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LETTER REGARDING U S EPA REGION III COMMENTS ON THE DRAFT FINAL STATUS
SURVEY REPORT SITE 1 THORIUM SPILL NON TIME CRITICAL REMOVAL ACTION NSWC
INDIAN HEAD MD
7/12/2016
U S EPA REGION III



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Robert Thomson, P.E.
Office of Federal Facility Remediation

Direct Dial (215) 814-3357
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Date: July 12, 2016

Alex Scott
NAVFAC Washington
Washington Navy Yard, Building 212
1314 Harwood Street, SE
Washington Navy Yard, DC 20374-5018

Re: Naval Support Facility, Indian Head, MD
Site 1 – Thorium Spill
Review of draft Status Survey Report

Dear Mr. Scott:

The U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Navy's (Navy's) May 2016 draft *Status Survey Report* for the removal completion at Site 1, the Thorium 232 spill site, located at Naval Support Facility Indian Head NPL site. Based upon that review, EPA offers the following comments:

1. EPA recommends calculating 95% UCL background for Thorium 232. Also, EPA recommends the addition of a table in Section 14 presenting the risks at background and at the 95% UCL for the excavated bottom and sidewalls, along with the comparison to the OSWER 9285.6-20 protectiveness criteria. As an example, EPA has attached an Excel spreadsheet with the 95% UCL calculations for background and post excavation sampling using data from the draft *Status Survey Report*. Below is also a comparison of 95% UCL background and post excavation samples to risk based concentrations generated using the Preliminary Remediation Goals for Radionuclides electronic calculator. Additional discussion follows below.
2. Page 65, Table 13 – The Th-232 result at IHS1EB-D2 is a statistical outlier (i.e. hot-spot) and should be considered/discussed further: In comparison to background, this value presents site-related contamination greater than background and, according to PRG calculator, results in unacceptable risk. To illustrate this recommendation, EPA has attached the calculation of a 95% UCL for post excavation sampling results excluding the potential outlier.
3. The cleanup criteria established in the EE/CA was based on RESRAD software runs at 1, 2, 3 and 4 pCi/g. The cancer risks from the RESRAD software indicated that the DCGL of 3 pCi/g resulted in risks within the 1E-4 and 1E-6 risk

range (thus acceptable risk). In the draft *Status Survey Report*, the average Th-232 concentration after excavation (0.79 pCi/g) results in a cancer risk of 2E-4 based on RESRAD calculations, which now exceeds the EPA risk range. Why does the risk at 0.79 pCi/g exceed the risk at 3 pCi/g?" This seems to be a misstatement that needs further clarification. The DCGL of 3 pCi/g in soil does have a corresponding PRG calculated risk of 8.27E-04, not meeting CERCLA risk protectiveness. An analysis of risk based on concentration of Th-232 in soils compared to the estimated risk of Th-232 in background established earlier might be more appropriate.

EPA acknowledges the Navy use of RESRAD family code to develop a derived concentration guideline level (DCGL) as a cleanup goal, as this may satisfy other regulations and authorities. As a matter of policy, EPA recommends using the Preliminary Remediation Goals for Radionuclides electronic calculator as a means to calculate risk per CERCLA remedial program guidance. EPA utilized the PRG calculator in its review and analysis of the data and included the calculator output as attachments. The Navy can incorporate the PRG calculated risk values in their addressing the comments and recommendations.

EPA also calculated UCLs for the background data and the post excavation samples data. The Navy and their contractors should be able to replicate and verify these calculations. Attached, please find an Excel spreadsheet with these calculations. Based on the twenty-seven (27) samples collected by the Navy and EPA's calculations, the background UCL is 1.19 (1.186) pCi/gr in soil. Using the same methodology, EPA calculated the UCL for the post excavation twenty-four (24) samples, including the possible outlier 2.33 pCi/g, and a UCL was calculated at 0.935 pCi/g. Without the outlier data point, the UCL for post excavation data samples is 0.794 pCi/g in soil.

Using the PRG calculator, https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search, with a residential scenario, soil media, and selecting output in risk, selecting Th-232+D for the radionuclide and its daughter products, EPA had the calculator generate estimated risk for the background and post excavation samples with and without the potential data outlier. A soil cover of 1 m and an area correction factor of 1000 m² were used in the calculations. The corresponding total calculated risk was as follows: 3.25E-04 for background, 2.58E-04 for a post excavation 95% UCL including the 2.33 pCi/g and 2.19E-04 for a 95% UCL without the outlier data.

The remaining risk post excavation, without the data outlier would be estimated at 2.19E-04. This is below the risk estimated for soil concentrations in background samples. EPA believes the Navy may be able to justify, by including discussion in the *Status Survey Report*, having met CERCLA criteria since the concentration of radionuclides in soils remaining after excavation is below background, even when the associated risk is "a few" above 10⁻⁴ risk. OSWER 9285.6-20 protectiveness criteria allows for risk slightly above 10⁻⁴ risk in

situations where site specific conditions may justify so. See Q34 of OSWER 9285.6-20, Page 27.

If you have any questions, please feel free to call me at (215) 814-3357,

Sincerely,



Robert Thomson, P.E., REM
Office of Federal Facility Remediation (3HS11)

Attachments (2)

Cc: Curtis DeTore (MDE - Baltimore)
Travis Wray (NSWC-IH)

**Site-Specific
Resident Risk for Soil**

DCGL = 3 pCi/g

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr pCi/g)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Concentration (pCi/g)	Particulate Emission Factor (m ³ /kg)	Lambda (1/yr)	Halflife (yr)	1000 m ³ Soil Volume Area Correction Factor
Th-232+D	S	S	8.70E-08	4.04E-06	1.56E-09	2.17E-09	3.00E+00	1.36E+09	4.93E-11	1.41E+10	8.17E-01
<i>*Total Risk</i>											

100 cm Soil Volume Gamma Shielding Factor	Wet Soil-to-plant transfer factor (pCi/g-fresh plant per pCi/g-wet soil)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Produce Consumption Risk	Total Risk
9.05E-05	1.83E-03	7.29E-06	3.09E-08	6.75E-05	7.52E-04	8.27E-04
-	-	<i>7.29E-06</i>	<i>3.09E-08</i>	<i>6.75E-05</i>	<i>7.52E-04</i>	<i>8.27E-04</i>

Site-Specific
Resident Risk for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr pCi/g)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Background Concentration (pCi/g)	Particulate Emission Factor (m ³ /kg)	Lambda (1/yr)	Half-life (yr)	1000 m ² Soil Volume Area Correction Factor
Th-232+D	S	S	8.70E-08	4.04E-06	1.56E-09	2.17E-09	1.18E+00	1.36E+09	4.93E-11	1.41E+10	8.17E-01
<i>*Total Risk</i>											

100 cm Soil Volume Gamma Shielding Factor	Wet Soil-to-plant transfer factor (pCi/g-fresh plant per pCi/g-wet soil)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Produce Consumption Risk	Total Risk
9.05E-05	1.83E-03	2.87E-06	1.22E-08	2.66E-05	2.96E-04	3.25E-04
-	-	2.87E-06	1.22E-08	2.66E-05	2.96E-04	3.25E-04

Site-Specific
Resident Risk for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr pCi/g)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Concentration (pCi/g)	Particulate Emission Factor (m ³ /kg)	Lambda (1/yr)	Half-life (yr)	1000 m ³ Soil Volume Area Correction Factor
Th-232+D	S	S	8.70E-08	4.04E-06	1.56E-09	2.17E-09	9.35E-01	1.36E+09	4.93E-11	1.41E+10	8.17E-01
<i>*Total Risk</i>											

Post Excavation

100 cm Soil Volume Gamma Shielding Factor	Wet Soil-to-plant transfer factor (pCi/g-fresh plant per pCi/g-wet soil)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Produce Consumption Risk	Total Risk
9.05E-05	1.83E-03	2.27E-06	9.63E-09	2.10E-05	2.34E-04	2.58E-04
-	-	2.27E-06	9.63E-09	2.10E-05	2.34E-04	2.58E-04

Site-Specific
Resident Risk for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr pCi/g)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Concentration (pCi/g)	Particulate Emission Factor (m ³ /kg)	Lambda (1/yr)	Half-life (yr)	1000 m ² Soil Volume Area Correction Factor
Th-232+D	S	S	8.70E-08	4.04E-06	1.56E-09	2.17E-09	7.94E-01	1.36E+09	4.93E-11	1.41E+10	8.17E-01
<i>*Total Risk</i>											

PE w/o multiplier

100 cm Soil Volume Gamma Shielding Factor	Wet Soil-to-plant transfer factor (pCi/g-fresh plant per pCi/g-wet soil)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Produce Consumption Risk	Total Risk
9.05E-05	1.83E-03	1.93E-06	8.18E-09	1.79E-05	1.99E-04	2.19E-04
-	-	1.93E-06	8.18E-09	1.79E-05	1.99E-04	2.19E-04

background samples

	Number of samples	27
0.99 average	1.145	
1.18 STDDEV	0.108	
1.24 95 % Confidence	0.041	
0.99 UCL	1.186	
1.1		
1.14		
0.94		
1.28 median	1.17	
1.17		
1.28		
1.12		
1.05		
1.25		
1.08		
1.24		
0.99		
1.02		
1.02		
1.18		
1.25		
1.28		
1.23		
1.3		
1.23		
1.06		
1.17		
1.14		

post excavation sample summary table

	Number of samples	24
0.636 average	0.7843	
0.871 STDDEV	0.3778	
0.972 95 % Confidence	0.1511	
0.801 UCL	0.9355	
0.717		
0.468		
0.751		
0.753 median	0.72	
0.439		
1.22		
0.56		
0.647		
0.857		
0.689		
2.33		
0.725		
1		
0.694		
0.597		
0.724		
0.723		
0.688		
0.349		
0.613		

post excavation sample summary table minus outlier

	Number of samples	23
0.636	average	0.717
0.871	STDDEV	0.189
0.972	95 % Confidence	0.077
0.801	UCL	0.795
0.717		
0.468		
0.751		
0.753	median	0.717
0.439		
1.22		
0.56		
0.647		
0.857		
0.689		
0.725		
1		
0.694		
0.597		
0.724		
0.723		
0.688		
0.349		
0.613		

without 2.33 outlier