Letter Health Consultation

MUKLUK SPORTSMAN'S CLUB
SPRAGUE, CONNECTICUT

Prepared by the
Connecticut Department of Public Health

JUNE 23, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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

MUKLUK SPORTSMAN'S CLUB

SPRAGUE, CONNECTICUT

Prepared By:

Connecticut Department of Public Health
Site Assessments and Chemical Risk Unit
Under a cooperative agreement with the
Agency for Toxic Substances and Disease Registry

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

June 11, 2009

Bill Warzecha
CT Department of Environmental Protection
Bureau of Water Protection and Land Reuse, Remediation Division
79 Elm Street
Hartford, CT 06106

Dear Mr. Warzecha,

This letter is in response to your request for assistance in evaluating the health protectiveness of a cleanup proposal from the Town of Sprague for lead-contaminated soils at the Mukluk Club (former skeet shooting range), located at 239 Pautipaug Hill Road in Sprague, CT.

Background
The Town of Sprague has acquired the Mukluk Club property (approximately 16 acres in size) and intends to preserve it as open space for passive recreational uses. At the time it acquired the Mukluk Club parcel, the town placed plastic fencing (with warning signs) to restrict access to a portion of the parcel where the concentration of lead in soil was significantly elevated. This portion of the property is referred to as the 'upland soils' portion.

The Mukluk Club property is located in a relatively remote area of Sprague. There are currently no maintained trails or other designated recreational areas on the parcel and the town presently does not intend to create any in the future. Because of the parcel's remote location, it currently receives very little recreational use. Town staff regularly inspect the fencing. During one inspection, it was observed that the fence was breached, apparently by all terrain vehicle (ATV) use. The fence has since been repaired. There is currently no institutional control in place (such as a deed restriction) to ensure that the area does not receive more extensive recreational use in the future.

Proposed Cleanup Plan
As detailed in your emails of February 26, 2009 and March 12, 2009, there are two components of the Town of Sprague's proposed cleanup plan for the Mukluk Club property.

- No action in the 'far reaches' of the Mukluk Club property where lead concentrations are fairly low. The portion of the site referred to as the far reaches is approximately 1.8 acres in size. It is remote and heavily wooded. The average concentration (as estimated by the 95% Upper Confidence Limit (UCL)) for lead

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in soil in the far reaches of the property is 431 mg/kg (based on 44 surface soil samples). The maximum lead concentration in this area is 1,620 mg/kg.

- Placement of 6 inches of clean soil over the remainder of the site (an area of upland soils approximately 14 acres in size). This part of the cleanup proposal is referred to as "engineered control light." The 95% UCL soil lead concentration in this area is 23,781 mg/kg (based on 50 surface soil samples). The maximum lead concentration is 168,000 mg/kg. The 6-inch soil cap would be maintained by the Town of Sprague. The Town would also place signage in this portion of the property and ultimately, an Environmental Land Use Restriction (ELUR) would be placed on this portion of the property by the Town to restrict future development to ensure there would not be an increase in exposure.

Evaluation of Proposed Cleanup Plan
As requested, the CT Department of Public Health (CT DPH) evaluated the public health protectiveness of each component of the Town's proposed cleanup plan. CT DPH's evaluation is summarized below.

Proposed 'No Action' Remedy in the Far Reaches of the Mukluk Club Property
To evaluate the health protectiveness of the 'no action' component of the proposed remedy, we assessed exposure to the 95% UCL for lead in surface soil (431 mg/kg) using a biological model that predicts a blood lead concentration that would result from exposure to lead. The model also accounts for exposure to lead from sources other than soil at the Mukluk Club (such as "background" levels of lead in air, food, water, dust and residential soil). The model we used is the US Environmental Protection Agency's (EPA's) Integrated Exposure Uptake and Biokinetic (IEUBK) model (IEUBKwin v1.0 build264, August 2007). This is the most widely used model for estimating blood lead concentrations from environmental exposure. The IEUBK model is designed to predict blood lead concentrations in children 0 to 7 years of age. The model estimates a distribution of blood lead concentrations centered on the geometric mean blood lead concentration. In evaluating whether a soil lead level is protective, EPA recommends that blood lead estimates be less than 10 µg/dL in at least 95% of children (IEUBK Model User's Guide, EPA 2007). A blood lead level of 10 µg/dL or greater is the Centers for Disease Control level of concern for children (http://www.cdc.gov/nceh/lead/).

Table 1 below summarizes IEUBK model results using different assumptions about the frequency of visits to the site. Because the future use of the parcel will be passive open space, we assumed that visits would not be more frequent than 2 days per week. As shown in Table 1, the model predicts that less than 5% of exposed children (even at the higher visit frequency of 2 days per week) would exceed the blood lead level of concern of 10 µg/dL. According to the model and assuming 2 days per week exposure, the lead in soil in the far reaches of the Mukluk Club property would increase the geometric mean blood lead level less than one ug/dL (from 3.35 to 3.9 ug/dL) and would increase the percentage of children exceeding the blood lead level of concern from 1% to slightly over 2%.

Therefore, the proposed 'no action' remedy in the far reaches of the Mukluk Club property seems adequately protective of public health. This conclusion is supported by the similarity of the 95% UCL value (431 mg/kg) to both the Department of Housing and Urban Development (HUD) residential soil target concentration of 400 mg/kg (40 CFR Part 745, January 5, 2001) and the CT Department of Environmental Protection's (DEP) Remediation Standard Regulation (RSR) residential soil cleanup value of 400 mg/kg (DEP 1995). Assumptions used in developing those two values involve more frequent and intensive exposure than the recreational scenario evaluated here.

Table 1. IEUBK model results for recreational, intermittent exposure at the Mukluk Club (far reaches of the parcel), Sprague, CT

Exposure Frequency	Site Soil Pb conc. (mg/kg)	Home Soil Pb conc. (mg/kg)	Weighted soil Pb conc. (mg/kg)	Weighted dust Pb conc. (ppm)	Geometric Mean Blood Pb (ug/dL)	% above 10 ug/dL
0 day/week	-------	200	200	140	3.35	1.0
1 day/week	431	200	233	163	3.6	1.6
2 days/week	431	200	266	186	3.9	2.3

All IEUBK model defaults were used except site soil concentration.
Age range of recreational visitor, 0-7 years.
Weighted Pb concentration = (Site Soil conc. * exposure freq.) + (Home soil conc. * freq). (EPA 2003).
Weighted Pb conc. in dust = 70% of weighted soil Pb concentration. 70% is the model default.

Proposed Engineered Control Light Remedy in the Upland Soils

The Town's proposed remedy for the upland soils portion of the site consists of placing 6 inches of clean topsoil across the area. The town would undertake monitoring and maintenance of the topsoil cap to ensure that it continues to provide a barrier into the future. The town would also place an ELUR on this portion of the property to restrict future development of the property.

With regard to the health protectiveness of this portion of the proposed remedy, we have concerns about whether a 6-inch topsoil cap can be adequately maintained. If the cap is breached, exposure to lead could be very significant and could present a public health concern because lead concentrations in surface soils immediately beneath the cap are so high. CT DPH ran the IEUBK model using the 95% UCL for lead of 23,781 mg/kg. Assuming only 1 day per week exposure frequency, the model predicts that 95% of exposed children would exceed the blood lead level of concern of 10 µg/dL (see Table 2). If exposure to contaminated soils beneath the 6-inch topsoil cap were to occur on a regular basis, particularly by young children, it could harm their health.

Table 2. IEUBK model results for recreational, intermittent exposure at the Mukluk Club (upland soils portion of the parcel), Sprague, CT

Exposure Frequency	Site Soil Pb conc. (mg/kg)	Home Soil Pb conc. (mg/kg)	Weighted soil Pb conc. (mg/kg)	Weighted dust Pb conc. (ppm)	Geometric Mean Blood Pb (ug/dL)	% above 10 ug/dL
0 day/week	-------	200	200	140	3.35	1.0
1 day/week	23,781	200	3569	2498	21.9	95.3

All IEUBK model defaults were used except site soil concentration.
Age range of recreational visitor, 0-7 years.
Weighted Pb concentration = (Site Soil conc. * exposure freq.) + (Home soil conc. * freq). (EPA 2003).
Weighted Pb conc. in dust = 70% of weighted soil Pb concentration. 70% is the model default.

The typical DEP RSR coverage depth for a cap consisting only of clean soil is four feet (DEP 1995). Justification for considerably less than this for the Mukluk Club (i.e. 6 inches) appears to be that the site is remote and so should receive less use than typical scenarios. However, the high lead concentrations in existing surface soil and the unrestricted nature of these soils leads us to offer a number of risk management suggestions for the upland soils portion of the property, as alternatives to the Town's proposed remedy. We understand that the risk management decision about whether a 6-inch soil cap can be adequately maintained is a decision within DEP's purview. There may be additional engineering controls that DEP could require, such as geotextile fabrics, which would enhance the protectiveness of a 6-inch soil cap. Understanding this, we have offered several risk management options to assist DEP in their risk management decision process. These options are provided in the Recommendations Section below.

Conclusions

As requested by CT DEP, CT DPH's evaluation focused on evaluating the health protectiveness of the Town of Sprague's cleanup proposal for lead-contaminated soils at the Mukluk Club former skeet shooting range. Before providing those conclusions, CT DPH will present its conclusions about public health risk from the Mukluk property under past conditions.

In the past, when the property was an active shooting range, young children would not likely have visited the property and therefore, would not have come into contact with lead-contaminated soils on a routine basis. Therefore it is not expected that lead in soils at the Mukluk Club would have harmed people's health in the past.

As requested, CT DPH evaluated the health protectiveness of the Town's cleanup proposal for addressing current conditions at the Mukluk Club property. Based on an evaluation of recreational exposures to lead-contaminated soils in the 'far reaches' portion of the Mukluk Club property, CT DPH concludes that the proposed 'no action' remedy is protective of public health. Lead in soil in the far reaches portion of the property is not expected to harm people's health because the lead concentrations are so low. No further actions are needed by the Town to address low levels of lead in soil in the 'far reaches' portion of the property.

The 'upland soils' portion of the Mukluk Club property has significantly elevated levels of lead. If exposure to these soils were to occur on a regular basis, particularly by young children, it could pose a risk to health. Currently, access to this portion of the property is somewhat restricted by a fence and is also posted. Furthermore, the property is remote, has no designated recreational facilities and appears to receive very little use. Therefore, at the current time, there are no obvious signs that exposure is occurring. Without exposure, there is no risk of harm to health. However, this is no guarantee that more intensive recreational use and exposure, particularly by children, would not occur in the future. In order to prevent exposure and risk in the future, the Town should undertake remedial actions in the 'upland soils' portion of the property.

As mentioned previously, the Town has proposed a 6-inch soil cap over the 'upland soils.' CT DPH has concerns about whether a 6-inch soil cap can be adequately maintained over time and whether it will provide an ongoing barrier from the highly contaminated soils beneath. Therefore, CT DPH has provided the following recommendations for CT DEP to consider as alternatives to the Town's proposed remedy.

Recommendations
Risk Management Options for the Upland Soils, Mukluk Club

1. Prior to placement of the 6-inch soil cap, perform remediation such that the 95% UCL in upland surface soils does not exceed 1,000 mg/kg (see attachment for justification for 1,000 mg/kg).
2. Apply a four-foot soil cap over existing upland soils.
3. Use fencing, signage and heavy vegetative cover to restrict access to contaminated upland soils.
4. Designate certain areas for walking/hiking or other recreational access and perform additional remediation in those areas to meet the CT RSR of 400 mg/kg (or the 95% UCL lead concentration that exists in the far reaches of the property [431 mg/kg]). Use options 1 through 3 or any combination thereof on remaining soils that do not receive the additional remediation.
5. Use options 1 through 4, or any combination thereof. Additional soil sampling could be used to identify specific areas that may be more amenable to a particular risk management option, or combination of options.

Please contact me at 509-7748 if you have questions or need further information.

Sincerely,

Meg Harvey

Meg Harvey, MPH
Supervisor, Site Assessment and Chemical Risk Unit
Environmental and Occupational Health Assessment Program

Attachment

Attachment

CT DPH used the IEUBK model to evaluate a 2 day/week recreational exposure to lead in soil at a concentration of 1,000 mg/kg. We evaluated exposure to 1,000 mg/kg because it was the concentration which was initially proposed by the Town of Sprague as an alternative cleanup value for the far reaches of the property. They subsequently withdrew that proposal when they discovered that average lead concentrations were much lower than 1,000 mg/kg. We ran the model using three different assumptions for the background lead concentration in residential soil. The EPA default is 200 mg/kg, but they state that it is a plausible value for urban settings. This implies that in rural settings, a lower concentration may be appropriate. We selected to run the model using 50 mg/kg and 100 mg/kg (in addition to 200 mg/kg) because these values were used in EPA case studies in IEUBK model guidance (EPA 2003).

As shown in Table 2 below, the IEUBK model predicts some excess risk at a soil concentration of 1,000 mg/kg (particularly when the default home soil concentration of 200 mg/kg is used). However, as the 6-inch clean soil cap gradually mixes with underlying soil over time, the lead concentrations will be somewhat diminished, which will result in lower exposure and risks. Therefore, we conclude that placement of a 6-inch clean soil cap on top of surface soils that do not exceed a 95% UCL of 1,000 mg/kg lead will be adequately protective of public health .

Table 2. IEUBK model results for recreational, intermittent exposure at the Mukluk Club (upland soils portion of the parcel), Sprague, CT

Exposure Frequency	Site Soil Pb conc. (mg/kg)	Home Soil Pb conc. (mg/kg)	Weighted soil Pb conc. (mg/kg)	Weighted dust Pb conc. (mg/kg)	Geometric Mean Blood Pb (ug/dL)	% above 10 ug/dL
0 day/week	-------	200	200	140	3.35	1.0
2 day/week	1000	50	321	225	4.4	4.0
2 days/week	1000	100	357	250	4.7	5.4
2 days/week	1000	200	429	300	5.3	8.7

All IEUBK model defaults were used except site soil concentration.
Age range of recreational visitor, 0-7 years.
Weighted Pb concentration = (Site Soil conc. * exposure freq.) + (Home soil conc. * freq) (EPA 2003)
Weighted Pb conc. in dust = 70% of weighted soil Pb concentration. 70% is the model default.

References:

40 CFR Part 745. Identification of Dangerous Levels of Lead, Final Rule, Federal Register, Vol. 66, No.4, January 5, 2001.

DEP 1995. CT Department of Environmental Protection Remediation Standard Regulations, Section 22a-133K-1, Direct Exposure Criteria, December 13, 1995.

EPA 2003. Assessing Intermittent or Variable Exposures at Lead Sites, EPA-540-R-03-008. OSWER# 9285.7-76. November 2003.

EPA 2007. EPA User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows, EPA 9285.7-42, May 2007.

EPA 2007. IEUBKwin v1.0 build264, August 2007.

CERTIFICATION

The letter health consultation for the Mukluk Sportman's Club (AKA Mukluk Skeet Shooting Range) site was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the letter health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

Technical Project Officer, CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation, and concurs with its findings.

Team Leader, CAT, CAPEB, DHAC, ATSDR