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May 4, 2007



SDMS DocID

273410

Ms. Anna Krasko, Project Manager
United States Environmental Protection Agency
Region I
One Congress Street
Boston, Massachusetts 02114

RE: Centredale Manor Restoration Project, North Providence, Rhode Island
Oxbow Area Risk Assessment

Dear Ms. Krasko:

At the April 23, 2007 dialogue meeting, the Battelle project team presented EPA's detailed analysis of the remedial alternatives for the Oxbow area. According to Battelle's presentation, it was stated that 17.5 acres of the Oxbow (35,000 cubic yards of soil) requires remediation. We are writing on behalf of Enhart Industries, Inc., to express significant concern with both the extent of the stated need for remediation as well as the conclusion that any remediation, beyond perhaps periodic monitoring, is required for the Oxbow area.

Although we already have commented to EPA on the interim-final Baseline Human Health (Oxbow BHHRA) and Ecological (Oxbow BERA) Risk Assessments for the Oxbow¹, the content of Battelle's presentation has prompted us to reiterate and expand upon some of our more significant concerns about the failure of EPA's Oxbow area risk assessments to provide a plausible and accurate assessment of the potential human and ecological risks

Given that information from the baseline risk assessments is used to assess the need for remedial action, it is critical that these assessments evaluate plausible exposures in a manner that provides decision makers with information that is well supported and technically credible. As we highlight below, neither the Oxbow BHHRA, nor the Oxbow BERA, provide information that is plausible or supported by the data collected to date.

The Oxbow BHHRA evaluates the potential exposure of a passive recreational visitor to chemicals present in low lying, wet soil/sediment. It evaluates both the central tendency exposure (CTE) and the reasonable maximum exposure (RME). Battelle's suggested need to address the Oxbow area in the Feasibility Study (FS) from a human health protection standpoint is apparently driven by the fact that the Oxbow BHHRA computed RME incremental cancer risks of 3 in 10,000, which is only a factor of three greater than the upper-end of the National Contingency Plan (NCP) "risk range" of 1 in 10,000. The CTE cancer risks, although

¹ See October 16, 2006 letter from J. Muys to A. Krasko.

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conservatively computed, were within the NCP risk range, and thus are not indicative of triggering a remedial action.

The RME incremental risk estimate of 3 in 10,000 is based on a series of extremely conservative individual exposure assumptions, which taken together result in an exposure scenario that is not plausible, for the following reasons:

- The RME receptor assumes visits to the site for a period equivalent to 6.4 years (2,340 days) over the course of the thirty (30) year cumulative exposure duration. This is an excessively high assumed number of visits to an area whose access is limited because all abutting properties are commercial/industrial properties.
- Every receptor visit during the putative 6.4 year period is spent at locations where the concentration of 2,3,7,8-TCDD is reportedly at the maximum detected concentration.
- Every receptor visit is modeled as a day-long visit to the site. This is made evident by the use of a "fraction ingested" value of 1.0, which indicates that a full day's incidental soil ingestion comes from the site.
- For the first 1,404 days of visits to the Oxbow, the receptor wears only shorts and a short-sleeved shirt. For the final 936 days of visits, the receptor wears only shorts, a short-sleeved shirt and shoes. The wearing of a minimal amount of clothing for all 2,340 visits is not at all plausible considering visits are assumed to occur between May 1 and October 31 each year. The weather during this time period, particularly in May, September, and October, is generally not conducive to the minimal attire assumed in the Oxbow BERA.

Moreover, in evaluating the potential CTE exposures that could plausibly occur, the Oxbow BHHRA fails to conform to EPA's definition of a RME:

Readers are reminded that the goal of RME is to combine upper-bound and mid-range exposure factors in the following equation so that the result represents an exposure scenario that is both protective and reasonable; not the worst possible case.²

The combination of an upper-bound and mid-range exposure factor is further emphasized by EPA in a later guidance document for characterizing risk:

"If only limited information on the distribution of the exposure or dose factors is available, the assessor should approach estimating the high end by identifying the

² EPA, 1991. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.3-03. March 25.



most sensitive variables and using high end values for a subset of these variables, leaving others at their central values.³

Contrary to the instructions in its guidance documents, the values that EPA uses for essentially all of the exposure parameters are high-end values. As a result, the potential risks computed are not indicative of a plausible receptor. However, if a combination of RME exposure parameters and exposure point concentration data that are more indicative of the potential users of the Oxbow area are applied, the risks most likely would fall within the acceptable NCP risk range. In that event, Battelle would not be suggesting the need for remediation to mitigate potential health risks in the Oxbow area.

Regarding the Oxbow BERA results, EPA lacks adequate information to determine whether a risk to ecological receptors exists. In the Oxbow BERA, EPA evaluated four terrestrial ecological receptors: earthworms, woodcock, short-tailed shrews, and raccoons. The Oxbow BERA concludes that there is "substantial risk of harm" for the woodcock and the short-tailed shrew. To arrive at these conclusions, the Oxbow BERA relies upon simplistic, intrinsically conservative food chain modeling to estimate chemical intake rates and body residue levels for each of the receptors. The only Oxbow area-specific data used in the model are the chemical concentrations for the few sediment/soil samples collected.

Nevertheless, even with the available data, Battelle's suggested need for remediation of the Oxbow is unsupported given the BERA results. For this site, it appears that EPA is making decisions for ecological receptors based on the Hazard Quotients (HQ) developed as part of the Oxbow BERA. For most receptors evaluated in the Oxbow BERA, EPA is using a threshold HQ of 1.0 as the basis for concluding whether a significant risk of harm is present.

In the interim-final site-wide BERA (site-wide BERA), EPA computes the hazard indices for the floodplain soil in the upstream area of Greystone Mill Pond (EPA, 2004).⁴ Like the Oxbow BERA, the site-wide BERA evaluates the risks to the woodcock and short-tailed shrew. The following table summarizes the findings of the site-wide BERA and the Oxbow BERA with respect to these two receptors.

³ EPA, 1995. Guidance for Risk Characterization. U.S. Environmental Protection Agency. Science Policy Council. February.

⁴ Battelle, 2004. Interim-Final Baseline Ecological Risk Assessment. Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island. Contract No. DACW33-01-D-004. September. See Exhibit L for the risk calculations.



Site Location	Exposure Medium	Ecological Receptor			
		American Woodcock		Short-tailed Shrew	
		NOAEL-based HQ	LOAEL-based HQ	NOAEL-based HQ	LOAEL-based HQ
Greystone Mill	Surface Soil	27	4.5	51	6.2
	Plants	NA	NA	6.8	0.74
	Soil invertebrates	14	2.2	70	9.1
	Total HQ	41	6.7	127.8	16.04
Oxbow	Surface Soil	29	4.0	100	11
	Plants	NA	NA	3.6	0.48
	Soil invertebrates	16	2.1	160	18
	Total HQ	45	6.1	263.6	29.48

Notes: NA- Not analyzed for this receptor.

The summary table shows that the HQs computed for Oxbow and the background area, Greystone Mill Pond, are both in excess of 1.0. The HQs for the American woodcock are practically indistinguishable between the background area and the Oxbow area. The HQs for the shrew are both well above 1.0 for both areas. Because of the threshold method used to compute a hazard and the uncertainty of the calculations, it is difficult to determine whether there is any real difference for the shrew between the Oxbow and Greystone Mill Pond HQs. In fact, it is not known whether either location (background or Oxbow) actually poses any significant risk to these receptors. To illustrate this point, one can examine the assessment for the earthworms in the Oxbow.

Several HQs were computed for the Oxbow earthworms. The HQ for the earthworm ranged from 32 to 480, depending on the method and the soil concentration used in the computation. Even the so-called incremental HQ for the earthworm (the "difference" between background and the Oxbow) exceeds 100. Although the HQs for the earthworm exceeded even the highest HQ for the shrew, EPA determined that the earthworm community is not likely at significant risk based on the results of a community assessment conducted as part of the site-wide BERA. That community assessment concluded that no adverse effects were evident in the floodplain soils adjacent to Allendale and Lyman Mill Ponds when compared to upstream locations, based on a comparison of relative abundance, species diversity, and the overlap of shared fauna. As another point of comparison, the HQs computed for the earthworms in the downstream floodplains ranged as high as 4,400. In short, the site-specific data, which are far more indicative of the actual conditions on the site, showed that there were no significant risks to the earthworm community, even when the HQs were as high as 4,400.

No such site-specific data collection efforts have been conducted in the Oxbow to further refine the risk assessment of short-tailed shrews or American woodcock. Additional data that could



help refine the assessment may include chemical assay data for soil invertebrates (the primary food source for the shrew and the woodcock), and, possibly, additional soil sampling data. If soil invertebrates are sampled, the analysis should not be limited to earthworms (as was done in the site-wide BERA), but should be a composite of all soil invertebrates, which serve as the prey base for the opportunistic shrew and woodcock.

Even though additional data would help to refine the risk estimates for the woodcock and the shrew in the Oxbow area, on the basis of present data and conservative modeling approaches, it can legitimately be stated that the risks to these receptors in the Oxbow are no worse than the risks for the upstream, background areas (i.e., HQ's for both areas are well above 1.0). Even though the risks at the Oxbow and background areas may be due to different chemicals, receptors cannot differentiate their exposure by the source of the chemical. To exclude the risks related to background sources from consideration in the assessment's conclusion could result in the selection of a remedy that does not significantly mitigate overall ecological risk.

The Battelle analysis has not demonstrated that remediation of the Oxbow area is necessary. The calculated human health risks are based on exposure assumptions that are so conservative as to be unrealistic. The use of more plausible exposure parameters would lead to a more realistic, yet conservative, assessment of risk, which likely would fall within the NCP risk range. Also, remediation of the Oxbow area based on ecological risks is unnecessary given that the computed HQs for the Oxbow and the background areas are both well above 1.0. If some portion of the Oxbow were to be remediated, the risks from off-site compounds still would result in an HQ above 1.0. Finally, additional site-specific data could be collected to improve the ecological exposure assessment, which, based on the results of the assessment for earthworms, has already been shown to have a marked impact on the assessment results.

Sincerely,

A handwritten signature in black ink, appearing to read "Russ Keenan".

Russell E. Keenan, Ph.D.
Vice President
Technical Director, Risk Assessment

A handwritten signature in black ink, appearing to read "Patrick O. Gwinn".

Patrick O. Gwinn
Senior Environmental Scientist

cc: Ms. Deidre Dahlen, Battelle
Eve Vaudo, Esq.