appropriate. In addition, sample size is not large enough to use four exposure areas (for example, exposure area #4 has only 3 samples).
2. The arithmetic average was used as the exposure point concentration rather than a statistical bounding estimate of the average (such as a 95% UCL). The risk assessment states correctly that EPA IEUBK model guidance recommends use of the arithmetic average. However, EPA guidance does not prohibit use of a UCL in the IEUBK model. If a UCL is used, the model's result is interpreted as a more conservative estimate of the risk of an elevated blood lead level (<http://www.epa.gov/superfund/lead-superfund-sites-frequent-questions-risk-assessors-integrated-exposure-uptake#mean>). In accordance with the CT Remediation Standard Regulations, CT prefers use of a 95% UCL of the arithmetic mean because it provides a realistic bounding estimate of the true average concentration to which people are exposed at a site.
3. The risk assessment uses an exposure frequency of one day per week during the five warmest months of the year (May – September). The risk assessment also references USDA observations of the site that are suggestive of more intensive use. An assumption of 2 days per week is an exposure frequency that seems more representative of how the site is used.
4. The risk assessment uses an outdated target blood lead level of 10 ug/dL. The CDC currently recommends a reference level of 5 ug/dL as the blood lead level at which public health actions are recommended (<http://www.cdc.gov/nceh/lead/>).

Please contact me at 860-509-7748 or Margaret.harvey@ct.gov if you have any questions. Exposure assumptions and IEUBK Model outputs are provided in the attachment to this memo.

Attachment

IEUBK Lead Model Inputs and Predicted Blood Lead Levels in Children, Lordship Gun Club, Stratford, CT

Sediment Size	Exposure Area	95% UCL ¹ Lead (mg/kg)	Weighted EPC ²	GM Child Blood Lead (ug/dl) ³	Probability Child Blood Lead > 5 ug/dL ⁴
250 um	Intertidal and Subtidal	227	75	1.4	0.607 %
2 mm	Intertidal	3,161	914	6.8	62 %

¹95% Upper Confidence Level of the mean.

²Weighted Exposure Point Concentration in sediment based on 2 days per week site exposure. Non-site soil lead concentration = 15 mg/kg (as used in Lordship Risk Assessment).

³Geometric Mean based on average of 7 runs (6-12 months, 12-24 months, 24-26 months, 36-48 months, 48-60 months, 60-72 months, 72-84 months). In accordance with EPA Guidance (Assessing Intermittent or Variable Exposures at Lead Sites, EPA-540-R03-008, November 2003).

⁴Probability is average of 7 runs. 5 ug/dL is CDC blood lead level at which public health actions are recommended (<http://www.cdc.gov/nceh/lead/>).