TECHNICAL MEMORANDUM CH2MHILL

Site Visit, Confirmatory Sampling, and Analytical Results for the Southwest Area at Site 17, NSF-IH, Indian Head, MD

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Introduction

The Navy used Site 17 as a metal parts and drum disposal area from the 1960s until the early 1980s (CH2M HILL, 2004a). Remedial investigations conducted in 2000 and 2002 identified ecological risks from lead, mercury, and zinc in surface soil at Site 17 (CH2M HILL, 2004a). The results of these investigations were used to prepare an Engineering Evaluation/Cost Analysis (EE/CA) (CH2M HILL, 2004b). The overall objective of the EE/CA was to reduce risks to ecological receptors associated with site soil in the Southwest and Northwest Areas to acceptable levels (Figure 1). This was to be achieved through a removal action consisting of excavation and removal of impacted soil and removal of rusted drums from the site. Excavation and removal activities were performed by the Navy's Removal Action Contractor (RAC), Shaw Group, Inc. (Shaw) in accordance with the *Final Work Plan, Remedial/Removal Action for Site 42 – Olsen Road Landfill and Site 17* (Shaw Environmental, Inc., 2005).

This technical memorandum presents the field observations made during the site visits conducted during excavation, confirmatory sampling, analytical results, and discussions with the Navy, the United States Environmental Protection Agency (EPA), and the Maryland Department of the Environment (herein referred to as the "Team") with respect only to the Southwest Area.

Site Visits

CH2M HILL conducted site visits from October 26 through October 28, 2005. During the site visits, CH2M HILL observed excavation of soil from the Southwest Area down to 1 foot below ground surface (bgs).

CH2M HILL arrived at Site 17 on October 26, 2005; however, Brian Harris/Shaw, Site Supervisor, informed CH2M HILL that no excavation activities would occur that day because of recent heavy rains. It was observed that approximately 60 percent of soil (approximately 7,000 square feet of area; approximately 260 cubic yards) from the Southwest Area had already been removed.

CH2M HILL was onsite again on October 27, 2005. A Health and Safety (H&S) briefing, including a Munitions and Explosives of Concern (MEC) H&S briefing, was given to CH2M HILL for the site activities. During the day, Shaw excavated and stockpiled approximately 4,000 square feet (approximately 150 cubic yards) of soil using a backhoe. The soil was then placed into a screener with a backhoe. Soil excavated contained mostly wood debris and rebar pieces. After the soil was screened, it was temporarily stockpiled within the Southwest Area excavation. Periodically, Shaw had to cease excavation operations and clean out the screener due to large wood debris trapped within the screener. Prior to stockpiling, Shaw laid a gravel road connecting Site 11 and Site 17 to create an easier right of way for equipment and vehicles. As of October 27, 2005, approximately 80 percent of soil had been excavated from the Southwest Area.

On October 28, 2005, CH2M HILL was onsite to observe the continued excavation activities at Site 17. During the day, approximately 2,000 square feet (approximately 75 cubic yards) of soil was excavated. It also contained mostly wood debris and rebar pieces. Operations also ceased during this day in order to clean out the screener. Shaw completed the excavation of the Southwest Area down to 1 ft bgs on October 28, 2005.

According to Brian Harris/Shaw, all screened soil will be transported and staged at adjacent Site 11. During CH2H HILL's site visit, the excavated soil from Site 17 had not been transported to Site 11 and remained stockpiled at Site 17. CH2M HILL did not observe Shaw cover the stockpile while it was staged at Site 17. CH2M HILL observed sand and plastic lining being placed at Site 11 in preparation for the Site 17 soil. During the 3 days, CH2M HILL was present at the site, only part of the work performed at the Southwest Area was observed. CH2M HILL did not observe the excavation of soil from the Northeast Area or drum removal. Brian Harris/Shaw informed CH2M HILL that excavation of the Northwest Area and drum removal was planned for the week of October 31, 2005.

Confirmatory Sampling Activities

Upon completion of the excavation activities on October 28, 2005, confirmatory samples were collected in accordance with the Verification Sampling and Analysis Plan (CH2M HILL, 2005). Four composite soil samples, IS17SC01, IS17SC02, IS17SC03, and IS17SC04, were collected (Figure 2). Each individual composite sample was comprised of four grab samples from each of the four sidewalls within the excavation and collected at a depth of 0-6 inches.

The samples were collected with a disposable plastic trowel, placed in a stainless steel bowl, and homogenized. Following homogenization of each composite sample, the sample was placed in a 2 oz. glass jar, and placed in a cooler with ice. All non-dedicated sampling equipment was decontaminated prior to and after sampling. Quality assurance/quality control (QA/QC) samples, including a field blank, equipment blank, matrix spike/matrix spike duplicate (MS/MSD) samples were also collected. The samples were packed and shipped priority overnight under chain-of-custody to Katahdin Analytical Services. All samples were analyzed on a 72-hour turn-around-time for lead, mercury, and zinc. Table 1 presents a summary of the samples collected and the analyses performed.

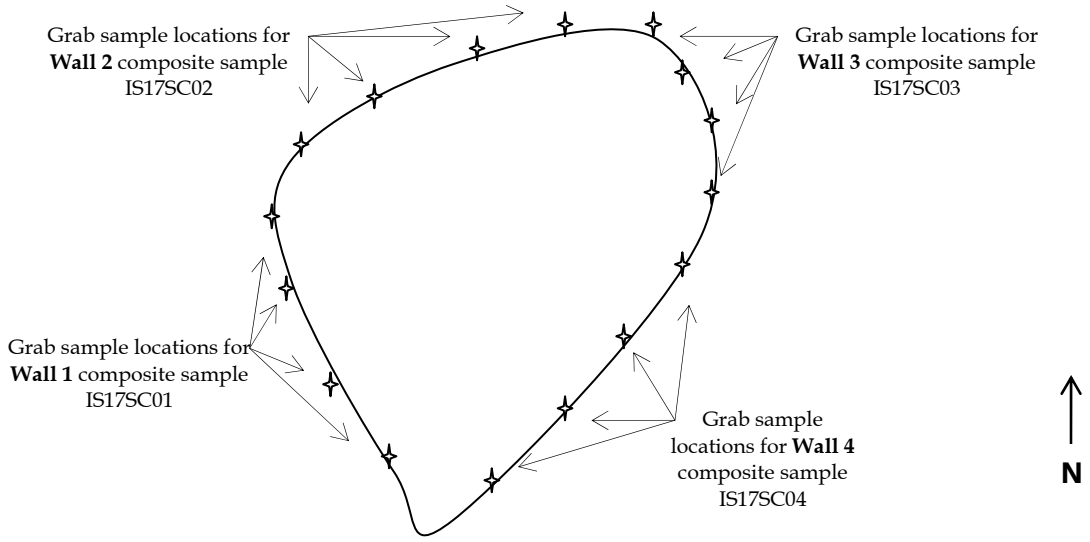

FIGURE 2
Confirmatory Sample Locations - Southwest Area Excavation
NSF-IH, Indian Head, Maryland

Confirmatory Sample Analytical Results

On November 4, 2005, the unvalidated sample results for the four composite samples were received from the laboratory. The data were compared to the soil remediation goals (SRGs) (presented on Figure 1) to determine if risks were acceptable or if additional excavation was warranted. Figure 3 (presented as Figure 4-1 in the VSAP) shows the decision flow chart that was used in the risk management decision-making process. The arithmetic mean concentration for each constituent of concern (COC) was calculated and compared to the SRGs. The mean concentration for lead (68.37 mg/kg) did not exceed the SRG of 500 mg/kg. The mean concentrations for mercury (0.22 mg/kg) and zinc (225.1 mg/kg) exceed the SRGs of 0.15 mg/kg and 200 mg/kg, respectively. Table 2 presents the unvalidated sample results and application of the decision rules process.

On November 7, 2005, a conference call was held with the Team to discuss the unvalidated confirmatory sample results and risk management decisions. The Team discussed the mean

concentrations of mercury and zinc in relation to the preliminary remediation goals (PRGs) developed for Site 28, which were based on soil bioassays conducted at Site 47, NSF-IH. The maximum concentrations of mercury and zinc in the soil toxicity tests for Site 47 were 3.0 mg/kg and 219 mg/kg, respectively. These concentrations did not produce any adverse effects on growth or survival of earthworms during laboratory bioassays. These bioassay results were not available during selection of the PRGs for Site 17. The SRGs selected for Site 17 were based on published SRG values for ecological endpoints (Efroymson *et al.*, 1997), which were developed for general use at the Oak Ridge Reservation, Tennessee.

The Team also discussed the recent bioassay data from the Lab Area at NSF-IH, which indicated that concentrations of zinc in site soils up to 586 mg/kg did not have adverse effects on the survival of earthworms. The Team weighed all of this information and arrived at a consensus that the scope of the removal was sufficiently protective of ecological receptors and that backfilling of the excavation should proceed, pending EPA's approval after checking with the Biological Technical Assistance Group. On November 22, 2005, CH2M HILL received an e-mail from EPA stating that it was appropriate to backfill the excavation without further soil removal.

Table 3 presents the validated data for the confirmatory samples.

References

CH2M HILL, 2005. *Site 17 Verification Sampling and Analysis Plan, Naval District Washington, Indian Head, Indian Head, Maryland.*

CH2M HILL, 2004a. *Final Remedial Investigation Report, Site 11, 13, 17, 21, and 25, Naval District Washington, Indian Head, Indian Head, Maryland.*

CH2M HILL, 2004b. *Final Engineering Evaluation/Cost Analysis for Site 17, Naval District Washington, Indian Head, Indian Head, Maryland.*

Efroymson, R.A., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. *Preliminary Remediation Goals for Ecological Endpoints*. Environmental Restoration Division, ORNL Environmental Restoration Program. ES/ER/TM-162/R2.

Shaw Environmental, Inc. 2005. *Final Work Plan, Remedial/Removal Action for Site 42 – Olsen Road Landfill and Site 17, Naval District Washington, Indian Head, Indian Head, Maryland.*

TABLE 1
Summary of Confirmation Samples Collected and Analyses
Site Visit, Confirmatory Sampling, and Analytical Results for the Southwest Area at Site 17
NSF-IH, Indian Head, Maryland

Sample Identification	Type of Sample	Analysis	
		Lead and Zinc by ICP (SW846-6010B)	**Mercury by cold vapor (SW846-7471B)**
IS17SCS01[1]	Composite soil from Wall 1	X	X
IS17SCS02[1]	Composite soil from Wall 2	X	X
IS17SCS03[1]	Composite soil from Wall 3	X	X
IS17SCS04[1]	Composite soil from Wall 4	X	X
QA/QC Samples			
IS17SCS01	Soil sample MS	X	X
IS17SCS01	Soil sample MSD	X	X
IS17FB102805	Field blank	X	X
IS17EB102805	Equipment blank	X	X

Notes

[1] Sample nomenclature for field samples incorporates the station ID and the sample location. For example, IS17SCS01 is a confirmatory soil sample taken at the Southwest Area from wall 1.

[2] MS/MSD samples will have identical sample IDs to their primary samples.

[3] Sample nomenclature for field blanks incorporates the site ID, the QC type, and the date the sample was collected. For example, IS17FB102805 is a field blank taken at Indian Head Site 17 on October 28, 2005.

Table 2
Unvalidated Analytical Results for Confirmatory Samples and Application of Decision Rules
Site Visit, Confirmatory Sampling, and Analytical Results for the Southwest Area at Site 17
NSF-IH, Indian Head, Maryland

Sample ID	1S17SCS01	1S17SCS02	1S17SCS03	1S17SCS04
Sample Date	10/28/05	10/28/05	10/28/05	10/28/05
Chemical Name				
Total Metals (mg/kg)				
LEAD	81.8	14.8	120	56.9
MERCURY	0.07	0.04	0.36	0.41
ZINC	598	51.4	107	144

Note:
A highlighted cell indicates that the concentration of this composite sample is driving the SRG exceedance.

Lead	
Mean	68.375
Standard Error	22.07435824
Median	69.35
Mode	#N/A
Standard Deviation	44.14871648
Sample Variance	1949.109167
Kurtosis	0.004605973
Skewness	-0.11837043
Range	105.2
Minimum	14.8
Maximum	120
Sum	273.5
Count	4
Largest(1)	120
Smallest(1)	14.8
Confidence Level(95.0%)	70.25045981

Mercury	
Mean	0.22
Standard Error	0.096003
Median	0.215
Mode	#N/A
Standard Deviation	0.192007
Sample Variance	0.036867
Kurtosis	-5.545574
Skewness	0.037295
Range	0.37
Minimum	0.04
Maximum	0.41
Sum	0.88
Count	4
Largest(1)	0.41
Smallest(1)	0.04
Confidence Level(95.0%)	0.305526

Zinc	
Mean	225.1
Standard Error	125.7480682
Median	125.5
Mode	#N/A
Standard Deviation	251.4961365
Sample Variance	63250.30667
Kurtosis	3.567647112
Skewness	1.862130389
Range	546.6
Minimum	51.4
Maximum	598
Sum	900.4
Count	4
Largest(1)	598
Smallest(1)	51.4
Confidence Level(95.0%)	400.1864751

Decision Rules

Calculate Summary statistics including arithmetic mean at the EA

	Lead	Mercury	Zinc
Compare mean conc of each COC to respective SRGs	Pb = 68.37 mg/kg	Hg = 0.22 mg/kg	Zn = 225.1 mg/kg
Is mean < SRG	SRG for Pb = 500 mg/kg	SRG for Hg = 0.15 mg/kg	SRG for Zn = 200 mg/kg
	yes	no	no
Yes: Removal action is complete; backfill hole	Complete for Pb		
No: Risk management decision		Risk management decision	Risk management decision

Team agrees levels left in place are protective of the environment and further excavation is not warranted?

Yes: Removal action is complete; backfill hole

No: Identify which composite sample is driving the exceedance; excavate, then sample.

Table 3
Validated Analytical Results for Confirmatory Samples
Site Visit, Confirmatory Sampling, and Analytical Results for the Southwest Area at Site 17
NSF-IH, Indian Head, Maryland

Station ID	IS17SO01	IS17SO02	IS17SO03	IS17SO04
Sample ID	IS17SCS01	IS17SCS02	IS17SCS03	IS17SCS04
Sample Date	10/28/05	10/28/05	10/28/05	10/28/05
Total Metals (MG/KG)				
Lead	81.8 L	14.8 L	120 L	56.9 L
Mercury	0.07 L	0.04 L	0.36 L	0.41 L
Zinc	598	51.4	107	144
Wet Chemistry (MG/KG)				
% Solids	81	79	78	83

Notes:
L = Reported value may be biased low.

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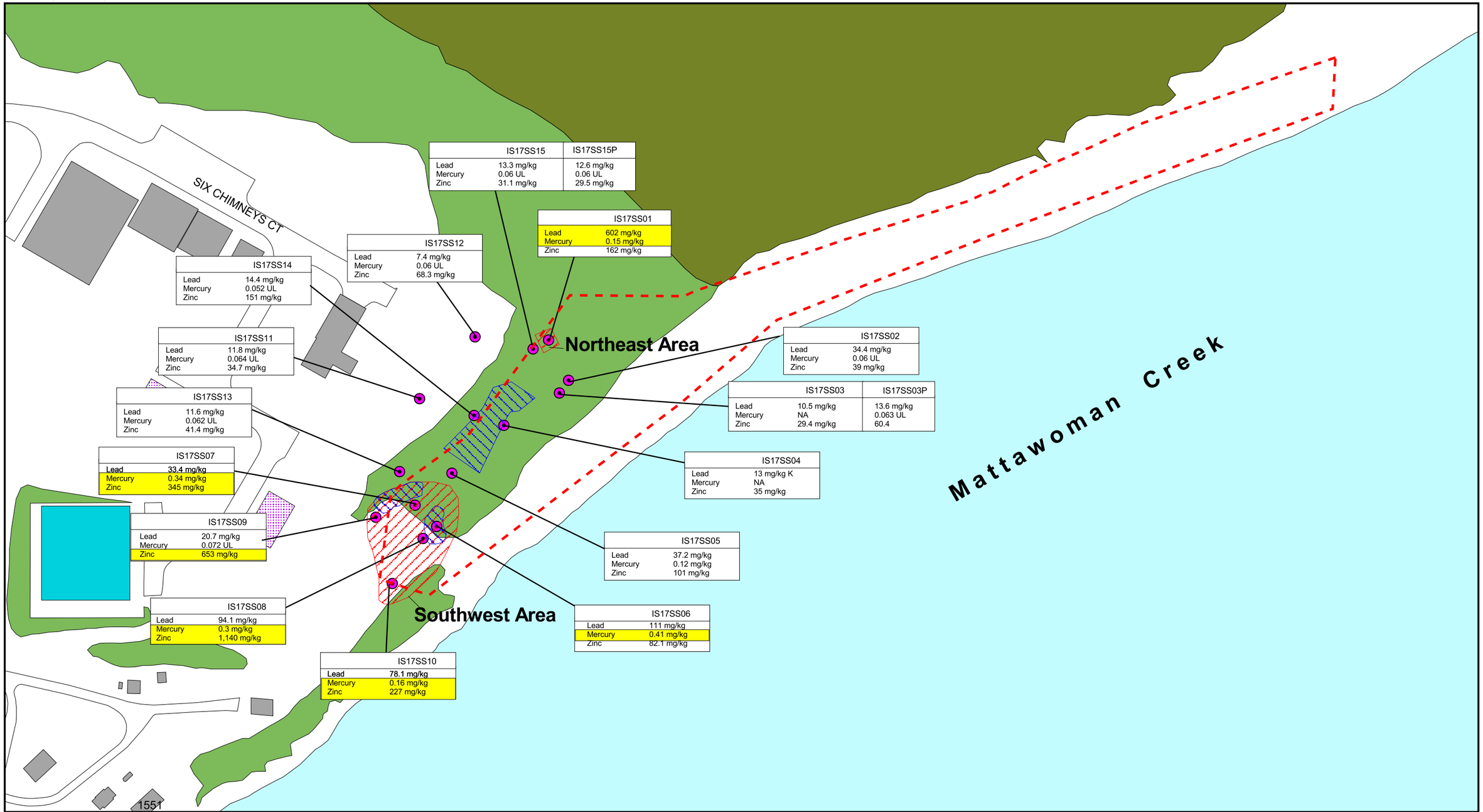

LEGEND

- Surface Soil Sample Location
- Approximate Site Boundary
- Buildings
- Demolished Buildings
- Wooded Area
- Proposed Soil Excavation Area
- Approximate lateral extent of drum removal based on visual Site inspection
- Road
- Dense Wooded Area
- Values that Exceed PRGs
- Pond

Ecological Site Remediation Goals (SRGs):

Lead	500 mg/kg
Mercury	0.15 mg/kg
Zinc	200 mg/kg

Notes:

UL = Below Detection Limit
mg/kg = Milligrams per kilogram

N

0 100 200 Feet

1 inch = 100 feet

Figure 1
Proposed Areas for Soil Excavation and Drum Removal
NSF-IH, Indian Head, Maryland

Note:
This figure is Figure 2-1 in the Site 17 VSAP (CH2M HILL, 2005)

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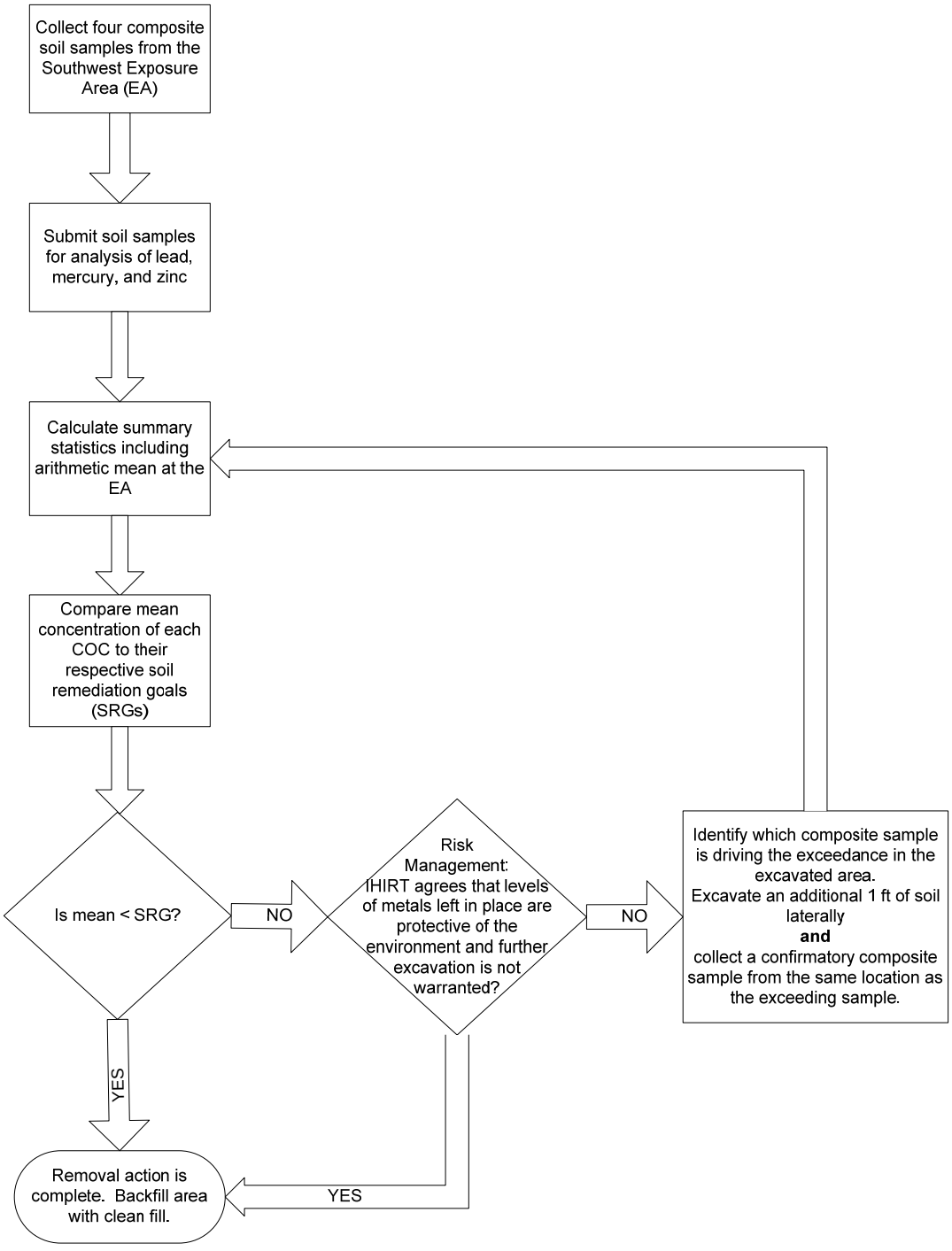

Figure 3
Confirmatory Sampling Decision Rules
NSF-IH, Indian Head, MD