STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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July 27, 2004

Mr. Fred Evans
Department of the Navy
Northern Division
Naval Facilities Engineering Command
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re: Technical Memorandum, Derivation of Lead Screening Levels for Recreational Users Exposed to Intertidal Surface Water and Construction Workers Exposed to Shallow Groundwater at Portsmouth Naval Shipyard, Kittery, Maine, June 17, 2004.

Dear Fred:

The Maine Department of Environmental Protection has reviewed the document referenced above. The Department's comments follow.

General Comment

1. The MEDEP concurs with the Navy's assertion that the EPA drinking water standard is not appropriate for water that is brackish or saline, and therefore presumably would not be voluntarily ingested. However, the MEDEP does not concur with the details of the assessment. The Navy has not adequately justified and/or referenced the choice of values used in the calculations, and has used averaging over time inappropriately and contrary to EPA guidance for the models used. The Navy should recalculate the proposed screening levels based on the comments below.

2. This comment is primarily for information only. The MEDEP is not asking the Navy to calculate screening levels based on a blood lead level lower than 10 μg/dl.

It is important to recognize that 10 μg/dl in blood in no way represents a "safe" level. That level was set in 1991 by the CDC largely for practical reasons: there was no economical methodology at that time for screening many thousands of children that was accurate below 10 μg/dl. It was recognized even then that there were effects below 10 μg/dl. There apparently is no threshold for lead-induced deficits in children down to at least 1 μg/dl (Schwartz, 1994, see references below), and recent studies suggest that the decrement in IQ is relatively greater between 1 and 10 μg/dl than at levels above 10 μg/dl (Canfield et al., 2003; Bellinger and Needleman, 2003). This argument may not be directly applicable to the fetus; this tissue has not been explored in relation to maternal blood lead levels. Although the EPA models use 10 μg/dl as the

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value not to be exceeded, it is important to understand that there is no "safe" level of lead within the range of current body burdens. This has important implications for how "conservative" derived values are considered to be.

Specific Comments

3. 1st paragraph, p. 1

a) "The human health screening level for groundwater and intertidal surface water that has been used previously for evaluation of lead at the PNS IRP sites is based on an action level for lead in drinking water."

Please cite the source and value of this human health screening level.

b) This comment applies to the present technical memorandum as well as prior reports discussing human health risk screening levels for exposure to intertidal surface water.

"The technical memorandum presents alternative screening levels for two receptors hypothetically exposed to lead in aqueous media: 1) a child recreational user exposed to lead in water along the shoreline at a site."

The MEDEP notes that, like the present technical memorandum, the screening levels presented in the December 2002 Human Health Risk Screening Levels for Intertidal Surface Water and Sediment Technical Memorandum[1] were developed only for the recreational scenario. Please clarify how the recreational scenario screening level will be protective of potential future residents. For example, the Site 32 RI QAPP[2] Human Health Risk Assessment Protocol states that risk will be calculated for the potential future resident at that site. If this has been discussed elsewhere, e.g. in an earlier report, meeting minutes, etc., please provide a reference.

c) The full reference for the USEPA, September 2001 document is not. Likewise please provide the web address for the ATSDR reference.

4. 1.0 Approach No. 1, p. 1

"An industrial soil remediation goal of 800 mg/kg based on the ALM has already been published by the USEPA."

Please provide a full reference for the EPA publication.

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[1] Final Technical Memorandum, Development of Facility-Specific Human Health Risk Screening Levels for Intertidal Surface Water and Sediment, Portsmouth Naval Shipyard, Kittery, Maine. December 2, 2002.
[2] Site 32 Remedial Investigation Quality Assurance Project Plan for Portsmouth Naval Shipyard, Kittery, Maine, March 2003.

5. 1.0 Approach No. 1, p. 1

"This value [800 mg/kg] is expected to be protective of workers and the fetuses of workers."

In the Adult Lead Methodology (ALM) FAQs referenced by the Navy the USEPA states,

"An updated screening level for soil lead at commercial/industrial (i.e., non-residential) sites of 800 ppm is based on a recent analysis of the combined phases of NHANES III that choose a cleanup goal protective for all subpopulations."

However, earlier in the FAQs the EPA states,

"Either commercial or industrial workers may work primarily indoors, so that exposure to soil occurs primarily via indoor dust. Workers' limited and occasional contact with outdoor soils (e.g., walking at noontime, picnicking, walking to parking lots, standing on a loading dock) should be adequately accounted for via the 50 mg/day incidental soil ingestion. If an individual is performing a contact-intensive activity with soil, then a soil ingestion rate greater than 50 mg/day would be expected. At sites where lead materials have been historically used, exposure scenarios would have to be evaluated individually to determine the indoor and outdoor activities that may result in greater exposure to soil and the corresponding soil ingestion rate."

Therefore, the Navy's statement should be changed to "This value is expected to be protective of workers who work primarily indoors, i.e. work is not soil contact-intensive, and the fetuses of those workers."

6. Equation for Calculating a Construction Worker Screening Level Based on Incidental Ingestion of Lead in Water, p. 2

a) The rationale for the following factors are not justified. Please provide justification/sources for these factors:

- 2 μg/dL baseline PbB
- 2 hr exposure rate
- 0.01 L/hr water ingestion rate
- 150 days/year exposure

We note that in the December 2002 Human Health Risk Screening Levels for Intertidal Surface Water and Sediment Technical Memorandum[3] the Navy used a 4 hour exposure rate. Please explain why the exposure time has changed.

[3] Final Technical Memorandum, Development of Facility-Specific Human Health Risk Screening Levels for Intertidal Surface Water and Sediment, Portsmouth Naval Shipyard, Kittery, Maine. December 2, 2002.

Exposure frequency for construction workers = 150 days/yr. This EF may be appropriate for Maine however the Navy has not discussed the reasons for choosing 150. We note that the ALM FAQs referenced by TetraTech state,

"The model default value for exposure frequency (EF) is 219 days/year. This value is a central tendency estimate for non-residential exposure scenarios (i.e., both commercial and industrial), and corresponds to the average time spent at work by both full- and part-time workers engaged in non-contact-intensive activities. If workers are engaged in full-time activities, then an EF greater than 219 days/year may be appropriate."

Given that the scenario the Navy is evaluating involves full-time workers in contact-intensive activities then a value less than 219 days/year seems inappropriate and indeed, a value greater than 219 days may be more realistic. The Navy should discuss why they believe 150 days/year is appropriate.

b) The Navy includes an Averaging Time for exposure to water. EPA states in the ALM FAQs that averaging over the entire year is inappropriate, because it risks "diluting" the exposure. Averaging does not recognize the real potential for sensitive periods during fetal development when increased maternal blood lead levels may be particularly harmful. In addition, fetal development takes place over a shorter time than 1 year. Therefore, the averaging performed by the Navy is inappropriate.

7. <u>1.0, p. 3</u>

"A screening level derived assuming receptor contact by *both* the ingestion and dermal routes of exposure would be approximately 750 μg/L..."

Please clarify how this value was calculated.

8. <u>Approach No. 2.0. Derivation of a Screening level for Child Recreational User Exposed to Intertidal Surface Water</u>

The Navy presents a scenario in which exposure is 4 hours/day for 26 days. No rationale is given for these exposure factors. We assume the Navy is using the values presented in the 2002 Risk Screening Levels Tech Memo referenced above. The source for these factors should be clearly stated. Likewise, the Navy should discuss how these factors vary from MEDEP default factors and how the results of the risk calculations differ between the two different exposure scenarios.

In this case there shouldn't be any difference in the results of the calculations as the total annual exposure is the same for the Navy's exposure factors as for the State's default exposure factors (2.6 hours/day, 40 days/year). That is, both exposure scenarios result in 104 hours/year.

9. Approach No. 2.0. Derivation of a Screening level for Child Recreational User Exposed to Intertidal Surface Water

The Navy has used the EPA IEUBK model, with ingestion of seep or river water as the alternate source of lead exposure. This model is designed for continuous exposure for at least three months. If those criteria are met, further time-weighting is *not* to be performed. For the scenario under discussion, the Navy is referred to the EPA document "Assessing Intermittent or Variable Exposures at Lead Sites" (EPA, 2003)[4] for a discussion of the use of time-weighted averages for intermittent exposure. For exposure of children at Portsmouth, if exposure is 26 days, this would translate to 2X/week for a 90-day exposure. This would be the value (2/7) that would be submitted to the model. Note that *no* further averaging is performed in accordance with the guidance. However, it is likely that exposure would actually be over a shorter period than 90 days, given Maine weather. The Navy should model a 26-day exposure only, with no averaging, compare to the 90-day scenario, and discuss the uncertainties associated with each approach.

10. Approach No. 2.0. Derivation of a Screening level for Child Recreational User Exposed to Intertidal Surface Water

The Navy's proposal addresses children from 3 to 7 years of age. In discussions during development of the 2002 Screening Level Tech Memo the MEDEP agreed that including children from 0 to 3 would not significantly affect the outcome of the risk assessment.

The Navy should discuss why the lead screening level calculated for incidental ingestion of water by child recreational users from 3 to 7 years of age is also protective of children from 0 to 3 years of age. For instance, while a very young child might be more prone to ingesting surface water would its exposure to surface water be that much lower than the 3 to 7 year old such that there is no increased risk?

References

Bellinger, DC and Needleman, HL. Intellectual impairment and blood lead levels, N Engl J Med. 34:500-2, 2003

Canfield RL. Henderson CR Jr, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter, N Engl J Med 348: 1517-1526, 2003

Schwarz, J. Low-level lead exposure and children's IQ: a meta-analysis and search for a threshold. Environ Res. 1994 65: 42-55, 1994

[4] OSWER #9285.7-76, http://www.epa.gov/superfund/programs/lead/products/twa-final-nov2003.pdf

Please feel free to contact me at (207) 287-8010 if you have any questions.

Sincerely,

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