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EMAIL REGARDING U S NAVY RESPONSES TO U S EPA COMMENTS ON INTERIM MEASURES REPORT SOLID WASTE MANAGEMENT UNIT 12 (SWMU 12) NSA CRANE IN
8/17/2015
U S NAVY

Cohen, Deborah

To: Bernhardt, Aaron
Subject: RE: SWMU 12 IMR Battery Site - Eco Risk Comments

-----Original Message-----
From: Brent, Thomas CIV NAVFAC MIDLANT, PWD Crane [mailto:thomas.brent@navy.mil]
Sent: Monday, August 17, 2015 5:06 PM
To: Ramanauskas, Peter <ramanauskas.peter@epa.gov>
Cc: Cole, Linda L CIV NAVFAC MIDLANT, IPTNE <linda.cole@navy.mil>; Bernhardt, Aaron <Aaron.Bernhardt@tetratech.com>
Subject: RE: SWMU 12 IMR Battery Site - Eco Risk Comments

Pete,

The attached files are Tetra Tech/Navy responses to Dan's additional on the SWMU 12 IMR (November 2010). The Word file contains the responses and the PDF is the revised Appendix G of the draft IM report. This revised Appendix G reflects all changes made in response to the EPA comments.

Per Dan's request, additional backup material supporting the ecological risk assessment is now included in Appendix G. To accommodate this new material, Appendix G was restructured.

Hopefully this will resolve the outstanding issues. Once you have a chance to review, if there are still questions, I would recommend we get on a call to discuss.

Thanks,
Tom

-----Original Message-----
From: Ramanauskas, Peter [mailto:ramanauskas.peter@epa.gov]
Sent: Monday, March 23, 2015 4:45 PM
To: Brent, Thomas CIV NAVFAC MIDLANT, PWD Crane
Subject: SWMU 12 IMR Battery Site - Eco Risk Comments

Tom,

Attached please find Dan's comments on the SWMU 12 MFA Battery IMR.

Please let me know if you have questions or would like to arrange a call to discuss.

Thanks,

Pete

RESPONSE TO EPA COMMENTS MARCH 23, 2015
APPENDIX G: ECOLOGICAL RISK EVALUATION
DRAFT INTERIM MEASURES REPORT
SWMU 12 - BATTERY DUMP SITE
NSA CRANE, INDIANA

EPA Comment:

Review of the above ecological risk evaluation was focused on post-excavation analysis of residual lead in surface soil. Attachment A (2nd paragraph, 3rd sentence) states "… ecological scenarios only included backfill results, RFI surface samples, and verification samples …", but a data table used for this evaluation was not presented. I was unable to confirm the exposures presented in the three scenarios (Tables 2-1, 2-2 and 2-3), since Appendix G did not contain surface soil data.

Navy Response:

The Navy agrees to provide positive detection tables which present the data used to calculate average concentrations for each of the three ecological risk assessment scenarios. These tables are provided in Attachment A of Appendix G.

EPA Comment:

A protective risk goal typically uses both lower and upper thresholds of adverse impacts commonly represented by measures of no adverse effect level (NOAEL) and lowest adverse effect level (LOAEL). LOAEL values need to limit the upper level of effect (some LOAELs represent 50% or greater adverse effects). EPA prefers using studies that contain both NOAEL and LOAEL (i.e., bounded) values and limits LOAEL adverse effects to 20% or less. Although EPA guidance does not require the PRG or cleanup criteria to be a geometric mean of the NOAEL and LOAEL values, a geometric mean can refine exposure when increased food ingestion or soil uptake is expected.

For other Crane SWMU's, EPA did not agree with Navy selection of all lead LOAEL values (i.e., unbounded and >20% adverse effects) from the EPA Ecological Soil Screening Levels for Lead report (OSWER Directive 9285.7-70, March 2005) to develop a protective risk goal. A default LOAEL soil cleanup goal of 192 mg/kg for lead was recommended by EPA to be protective of the American woodcock. If the area weighted average lead concentrations for the three scenarios (32.77 mg/kg, 50.74 mg/kg and 49.45 mg/kg as shown in Tables 2-1, 2-2 and 2-3) are correct, these lead concentrations are less than the LOAEL PRG of 192 mg/kg and protective of the American woodcock (sensitive ecological receptor). This LOAEL PRG of 192 mg/kg is expected to be lower than a mammal LOAEL PRG for lead.

Navy Response:

The Navy does not agree that only studies that contain both NOAEL and LOAEL (i.e., bounded) values and limits LOAEL adverse effects to 20% or less should be used to derive the LOAELs. Basically, this approach would involve obtaining, reviewing, and evaluating hundreds of studies which would be very time consuming and duplicative of the work that EPA already has completed when the studies were reviewed for the Eco SSL documents. Based on EPA's intensive review of

studies when the Eco SSLs were developed, they selected the studies (presented in the Eco SSL documents) that met their criteria for deriving NOAELs. Therefore, The Navy does not believe it is necessary to re-review all of the studies that EPA has already approved.

The Navy does agree with use of 192 mg/kg as the PRG for lead which is based on the LOAEL that EPA Region 5 preferred. The initial agreement was that the PRG was only to be used at UXO 7 as a way to move the site forward, however, the Navy has subsequently used this PRG at other sites. The Navy also agrees that all weighted average concentrations for the three scenarios at SWMU 12 are less than the PRG. Therefore, no changes were made to the document based on this comment.

EPA Comment:

The food chain analysis did not provide data and equations used to estimate receptor exposure or LOAEL PRG values for generating the ecological effects quotient (EEQ) presented in Tables 3-1, 3-2 and 3-3. For mammals, exposure to a shrew is expected to be greater than a vole and for birds exposure is expected to be greater for a woodcock than a quail. Tables 3-1 and 3-2 shows a greater exposure (higher EEQ) to a vole than a shrew for lead and tin, respectively. These two vole EEQ values are in question as the data and equations are not available to confirm the EEQ values. Since chromium, copper and zinc exceeded screening values, LOAEL PRGs were calculated and compared to the area weighted concentrations. These LOAEL PRGs used the lowest bounded LOAELs from the EPA Eco-SSL reports for the American woodcock and short-tailed shrew along with an average food ingestion rate and median soil uptake (same approach used for the LOAEL PRG for lead).

The soil LOAEL PRG was calculated using the following equation and criteria from the EPA Guidance for Developing Ecological Soil Screening Levels (OSWER Directive 9285.7-55, February 2005).

HQ = Fir x (soil x Ps + B)/ TRV

Set HQ = 1 and solve for soil Use the following Fir, Ps & TRV

	Woodcock	Shrew
Food ingestion rate (Fir)	0.142 g/g-day	0.167 g/g-day
Soil ingestion, proportion of diet (Ps)	0.064 (6.4%)	0.009 (0.9%)

	LOAEL TRV (mg/kg-day)		Concentration in Soil Invertebrates
	Avian	Mammal	
Chromium^{+3}	2.78	2.82	B = 0.306 x soil
Copper	4.69	6.79	B = 0.515 X soil
Zinc	66.5	75.9	ln(B) = 0.328 x ln(soil) + 4.449

Solving for soil in the above equation provides the following soil LOAEL PRGs for the American woodcock and short-tailed shrew (sensitive bird and mammal receptors)

	Soil LOAEL PRG (mg/kg)	
	Woodcock	Shrew
Chromium^{+3}	52.9	53.6

Copper	57.04	77.59
Zinc	166.2	161.1

A comparison of the area weighted average concentrations for chromium^{+3}, copper and zinc in Tables 2-1, 2-2 and 2-3 against the above soil LOAEL PRGs shows all values are lower (except zinc in scenarios 2 and 3). For SWMU 16 (Media Cleanup Goals, surface soils) an avian LOAEL TRV of 128 mg/kg-day for zinc was recommended (twice the value used above) and was based on bounded studies with adverse effects ≤ 20% (same approach as lead). Although a mammal LOAEL TRV for zinc was not developed, data is available from studies listed in the Eco-SSL report.

The Navy needs to present data used to derive area weighted values in Tables 2-1, 2-2 and 2-3. Also data, equations and effect values used to derive the EEQ values in Tables 3-1, 3-2 and 3-3 need to be presented.

Navy Response:

Data used to derive area weighted values in Tables 2-1, 2-2 and 2-3 are now presented in Attachment A to Appendix G. The Navy also now provides the back-up data (i.e., exposure factors) and equations used to estimate receptor exposure or LOAEL PRG values for generating the EEQs presented in Tables 3-1, 3-2 and 3-3. These back-up data are included as Attachment B (bioaccumulation factors and toxicity reference values), Attachment C (exposure parameters), and Attachment D (food chain models with associated equations) to Appendix G.

In response to the comment regarding the greater EEQs for lead and tin for the vole compared to the shrew, the EEQs for the shrew are greater than those for the vole for lead. The EEQs for tin were slightly greater for the vole than the shrew because no soil to invertebrate or soil to plant bioaccumulation factors (BAFs) were available for tin so a default BAF of one (unity) was used for both food chain models. However, the incidental soil ingestion rate (See Table C-1 in Attachment C) is slightly greater for the vole, and the previous wet-weight to dry-weight conversion factor (0.3) used to adjust the ingestion rate for the vole resulted in the slightly larger overall ingestion rate for the vole than the shrew which resulted in the slightly greater EEQ for the vole. The current wet-weight to dry-weight conversion factor of 0.15 (see Table C-2 in Attachment C) for the vole results in a slightly lower EEQ for tin than the EEQ for the shrew. The EEQs for lead were greater for the shrew than they were for the vole even using the previous wet-weight to dry-weight conversion factor of 0.3.

The food ingestion rates the Navy has been using on all NSA Crane environmental sites in the Step 3a refinement portion of the ERA, and subsequently were used to set PRGs, has been as follows:

Exposure Factors	**Woodcock**	**Shrew**
Body Weight (kg)	0.1895	0.0169
Food Ingestion Rate (kg/d)	0.0253	0.0016
Percent soil ingestion (%)	6.4	0.9
Ingestion rate (g/g-day)	***0.133***	***0.098***

The food chain model the Navy has been using utilizes body weights and food ingestion rates as separate exposure factors. However, for comparison purposes, the food ingestion rate in g/g-day was calculated in the above table using the body weights and food ingestion rates. Although the food ingestion rates calculated above are less than those presented in the comment, these are the values that have been used by the Navy at every other NSA Crane environmental site and had been approved by EPA in the associated NSA Crane-specific environmental work plans and ERAs prepared by Tetra Tech. The exposure factors were calculated using data from the wildlife factors handbook. An attempt was made to use data from studies conducted in Indiana or similar areas to Crane, and/or on field studies in lieu of laboratory studies, which may be the reason for the differences in ingestion rates. Based on these factors, the Navy disagrees that the exposure factors should be changed to the factors suggested by EPA for SWMU 12.

Although not specifically stated, it appears that the LOAEL TRVs recommended in the comment by EPA are the lowest LOAEL that also is greater than the NOAEL TRV from the Eco SSL documents. The following table presents the NOAELs and LOAELs that the Navy has been using on all of its NSA Crane sites, including SWMU 16 where site-specific PRGs were calculated for copper and zinc.

Parameter	Mammal			Bird		
	Values Used at Crane		LOAEL Proposed by USEPA	Values Used at Crane		LOAEL Proposed by USEPA
	NOAEL	LOAEL		NOAEL	LOAEL	
Chromium	2.4	58.17	2.82	2.66	15.63	2.78
Copper	5.6	82.7	6.79	4.05	34.87	4.69
Zinc	75.4	298	75.9	66.1	171	66.5

Units are mg/kg-day

These data show that the LOAELs proposed by EPA are only slightly greater than the NOAELs, and are essentially the same values. For example, the bird NOAEL for chromium is 2.66 mg/kg-day and the proposed LOAEL is 2.78 mg/kg-day. For zinc, the bird NOAEL is 66.1 mg/kg-day and the EPA-proposed LOAEL is 66.5 mg/kg-day. The Navy does not believe it is appropriate to use the EPA-recommended LOAELs because they are essentially the same as NOAELS. The Navy believes that the LOAELs it has been using at NSA Crane and many other Navy facilities are sufficiently protective at this site, especially after accounting for the conservatism on which the food chain models are based (i.e., assumptions that chemicals are bioavailable, receptors obtain all of their food from the site, etc.).

As indicated above, the data used to derive area weighted values in Tables 2-1, 2-2 and 2-3 are presented in Attachment A and the equations and effect values used to derive the EEQ values in Tables 3-1, 3-2 and 3-3 are presented in Attachments B, C, and D.