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NSY PORTSMOUTH  
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LETTER AND U S NAVY RESPONSE TO U S EPA REGION I, MAINE DEPARTMENT OF  
ENVIRONMENTAL PROTECTION AND SEACOAST ANTI POLLUTION LEAGUE COMMENTS  
REGARDING LEAD MODELING AT DEFENSE, REUTILIZATION AND MARKETING OFFICE  
IMPACT AREA NSY PORTSMOUTH ME  
12/10/1998  
NAVFAC NORTHERN



# DEPARTMENT OF THE NAVY

NORTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
10 INDUSTRIAL HIGHWAY  
MAIL STOP, #82  
LESTER, PA 19113-2090

5090 IN REPLY REFER TO  
Code 1823/FE

10 DEC 1998

Ms. Meghan Cassidy  
U.S. Environmental Protection Agency  
Region 1  
JFK Federal Building HBT  
Boston, MA 02203-2211

Mr. Iver McLeod  
Maine Department of Environmental Protection  
State House Station 17  
Augusta, ME 04333-0017

Subj: IEUBK Lead Modeling at DRMO Impact Area, Portsmouth Naval Shipyard,  
Kittery, Maine

Dear Ms. Cassidy and Mr. McLeod:

Enclosed please find our responses to USEPA comments dated August 6, 1998  
comments, Maine Department Of Environmental Protection's comments dated July  
29, 1998, and Lepage Environmental Services comments dated August 6, 1998.  
Your comments on our responses are requested on or before January 11, 1998.

If additional information is required, please contact me at (610) 595-0567,  
x159.

For the Community Restoration Advisory Board (RAB) members; if you have any  
comments or questions on these issues, they can be provided to the Navy at a  
RAB meeting, by calling the Public Affairs Office at (207) 438-1140 or by  
writing to:

Portsmouth Naval Shipyard  
Code 106.3R Building 44  
Attn Ms Marty Raymond  
Portsmouth, NH 03804-5000

Sincerely,

  
FREDERICK J. EVANS, P.E.  
Remedial Project Manager  
By direction of the  
Commanding Officer

Encl:  
(1) Response to Comments

Subj: IEUBK Lead Modeling at DRMO Impact Area, Portsmouth Naval Shipyard,  
Kittery, Maine

Distribution:

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| Brown and Root Environmental (L. Klink, B. Horne) |  |

**RESPONSE TO USEPA COMMENTS DATED 8/06/98  
DRAFT IEUBK LEAD MODELING AT DRMO IMPACT AREA  
PNS, KITTEERY, MAINE**

**Specific Comments**

1. **Comment:** What were the sampling depths of samples SS-06 and SS-07? Please change information in text and in models (see comment #3) as appropriate.

**Response:** The sampling depth for both samples SS-06 and SS-07 were from 0-1 foot depth interval.

2. **Comment:** Since the maximum lead concentration, which gave Integrated Exposure Uptake Biokinetic (IEUBK) blood lead level model results greater than 10 ug/dl, was detected at sample location SS-23S, please describe the area this sample represents (i.e., is it on a hill?, is the soil easily accessed/a garden/highly vegetated?, are there any reasons why a child would prefer to play in this area of the yard versus the rest of the yard?, etc). Please address this in the text.

**Response:** Sample location SS-23S is located on a hill, which is densely covered with grass, no bare spots were apparent. There was no indication of children's toys on the hill nor was there any indication of the lawn having unusual wear in that area.

3. **Comment:** Since the lead concentration input for IEUBK Model should represent a potential exposure area, please rerun the model at the 0 to 0.5 foot surface soil depth (Surface soil is defined as 0 to 1 foot for human health evaluations) for each of the three residences:

- (·) at the "N" residence (samples SS- 17S, 18S, 19S, 20S, 21S, 22S, and 23S),
- (·) at the 68 residence (samples SS-06S and 07S),
- (·) and the "S" residence (Samples SS- 14S and 16S).

Please also include sample SS-15S in the appropriate residence evaluation (this sample was not depicted on figure 2-9 of the March 1994 Public Health and Environmental Risk Evaluation used to determine sample locations). Please also recalculate the indoor air concentration for inclusion in the IEUBK model.

**Response:** The Navy had included sample SS-15S (0-0.5' depth) in the model so no revision is required concerning this request.

The EPA appears to be requesting supplemental information, considering each of the three areas individually and only considering 0 - 0.5 foot samples. EPA guidance recommends the "top layers of soil" be considered in developing the exposure concentration for input to the model. The Navy interpreted this as surface soils from 0-2 foot depth to ensure data was not being "left out." Note that the 1992 assessment considered samples up to 1.5 depth.

The model additional runs were conducted using the individual area surface soil data sets requested in the EPA comment. Note, however, the 68 residence requested samples are 0-1 foot deep (please see the Navy response to EPA comment no. 1). The model additional runs also reflect separate results for each of the three individual areas as requested in the EPA comment. Exposures to lead in surface soil at the individual residences ("N", "68", and "S") were evaluated following the methodology presented in the technical memorandum. Note that the 1992 assessment considered the samples as a whole rather than splitting sample data specific to each of the three areas. The small data sets for each area resulted in the 95% UCL input concentrations equal to the maximum concentration; therefore, average and maximum input concentration model runs were conducted. Indoor air concentrations were calculated using the average and maximum soil concentrations and were used as an input to the model. The IEUBK model was run using the EPA recommended input assumptions and input assumptions recommended by the state of Maine. Results of the evaluation are summarized in Tables A and B. The results of this evaluation will be inserted in the appropriate sections of the technical memorandum.

The IEUBK model results derived using the average soil/dust lead concentration are within acceptable levels for the "S" residence (at least 95 percent of the population has blood lead levels below 10 ug/dL). The geometric mean blood lead level concentration based on an average soil/dust lead concentration was less than the acceptable level of 10 ug/dL. The average soil/dust concentration is the input value recommended by the IEUBK guidance as the most appropriate concentration for evaluating lead in children.

The geometric mean blood lead levels based on the maximum soil/dust lead concentrations for the "S" residence and average and maximum soil/dust concentrations for the "N" and "68" residences were less than the acceptable level of 10 ug/dL. However, the IEUBK model results for some scenarios indicated that less than 95 percent of the population would have blood lead levels less than 10 ug/dL which is not within acceptable levels. It should be noted that with the exception of the maximum lead concentration for the "N" residence, average and maximum lead concentrations in soil were less than or only slightly exceeded the OSWER residential screening level of 400 mg/kg. Furthermore, if the OSWER residential screening level of 400 mg/kg is inputted into the IEUBK model the results indicate that only 87.19 percent of the population will have blood lead levels less than 10 ug/dL.

**RESPONSE TO MEDEP COMMENTS DATED 7/29/98  
DRAFT IEUBK LEAD MODELING AT DRMO IMPACT AREA  
PNS, KITTEERY, MAINE**

**IEUBK Model**

1. **Comment:** Concentration of lead in air; Actual air monitoring data were used in the 1992 assessment. In the 1998 assessment, concentrations were estimated using MEDEP guidance. It is assumed that the air monitoring stations that provided data from the 1992 assessment were relatively local, whereas the MEDEP guidance combines measured state-wide concentrations of dust in the air with site-specific concentrations of contaminants in soil. Directly measured, local values are preferred over estimated concentrations. Whether the average or maximum concentrations should be used depends in part on the temporal distribution of the data. Average is satisfactory if it can be shown that concentrations approaching the maximum do not occur for extended periods of time.

**Response:** The following sentence will be added to the first paragraph of Section 2.0: *"An interim corrective measure was conducted at the DRMO in 1993, which included capping to prevent exposure to significantly elevated concentrations of lead in surface soil. Air monitoring prior to 1993 is not considered reflective of current day conditions."*

2. **Comment:** Concentration of lead in the soil; Average and maximum lead concentrations observed in soils of the DRMO area were evaluated in the 1992 assessment, whereas the average, maximum and upper 95% confidence limit (UCL) concentrations were used in the 1998 assessment. Considering that the model is for children of ages where movement about the DRMO area may be limited, it is considered most appropriate to use average concentrations observed in soils near individual sets of quarters (e.g., at stations 14 - 18 near S Quarters). Additionally, only surface samples from zero to 0.5 ft depth should be considered for use in the model.

**Response:** As noted in Section 6.1, the Navy agrees that average concentration is the governing scenario in evaluating model results; maximum and 95% UCL concentrations are provided as supplemental information.

Refer to the Navy response to EPA comment 3 concerning sample depths and additional model runs for the three individual areas.

3. **Comment:** Drinking water consumption rate; The MEDEP guidance recommends that the drinking water consumption rate for children be 1.0 L/day. This is an upper percentile value for children under the age of five that consume tap water and foods and beverages prepared with tap water. The default value used in the IEUBK model is graded, ranging from approximately 0.24 L/day for infants to approximately 0.6 L/day for children of six years and represents median (50<sup>th</sup> percentile) consumption rates. Although an upper percentile consumption rate may be preferred for risk assessments at hazardous materials sites in Maine, it is considered appropriate and acceptable to defer to the EPA default value as a measure of drinking water consumption in the IEUBK model.

**Response:** Agree. The following sentence will be added to the end of Section 4.0: *"Although the highly conservative drinking water consumption rate and soil ingestion rates may be preferred by MEDEP for baseline risk assessments, the MEDEP finds it appropriate and acceptable to defer to the EPA default values for use in the IEUBK model, as stated in the MEDEP's attached comment letter dated July 29, 1998."*

4. **Comment:** The MEDEP guidance recommends that the soil ingestion rate for children be 200 mg/day. This is near the average soil consumption rate for children (approximately 160 mg soil/day). Upper percentile rates average approximately 550 mg/day and children that exhibit pica behavior consume more than 1,000 mg/day. The default value used in the IEUBK model is graded, reaching a maximum of 135 mg/day. Although not preferred for baseline risk assessments at hazardous materials sites in Maine, it is considered appropriate and acceptable to defer to the EPA default value for soil consumption in the IEUBK model.

**Response:** Agree. Please see the Navy response to MEDEP comment no. 3.

5. **Comment: Conclusions;** Certain site-specific values are recommended in this section for use in the IEUBK model. However, the values recommended in the preceding comments are considered to be preferable. These would be to use the average lead concentration for soils adjacent to each of the Quarters, measured concentrations of lead in the air, and EPA defaults for soil and water consumption.

It is stated that "at least 95% of the population has blood lead levels below 10 mg/dL." This should be changed to read "at least 95% of the population has estimated blood lead levels below 10 mg/dL." The former version suggests that blood lead levels have been measured, which they have not. Similar statements occur elsewhere in the technical memorandum and should be adjusted accordingly.

**Response:** As discussed in the Navy response to comment no. 1, the model will not be changed to use measured concentrations of lead in the air. MEDEP guidance was included as supplemental information in the technical memorandum and EPA defaults are emphasized. The requested model runs for each of the three individual areas has been conducted; please refer to the Navy's response to comment no. 2.

The Navy agrees to clarify the technical memorandum to make clear that the model results are estimated concentrations.

#### **Adult/Fetal Lead Model**

1. **General Comment:** The adult/fetal lead exposure model is summarized in the technical memorandum. The model was developed by the EPA Technical Workgroup on adult lead exposure. This model was not available for review, therefore any comments at this time may be considered preliminary.

The model, as summarized in the technical memorandum, uses standard equations for estimating exposure of a pregnant female to lead in the soil. This is combined with a slope

factor that relates the blood lead level in the pregnant woman to that of the fetus. The assumptions that were used appear to be acceptable, with the exception that exposure frequency was assumed to be 219 days/year. This needs further justification. An exposure frequency of 350 days/year is generally recommended by the MEDEP when estimating exposure for the future residential use scenario.

**Response:** The adult/fetal lead exposure model evaluates nonresidential adult exposures to lead in soil. The default parameter of 219 days/year is based on EPA guidance for average time spent at work by both full-time and part-time workers (EPA, 1993. "Superfund's Standard Default Exposure Factors for the Central Tendency and RME-Draft. Working Draft, November 1993.)

**RESPONSE TO SAPL COMMENTS DATED 8/06/98  
DRAFT IEUBK LEAD MODELING AT DRMO IMPACT AREA  
PNS, KITTEERY, MAINE**

**General Comment:** The document concludes in paragraph 3 section 6.1 page 4 that "The 1998 IEUBK results.... Are well within acceptable levels (at least 95% of the population has blood lead levels below 10 ug/dL)." This conclusion is based on data reported in Table 2 and Attachment B. More information is needed before accepting this conclusion.

**Response:** Comment noted.

1. **Comment:** The finding reported in Table 2 row 4, that the percent of the population below 10 ug/dL is 95.85%, (column 7 row 4) is based on a 95 % Upper confidence Limit (UCL) soil/dust concentration of 316 ug/g and an air concentration of 0.00691 ug/cubic meter. The soil/dust calculation is partially based on soil lead levels at the surface and partially on levels one foot or more below the surface (Attachment C). The average value of surface lead levels is 340 ug/g with 95% UCL exceeding 400 ug/g. The average measured levels of lead in the air are 0.0497 ug/cubic meter, (Table 1) compared with 0.00691 UCL used in the model (Table 2 row 4 column 5). Therefore, as shown on Table 3 for air levels, these differences could mean that less than 95% of the estimated blood levels would be below 10 ug/dL. What is the justification for combining surface and deeper soil data? Why weren't actual air concentrations, rather than estimates, used? The model should be rerun using surface soil data only.

**Response:** Please see the Navy response to EPA comment no. 3.

2. **Comment:** Although the average soil lead level is higher for surface soil samples (340 ug/g) than for the overall sample set (253 ug/g) in Attachment C, both values are below the level of 500 ug/g widely used to guide cleanup for residential soil. Do the background lead exposures or the average childhood blood levels in Kittery indicate that there is a lead problem?

**Response:** Development of background concentrations is underway. Although there were previously some "outliers" included in the McLaren/Hart developed background set, these "outliers", including an elevated detection of lead at 1100 mg/kg, are currently being removed based on statistical evaluation.

Blood level studies were conducted by the Navy Environmental Health Center (NEHC) in 1995 and 1997. The analyses were conducted by the Child Care Clinic Naval Medical Clinic, Portsmouth, New Hampshire. Please refer to Attachment 1 of the subject comment response letter for detailed documentation. The analytical results indicate all blood level results are acceptable (less than 10 ug/dl) except for one test result in 1993:

1993 Testing Report Summary (combined results from 2<sup>nd</sup> and 3<sup>rd</sup> quarter 1993):

- Two test results are available for children from on-base housing. One of the test results was from a child in the 2-4 years old age bracket and the other result was

from a child in the 4-6 years old age bracket . The test report indicates that the blood level result was acceptable (less than 10 ug/dl) for the 2-4 years old age bracket test result but results (10-19 ug/dl) exceeded the target for the 4-6 years old age bracket test result.

- No tests were conducted for children from off-base housing

1993/1994 Testing Report Summary (combined results from 4<sup>th</sup> quarter 1993; 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> quarter 1994):

- One test result is available for children from on-base housing associated with a child from the 2-4 year age bracket. The test report indicates that the blood level result was acceptable (less than 10 ug/dl)
- Six test results are available for children from off-base housing; all of the test results were for children less than 2 years old. The test report indicates that all of the blood level results were acceptable (less than 10 ug/dl)

1994/1995 Testing Report Summary (combined results from 4<sup>th</sup> quarter 1994; 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> quarter 1995):

- Nine test results are available for children from on-base housing considered to be "high risk." Seven of the test results were for children less than 2 years old and two results were from the 2-3 years old age bracket. The test report indicates that all of blood level results were acceptable (less than 10 ug/dl)
- Three test results are available for children from off-base housing considered to be "high risk." All of the test results were for children less than 2 years old. The test report indicates that all of the blood level results were acceptable (less than 10 ug/dl)
- Twenty test results are available for children from on-base housing considered to be "low risk." Nineteen of the test results were for children less than 2 years old and one result was from the 2-3 years old age bracket. The test report indicates that all of the blood level results were acceptable (less than 10 ug/dl)
- Two test results are available for children from off-base housing considered to be "low risk." One of the test results was from a child less than 2 years old and the other result was from a child in the 2-3 years old age bracket. The test report indicates that both of the blood level results were acceptable (less than 10 ug/dl)

1997 Testing Report Summary (combined results from 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> quarter; no testing conducted for 1<sup>st</sup> quarter):

- Four test results are available for children from on-base housing considered to be "high risk." One test result each is indicated from children less than 2 years old, 2-3 years old, 4-5 years old and more than 6 years old. The test report indicates that all of blood level results were acceptable (less than 10 ug/dl)

- Two test results are available for children from off-base housing considered to be "high risk." One of the test results was from a child less than 2 years old and the other result was from a child from the 4-5 years old age bracket. Both of the test results indicate that all of the blood level results were acceptable (less than 10 ug/dl)
  - Four test results are available for children from on-base housing considered to be "low risk." For children from less than 2 years old, 4-5 years old, and more than 6 years old there were two, one, and one test results available, respectively. The test report indicates that all of the blood level results were acceptable (less than 10 ug/dl).
  - Two test results are available for children from off-base housing considered to be "low risk." One of the test results was from a child less than 2 years old and the other result was from a child more than 6 years old. The test report indicates that both of the blood level results were acceptable (less than 10 ug/dl).
3. **Comment:** In cases where other routes of exposure are present, a model is used to compensate for the higher blood lead exposures from background. In this case, EPA and other health agencies recommend that the acceptable level is less than 10 ug/dL for 95% of the population. Mean soil lead levels are used as inputs to the model unless the sample size is small in which case the upper confidence level of the mean is used. The models are sensitive to selection of default values, background air levels, time playing out-of-doors, etc. Since background lead levels for non-exposed children in the United States are 2-4 ug/dL, the model should be run to show that outcomes without soils exposure are near this range. If the estimated levels are too low, it means that the default values are not correct. We recommend the report include a non-exposed soil run of the model to determine whether the default values are realistic.

**Response:** The default values are conservative. The Navy was directed by the EPA to use these default values. The IEUBK lead model was run assuming that there was no exposure to soil by a child and the results are included in Tables A and B. The estimated geometric mean blood lead levels for the non-exposed soil runs based on the EPA model default exposure assumptions were 1.5 and 1.6 g/dL. The estimated geometric mean blood lead levels for the non-exposed soil runs based on Maine default exposure assumptions were 1.9 and 2.0 g/dL. These values are comparable to SAPL suggested background levels of 2-4 g/dL for non-exposed children.

4. **Comment:** The last paragraph in Section 6.1 notes that using maximum concentrations, the blood levels estimated are in excess of acceptable results but that results using the 95% UCL are not. This conclusion does not offer much comfort. There are a limited number of soil lead levels from the surface (a dozen) all of which are under the 500 ug/g level except for the one high value. Has the site been adequately sampled.

**Response:** The data set size appears to be adequate for the generally small area. The Navy was considering additional sampling in the near term only if a problem were evident from the IEUBK modeling. Of note, the Draft On-Shore Feasibility Study Report

(Halliburton NUS, 1995) did recommend additional sampling to refine the limits of excavation if an excavation alternative were decided upon. This recommendation was developed based on site conditions and an action level that might be near background.

5. **Comment:** Paragraph 6.2 also bases a conclusion on the maximum value. The 95% UCL is a more appropriate basis for the conclusion.

**Response:** The mean is the most appropriate basis for the conclusion. Please see the Navy response to MEDEP comment no. 2.

6. **Comment:** Finally, even if the findings from these models were to indicate a level in the non-acceptable range, a decision to attempt a time-critical removal action should be considered carefully because of the risks of exposure during removal may exceed the benefits.

**Response:** Comment noted.

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