Staszak, Janna/VBO

From: Doran,Karen [Karen.Doran@deq.virginia.gov]
Sent: Monday, December 21, 2009 2:10 PM
To: Jones, Adrienne/VBO; Bob Stroud; Staszak, Janna/VBO; John Burchette; Walter Bell
Subject: SJCA Site 11 Risk Evaluation Tech Memo - VDEQ comments
Attachments: image001.jpg; TM_Site 11 HHRS update_Dec09 - VDEQ comments.pdf

Team -

See attached for VDEQ comments on the above referenced report.

Thank you for the opportunity to comment.

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Updated Risk Evaluation for Site 11, St. Juliens Creek Annex, Chesapeake, Virginia

PREPARED FOR: Walter Bell/NAVFAC Mid-Atlantic
Robert Stroud/USEPA Region 3
Karen Doran/VDEQ

PREPARED BY: CH2M HILL

DATE: December 16, 2009

This Technical Memorandum presents an updated human health risk evaluation of Site 11 (Figure 1). The investigation results for Site 11, along with several other sites and areas of concern at St. Juliens Creek Annex (SJCA), were presented and evaluated, including a human health risk screening, in the *Site Screening Assessment Report* (SSA; CH2M HILL, 2002). The SSA concluded that Site 11 was fully characterized and recommended no further action for soil. However, a recent review of Table 6-2 from the SSA (i.e., the Phase I - Screening of Chemicals of Potential Concern for Surface Soil Results for Site 11) indicated that Aroclor-1260 had been inadvertently dropped out of the risk screening early. SSA Table 6-2 provides a comparison of the maximum detected concentrations of each constituent to Environmental Protection Agency (EPA) Region 3's residential risk-based soil concentration and the established SJCA background level. The detected concentration of Aroclor-1260 (i.e., 6,100 µg/kg) exceeded EPA Region 3's residential soil risk-based concentration (RBC) of 320 µg/kg. Although a background level for Aroclor-1260 was not established, the concentration of Aroclor-1260 was inadvertently flagged as being below background concentrations and Aroclor-1260 was not identified as a chemical of potential concern (COPC) and was eliminated from further evaluation. Risk estimates of the identified COPCs in Table 6-2 of the SSA were calculated and presented in Table 6-4 of the SSA; the cumulative risk and hazard estimates for Site 11 were below the EPA targets risk (i.e., 1×10^{-4}) and hazard (i.e., 1). Aroclor-1260 was not included in these risk estimates. This Technical Memorandum presents the updated screening tables identifying Aroclor-1260 as a COPC and the risk estimates for the all the COPCs at Site 11, including Aroclor-1260. The methodology of the risk evaluation performed in the SSA is briefly described below.

Human Health Risk Screening

A conservative preliminary human health risk screening was performed to determine the potential for human health risks associated with exposure to detected constituents in surface soil at Site 11. The human health risk screening for Site 11 was conducted in two steps using a risk ratio technique (U.S. Navy, 2000). If COPCs were identified after Step 1, the COPCs were evaluated in Step 2. The two-step screening process is described below:

Step 1. The maximum detected constituent concentrations in surface soil were compared to EPA Region 3 RBCs, from the EPA Region III RBC Table available at the time period the

Summary of Comments on General Comments:

Page: 1

Number: 1 Author: rwe77465 Subject: Cross-Out Date: 12/21/2009 1:18:13 PM -05'00'

Number: 2 Author: rwe77465 Subject: Note Date: 12/21/2009 1:20:32 PM -05'00'
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SSA was prepared (USEPA, May 2001) and site background concentrations. RBCs based on noncarcinogenic effects were divided by 10 to account for exposure to multiple constituents (i.e., were adjusted to a hazard quotient of 0.1, from the hazard quotient of 1.0 used on the RBC table). RBCs based on carcinogenic endpoints were used as presented in the RBC table, and are based on a carcinogenic risk of 1×10^{-6}.

If the maximum detected concentration exceeded the appropriate RBC and background concentration, the screening level risk evaluation proceeded to Step 2.

Step 2. For constituents identified as COPCs in Step 1, an apparent risk level was calculated using the following equation:

$$\text{apparent risk level} = \frac{\text{concentration} \times \text{acceptable risk level}}{\text{RBC}}$$

The concentration is the maximum detected concentration (the same concentration that was used in Step 1). The acceptable risk level is 1 for noncarcinogens and 1×10^{-6} for carcinogens. RBCs for noncarcinogenic effects were not adjusted by 10 as was done in Step 1, instead they are used as presented in the RBC table. All of the apparent risk levels for each constituent within a media were summed to calculate the cumulative apparent hazard index (for noncarcinogens) and cumulative apparent carcinogenic risk (for carcinogens). A cumulative apparent hazard index is also calculated for each target organ/effect. If the cumulative apparent hazard index for a target organ/effect is greater than 1, or the cumulative apparent carcinogenic risk is greater than 1×10^{-4}, the constituents contributing to these values are retained as COPCs and further evaluation of the site may be necessary.

Human Health Risk Screening Results

Step 1: Table 1 shows the results of the Step 1 screening. Chromium, copper, lead, Aroclor-1260, dieldrin, and benzo(a)pyrene were identified as COPCs for the surface soil; therefore, these COPCs ~~was~~ carried forward to Step 2.

Step 2: The Step 2 risk ratio screening for Site 11, shown on Table 2 eliminated all chemicals as COPCs. The cumulative apparent hazard index of 0.3 is below the target level of 1. The cumulative apparent risk of 2.7×10^{-5} is below the target risk level of 1×10^{-4}. Therefore, exposure to surface soil would not be expected to result in any unacceptable human health risks based on data collected during the SSA.

Conclusions

The addition of Aroclor-1260 would not have changed the results of the risk evaluation presented in the SSA (CH2M HILL, 2002). The risk/hazard estimates for COPCs are below the target levels and the exposure to surface soil would not be expected to result in any unacceptable human health risks.

Number: 1 Author: rwe77465 Subject: Highlight Date: 12/21/2009 1:54:46 PM -05'00'
What if there is no background concentration as in our situation?

Number: 2 Author: rwe77465 Subject: Replacement Text Date: 12/21/2009 1:55:12 PM -05'00'
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References

CH2M HILL. 2002. Site Screening Assessment Report, St. Juliens Creek Annex Chesapeake, Virginia. April

U.S. Navy. 2000. *Overview of Screening, Risk Ratio, and Toxicological Evaluation*. Procedures for Northern Division Human Health Risk Assessments. May 2000.

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Legend
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- Site 11

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Figure 1
Site Location
Updated Risk Evaluation for Site 11
St. Juliens Creek Annex
Chesapeake, Virginia

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Table 1
Site 11 - Hazardous Disposal Area Building 53
Phase I - Screening of Chemicals of Potential Concern for Surface Soil
1996 RRR Data Collection Study
St. Julien's Creek Annex, Chesapeake, VA

Analyte	Detection Frequency	Maximum Detected Concentration*	Sample Location of Maximum Detected Concentration	Adjusted Residential Soil RBC	Exceeds RBC?	Background UTL**	Exceeds Background Concentration?
Inorganics (MG/KG)							
Aluminum	1 - 1	7,400	SJC011SS01	7,800	No	21,155	No
Arsenic	1 - 1	3.3	SJC011SS01	0.43	Yes	5.5	No
Barium	1 - 1	148	SJC011SS01	550	No	61	Yes
Beryllium	1 - 1	0.29	SJC011SS01	16	No	0.6	No
Cadmium	1 - 1	2.1	SJC011SS01	7.8	No	NS	--
Calcium	1 - 1	1,040	SJC011SS01	NA	Human Nutrient	57,405	No
Chromium	1 - 1	32.3	SJC011SS01	23	Yes	28	Yes
Cobalt	1 - 1	1.9	SJC011SS01	160	No	6.3	No
Copper	1 - 1	362	SJC011SS01	310	Yes	38	Yes
Iron	1 - 1	9,780	SJC011SS01	2,300	Yes	17,494	No
Lead	1 - 1	1,040	SJC011SS01	400	Yes	92	Yes
Magnesium	1 - 1	507	SJC011SS01	NA	Human Nutrient	1,853	No
Manganese	1 - 1	61.6	SJC011SS01	160	No	133	No
Mercury	1 - 1	0.73	SJC011SS01	2.3	No	0.34	Yes
Nickel	1 - 1	10.4	SJC011SS01	160	No	11	No
Potassium	1 - 1	410	SJC011SS01	NA	Human Nutrient	1,067	No
Sodium	1 - 1	51.5	SJC011SS01	NA	Human Nutrient	NS	--
Vanadium	1 - 1	24.3	SJC011SS01	55	No	39	No
Zinc	1 - 1	461	SJC011SS01	2,300	No	131	Yes
Pesticides/PCB (UG/KG)							
4,4'-DDE	1 - 1	56	SJC011SS01DL	1,900	No	1,116	No
4,4'-DDT	1 - 1	74	SJC011SS01DL	1,900	No	566	No
Aroclor-1260[1]	1 - 1	6100	SJC011SS01DL	320	Yes	NS	--
Dieldrin	1 - 1	63	SJC011SS01DL	40	Yes	5.7	Yes
Endrin	1 - 1	170	SJC011SS01DL	2,300	No	5.7	Yes
Fluoranthene	1 - 1	1800	SJC011SS01	310,000	No	469	Yes
Semivolatile Organics (UG/KG)							
Anthracene	1 - 1	210	SJC011SS01	2,300,000	No	NS	--
Benzo(a)anthracene	1 - 1	790	SJC011SS01	870	No	221	Yes
Benzo(a)pyrene	1 - 1	570	SJC011SS01	87	Yes	253	Yes
Benzo(b)fluoranthene	1 - 1	870	SJC011SS01	870	No	316	Yes
Benzo(g,h,i)perylene	1 - 1	320	SJC011SS01	230,000	No	219	Yes
Benzo(k)fluoranthene	1 - 1	380	SJC011SS01	8,700	No	241	Yes
Chrysene	1 - 1	820	SJC011SS01	87,000	No	277	Yes
Indeno(1,2,3-cd)pyrene	1 - 1	330	SJC011SS01	310,000	No	NS	--
Phenanthrene	1 - 1	1,500	SJC011SS01	230,000	No	149	Yes
Pyrene	1 - 1	1,700	SJC011SS01	230,000	No	480	Yes
Volatile Organics (UG/KG)							
Methylene Chloride	1 - 1	6	SJC011SS01	85,000	No	NS	--
Trichloroethene	1 - 1	6	SJC011SS01	58,000	No	NS	--

Constituents selected as COPCS if maximum detected concentration exceeds RBC and background concentration as indicated by shading.

NA = No available RBC

NS = Constituent not analyzed in background data

Chromium VI RBC used as a surrogate for chromium.

Mercuric chloride RBC used as a surrogate for mercury.

Pyrene RBC used as a surrogate for benzo(g,h,i)pyrene and phenanthrene.

* Data from 1996 RRR; therefore, data was not validated.

** Maximum detected concentration compared with UTL of background surface/subsurface soil samples from the Urban-Udorthents soil type.

[1] Aroclor-1260 was inadvertently eliminated as a COPC in the SSA (CH2M HILL, 2002).

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Please make a note on this table that it has been updated.

Table 2
Site 11 - Hazardous Disposal Area Building 53
Phase II - Screening of Chemicals of Potential Concern for Surface Soil
1996 Data Collection Study
St. Julien's Creek Annex, Chesapeake, VA

Analyte	Maximum Detected Concentration*	Sample Location of Maximum Detected Concentration	Residential Soil RBC	Basis of RBC	Apparent Hazard Index	Apparent Cancer Risk
Inorganics (MG/KG)						
Chromium	32.3	SJC011SS01	230	NC	0.14	
Copper	362	SJC011SS01	3100	NC	0.12	
Lead	1,040	SJC011SS01				
Pesticides/PCB (UG/KG)						
Aroclor-1260[1]	6100	SJC011SS01DL	320	C		1.9E-05
Dieldrin	63	SJC011SS01DL	40	C		1.6E-06
Semivolatile Organics (UG/KG)						
Benzo(a)pyrene	570	SJC011SS01	87	C		6.6E-06
Cumulative Apparent Hazard Index					0.3	
Cumulative Apparent Cancer Risk						2.7E-05

NC = non-cancer

C = cancer

* Data from 1996 RRR; therefore, data was not validated.

Apparent Hazard Index equals maximum detected concentration divided by RBC.

Apparent Cancer Risk equals maximum detected concentration divided by RBC multiplied by 10-6.

Cumulative Apparent Hazard Index equals sum of apparent hazard indices for each constituent.

Cumulative Apparent Cancer Risk equals sum of apparent cancer risks for each constituent.

All constituents selected as COPCs if cumulative apparent hazard index above 1 or cumulative apparent cancer risk above 10-4, otherwise, none of the constituents selected as COPCs.

[1] Aroclor-1260 was inadvertently eliminated as a COPC in the SSA (CH2M HILL, 2002) and was not included in the risk estimates.

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