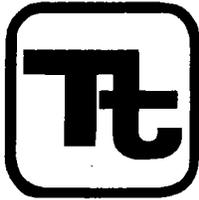


N00639.AR.002094
NSA MID SOUTH
5090.3a

LETTER DISCUSSING PROPOSED PATH FORWARD FOR REMEDIAL ACTIVITIES AT
UNEXPLODED ORDNANCE SITE UXO 2 MILLINGTON SUPPACT TN
4/12/2012
TETRA TECH



DATE: April 12, 2012

TO: Roger Donovan, TDEC; Nashville, TN
Charles Burroughs, TDEC; Nashville, TN

FROM: Lawson Anderson, Tetra Tech; Little Rock, AR
Geoff Pope, Tetra Tech; Memphis, TN

COPIES: Mr. Stacin Martin, NAVFAC Atlantic
Mr. David Criswell, BRAC PMO Southeast
Mr. Rob Williamson, NSA Mid-South
Mr. Jim Heide, NSA Mid-South
Mr. Ralph Basinski, Tetra Tech
Mr. Glenn Wagner, Tetra Tech
Project File – CTO 0107

SUBJECT: Naval Support Activity (NSA) Mid-South
Proposed Path Forward for Remedial Activities at Horse Stables Skeet Range #2
(HSSR#2)

This letter summarizes the results of pre-excavation sampling activities performed at HSSR #2 (Figure 1) to pre-define the limits of soil excavation to be performed at four “hot spots” (two polycyclic aromatic hydrocarbon [PAH] and two lead), as recommended in Appendix D of the September 2010 Site Inspection (SI) Report. The post-SI sampling activities were performed December 6 through 12, 2011 with a follow-up round of sampling on January 17, 2012.

Grab samples were collected along concentric rings centered on the initial “hot-spots” from the SI Report, and extending outward in all directions at regular intervals. The samples were primarily taken at 0- to 1-foot below ground surface (bgs) with a 1- to 2-foot sample taken at each ring of the sampling grid to confirm the vertical extent of impacted soil. Initially, samples collected on the first and third rings around the PAH hot spots and the first and second rings around the lead hot spots were analyzed. The samples were sent to Shealy Environmental Services, Inc. of West Columbia, South Carolina for analysis of PAHs and lead, in accordance with the approved December 2009 Sampling and Analysis Plan (SAP). Visual assessments of skeet fragments at PAH sample locations and initial laboratory results from all locations were used to determine which samples were analyzed from the other rings.

Lead analysis was performed on the samples taken from the two lead hot spot areas (northern and southern). One TCLP-lead analysis was performed on a sample collected at each of the two areas. The lead results for both hot spots are presented on Figure 2. A Benzo(a)pyrene Equivalent (BEQ) calculation was performed on the PAH concentrations reported in each sample collected from the two PAH hot spot areas (northern and southern). The PAH analytical results and BEQ concentrations are

presented in Tables 1 and 2, and the BEQ concentrations are presented on Figures 3 (southern) and 4 (northern). Electronic copies of the data validation reports for all sample analyses are provided on the CD attached to this document (Exhibit A).

Southern Lead "Hot Spot"

Three soil samples (SS097, SS105, and SS106) collected from the southern lead "hot spot" were above the project action limit of 400 milligrams per kilogram (mg/kg) (Figure 2). To address the observed lead exceedances in this area, the Navy proposes to excavate the area illustrated on Figure 5 and vertically 1-foot bgs. The TCLP-lead sample from this area (SS096) returned a value of 6.2 milligrams/liter (mg/L), an exceedance of the TCLP-lead limit of 5 mg/L. Upon removal of the contaminated soil, the excavation will be backfilled with certified clean soil, in accordance with NSA Mid-South and TDEC requirements.

Northern Lead "Hot Spot"

Two soil samples collected from the northern lead "hot spot" (SS080 and SS083) were above the project action limit (400 mg/kg) (Figure 2). To address the observed lead exceedances in this area, the Navy proposes to excavate the area illustrated on Figure 5 to 1-foot bgs. The TCLP-lead sample from this area (SS077) returned a value of 0.3 mg/L, which is below the TCLP-lead limit of 5 mg/L. Upon removal of the contaminated soil, the excavation will be backfilled with certified clean soil.

Southern PAH "Hot Spot"

The soil samples collected from the southern PAH "hot spot", and the corresponding field duplicates, contained BEQ concentrations below the NSA Mid-South background screening level of 0.565 mg/kg established during the RCRA Facility Investigation (Figure 3). The technical memorandum that established the background BEQ screening concentration is attached to this document as Exhibit B. Clay pigeon fragments were not observed during sampling activities. To address the initial exceedance identified during the SI, the Navy proposes to excavate a 20 foot by 20 foot area centered on the initial "hot spot" (Figure 6) and extending vertically to 1-foot bgs. Upon removal of the contaminated soil, the excavation will be backfilled with certified clean soil.

Northern PAH "Hot Spot"

Five soil samples collected from the northern PAH "hot spot" (SS115, SS118, SS121, SS127, and SS140) contained BEQ concentrations above the background screening level of 0.565 mg/kg (Figure 4). Clay pigeon fragments were observed at each of the sampling locations 30 feet out from the initial hot

spot (Figure 4) and within the first six inches bgs. Clay pigeons were not observed farther out than 30 feet from the initial hot spot or at depth intervals deeper than six inches bgs.

The exceedance at SS121 (0.617 mg/kg) was at 1- to 2-foot bgs, and only slightly exceeds the background screening level of 0.565 mg/kg. Furthermore, it is less than the upper end (0.700 mg/kg) of the normally distributed range of values used to calculate the screening level as described in Exhibit B. Based on this information, the Navy believes the BEQ concentration at SS121 to be representative of background conditions and is not related to skeet range activities.

To address the observed BEQ exceedances in this area, the Navy proposes to excavate the area illustrated on Figure 7 and extending vertically 1-foot bgs. Because the outer limits of the contamination on the southwestern portion of the site (SS140) have not been delineated, the Navy recommends that upon completion of excavation to the proposed limits shown on Figure 7, a representative, four-point composite sample be collected from every 50 linear feet along the northwest and southwest sidewalls of that area to confirm that any remaining BEQ concentrations are below 0.565 mg/kg. Upon confirmation of this, the excavation will be backfilled with certified clean soil.

Excavated Soil Disposal

All soil excavated from the two PAH and two lead hot spot areas will be transported to a permitted, off-site facility(ies) for disposal in accordance with TDEC regulations.

TABLES

TABLE 1
Soil Analytical Results - PAH
and BEQ Concentrations
Horse Stables Skeet Range #2 NSA Mid-South, Millington, Tennessee

SOIL

LOCATION		HSSR2-SS061	HSSR2-SS061	HSSR2-SS062	HSSR2-SS062	HSSR2-SS063	HSSR2-SS064	HSSR2-SS065	HSSR2-SS065
SAMPLE ID		HSSR2-SS061-0001	HSSR2-SS061-0102	HSSR2-SS062-0001	HSSR2-SS062-0001-D	HSSR2-SS063-0001	HSSR2-SS064-0001	HSSR2-SS065-0001	HSSR2-SS065-0102
SAMPLE DATE		12/6/2011	12/6/2011	12/6/2011	12/6/2011	12/6/2011	12/6/2011	12/6/2011	12/6/2011
BEQs (MG/KG)									
Calculated BEQ		0.030 U	0.124	0.030 U	0.029 U	0.0372	0.029 U	0.030 U	0.029 U
PAH Analytical Results (ug/kg)									
	TEF								
BENZO(A)ANTHRACENE	0.1	14 U	13 U	13 U	13 U	14 J	13 U	13 U	13 U
BENZO(A)PYRENE	1	30 U	90	30 U	29 U	29 U	29 U	30 U	29 U
BENZO(B)FLUORANTHENE	0.1	28 U	140	27 U	27 U	63	27 U	27 U	27 U
BENZO(K)FLUORANTHENE	0.01	34 U	62	33 U	35 U	33 U	33 U	33 U	33 U
CHRYSENE	0.001	13 U	88	13 U	13 U	13 J	12 U	13 U	12 U
DIBENZO(A,H)ANTHRACENE	1	27 U	27 U	27 U	27 U	26 U	26 U	27 U	26 U
INDENO(1,2,3-CD)PYRENE	0.1	37 U	51	37 U	36 U	36 U	36 U	37 U	36 U

LOCATION		HSSR2-SS066	HSSR2-SS067	HSSR2-SS069	HSSR2-SS070	HSSR2-SS070	HSSR2-SS072	HSSR2-SS113	HSSR2-SS113
SAMPLE ID		HSSR2-SS066-0001	HSSR2-SS067-0001	HSSR2-SS069-0001	HSSR2-SS070-0001	HSSR2-SS070-0102	HSSR2-SS072-0001	HSSR2-SS113-0001	HSSR2-SS113-0102
SAMPLE DATE		12/6/2011	12/6/2011	12/6/2011	12/8/2011	12/8/2011	12/8/2011	12/9/2011	12/9/2011
BEQs (MG/KG)									
Calculated BEQ		0.039	0.0742	0.029 U	0.029 U	0.031 U	0.026 U	0.029 U	0.031 U
PAH Analytical Results (ug/kg)									
	TEF								
BENZO(A)ANTHRACENE	0.1	14 U	41	13 U	13 U	14 U	12 U	13 U	14 U
BENZO(A)PYRENE	1	31 U	48	29 U	29 U	31 U	26 U	29 U	31 U
BENZO(B)FLUORANTHENE	0.1	66	65	27 U	27 U	28 U	24 U	27 U	29 U
BENZO(K)FLUORANTHENE	0.01	35 U	34 U	33 U	33 U	34 U	30 U	33 U	35 U
CHRYSENE	0.001	13 J	48	12 U	12 U	13 U	11 U	13 U	13 U
DIBENZO(A,H)ANTHRACENE	1	28 U	27 U	26 U	26 U	28 U	24 U	27 U	29 U
INDENO(1,2,3-CD)PYRENE	0.1	38 U	37 U	36 U	36 U	38 U	33 U	36 U	39 U

LOCATION		HSSR2-SS114	HSSR2-SS115	HSSR2-SS116	HSSR2-SS116	HSSR2-SS117	HSSR2-SS118	HSSR2-SS118	HSSR2-SS119
SAMPLE ID		HSSR2-SS114-0001	HSSR2-SS115-0001	HSSR2-SS116-0001	HSSR2-SS116-0001-D	HSSR2-SS117-0001	HSSR2-SS118-0001	HSSR2-SS118-0102	HSSR2-SS119-0001
SAMPLE DATE		12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/12/2011
BEQs (MG/KG)									
Calculated BEQ		0.458	1.085	0.191	0.547	0.033	6.174	0.030 U	0.179
PAH Analytical Results (ug/kg)									
	TEF								
BENZO(A)ANTHRACENE	0.1	280	710	120 J	390 J	14 U	4100	13 U	120
BENZO(A)PYRENE	1	350	830	140 J	420 J	30 U	4700	30 U	130
BENZO(B)FLUORANTHENE	0.1	460	1000	170 J	490 J	28 U	5700	28 U	160
BENZO(G,H,I)PERYLENE		200	480	79 J	230 J	28 U	2700	28 U	63
BENZO(K)FLUORANTHENE	0.01	190	550	89 J	340 J	34 U	3000	34 U	90
CHRYSENE	0.001	310	770	130 J	370 J	15 J	4300	13 U	140
DIBENZO(A,H)ANTHRACENE	1	28 U	34 J	27 U	28 U	28 U	220	27 U	27 U
INDENO(1,2,3-CD)PYRENE	0.1	180	440	74 J	210 J	38 U	2400	37 U	61

TABLE 1
Soil Analytical Results - PAH
and BEQ Concentrations
Horse Stables Skeet Range #2 NSA Mid-South, Millington, Tennessee

SOIL

LOCATION		HSSR2-SS121	HSSR2-SS121	HSSR2-SS122	HSSR2-SS123	HSSR2-SS124	HSSR2-SS124	HSSR2-SS125
SAMPLE ID		HSSR2-SS121-0001	HSSR2-SS121-0102	HSSR2-SS122-0001	HSSR2-SS123-0001	HSSR2-SS124-0001	HSSR2-SS124-0001-D	HSSR2-SS125-0001
SAMPLE DATE		12/12/2011	12/12/2011	12/12/2011	12/12/2011	12/12/2011	12/12/2011	12/12/2011
BEQs (MG/KG)								
Calculated BEQ		0.031 U	0.617	0.031 U	0.034	0.029 U	0.029 U	0.029 U
PAH Analytical Results (ug/kg)								
	TEF							
BENZO(A)ANTHRACENE	0.1	14 U	350	14 U	19 J	13 U	13 U	13 U
BENZO(A)PYRENE	1	31 U	480	31 U	30 U	29 U	29 U	29 U
BENZO(B)FLUORANTHENE	0.1	29 U	590	29 U	28 U	27 U	26 U	27 U
BENZO(K)FLUORANTHENE	0.01	35 U	300	35 U	34 U	33 U	32 U	33 U
CHRYSENE	0.001	13 U	430	13 U	18 J	12 U	12 U	13 U
DIBENZO(A,H)ANTHRACENE	1	28 U	27 U	28 U	27 U	26 U	26 U	27 U
INDENO(1,2,3-CD)PYRENE	0.1	39 U	260	38 U	37 U	36 U	35 U	36 U

LOCATION		HSSR2-SS126	HSSR2-SS127	HSSR2-SS128	HSSR2-SS134	HSSR2-SS138	HSSR2-SS138	HSSR2-SS139
SAMPLE ID		HSSR2-SS126-0001	HSSR2-SS127-0001	HSSR2-SS128-0001	HSSR2-SS134-0001	HSSR2-SS138-0001	HSSR2-SS138-0001-D	HSSR2-SS139-0001
SAMPLE DATE		12/12/2011	12/12/2011	12/12/2011	12/12/2011	1/17/2012	1/17/2012	1/17/2012
BEQs (MG/KG)								
Calculated BEQ		0.029 U	2.286	0.031 U	0.030 U	0.024	0.020 U	0.203
PAH Analytical Results (ug/kg)								
	TEF							
BENZO(A)ANTHRACENE	0.1	13 U	1500	14 U	14 U	16 J	20 U	130
BENZO(A)PYRENE	1	29 U	1700	31 U	30 U	20 U	20 U	150
BENZO(B)FLUORANTHENE	0.1	27 U	2500	29 U	28 U	20 U	20 U	210
BENZO(K)FLUORANTHENE	0.01	33 U	1100	35 U	34 U	20 U	20 U	63
CHRYSENE	0.001	12 U	1600	13 U	13 U	17 J	20 U	160
DIBENZO(A,H)ANTHRACENE	1	27 U	79	28 U	27 U	20 U	20 U	20 U
INDENO(1,2,3-CD)PYRENE	0.1	36 U	940	38 U	37 U	20 U	20 U	82

LOCATION		HSSR2-SS140
SAMPLE ID		HSSR2-SS140-0001
SAMPLE DATE		1/17/2012
BEQs (MG/KG)		
Calculated BEQ		3.161
PAH Analytical Results (ug/kg)		
	TEF	
BENZO(A)ANTHRACENE	0.1	1100
BENZO(A)PYRENE	1	2300
BENZO(B)FLUORANTHENE	0.1	2800
BENZO(G,H,I)PERYLENE		1500
BENZO(K)FLUORANTHENE	0.01	930
CHRYSENE	0.001	1500
DIBENZO(A,H)ANTHRACENE	1	320
INDENO(1,2,3-CD)PYRENE	0.1	1400

Notes:

Exceedances of the NSA Mid-South Background BEQ concentration (0.565 mg/kg) are shaded and bolded.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

U = The chemical was not detected.

TABLE 2
Soil Analytical Results - Lead and Lead TCLP Concentrations
Horse Stables Skeet Range #2 NSA Mid-South, Millington, Tennessee

Lead Analytical Results	Location	HSSR2-SS064	HSSR2-SS077	HSSR2-SS078	HSSR2-SS079	HSSR2-SS079	HSSR2-SS080	HSSR2-SS080	HSSR2-SS081	HSSR2-SS082	HSSR2-SS083	HSSR2-SS084	HSSR2-SS084	HSSR2-SS085
	Sample ID	HSSR2-SS064-TCLP	HSSR2-SS077-0001	HSSR2-SS078-0001	HSSR2-SS079-0001	HSSR2-SS079-0002	HSSR2-SS080-0001	HSSR2-SS080-0002	HSSR2-SS081-0001	HSSR2-SS082-0001	HSSR2-SS083-0001	HSSR2-SS084-0001	HSSR2-SS084-0001-D	HSSR2-SS085-0001
	Date	12/6/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011
Lead			250.0	J 210.0	J 120.0	J 7.5	J 780.0	J 7.1	J 7.6	J 14.0	J 420.0	J 210.0	J 190.0	J 29.0
Lead TCLP		0.02	U 0.3											
Lead Analytical Results	Location	HSSR2-SS086	HSSR2-SS086	HSSR2-SS087	HSSR2-SS088	HSSR2-SS089	HSSR2-SS090	HSSR2-SS091	HSSR2-SS092	HSSR2-SS093	HSSR2-SS093	HSSR2-SS094	HSSR2-SS094	HSSR2-SS095-0001
	Sample ID	HSSR2-SS085-0001	HSSR2-SS086-0102	HSSR2-SS087-0001	HSSR2-SS088-0001	HSSR2-SS089-0001	HSSR2-SS090-0001	HSSR2-SS091-0001	HSSR2-SS092-0001	HSSR2-SS093-0001	HSSR2-SS093-0102	HSSR2-SS094-0001	HSSR2-SS094-0001-D	HSSR2-SS095-0001
	Date	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/9/2011	12/9/2011
Lead		320.0	J 8.8	J 8.1	J 7.3	J 9.9	J 160.0	J 12.0	J 330.0	J 390.0	J 7.6	J 12.0	J 14.0	J 240.0
Lead TCLP														
Lead Analytical Results	Location	HSSR2-SS095	HSSR2-SS096	HSSR2-SS097	HSSR2-SS097	HSSR2-SS098	HSSR2-SS098	HSSR2-SS099	HSSR2-SS101	HSSR2-SS102	HSSR2-SS103	HSSR2-SS104	HSSR2-SS104	HSSR2-SS105
	Sample ID	HSSR2-SS095-0102	HSSR2-SS096-0001	HSSR2-SS097-0001	HSSR2-SS097-0102	HSSR2-SS098-0001	HSSR2-SS098-0001	HSSR2-SS099-0001	HSSR2-SS101-0001	HSSR2-SS102-0001	HSSR2-SS103-0001	HSSR2-SS104-0001	HSSR2-SS104-0102	HSSR2-SS105-0001
	Date	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011
Lead		11.0	J 170.0	J 790.0	J 9.2	J 98.0	J 42.0	J 170.0	J 91.0	J 20.0	J 53.0	J 97.0	J 8.0	J 530.0
Lead TCLP			6.2											
Lead Analytical Results	Location	HSSR2-SS106	HSSR2-SS107	HSSR2-SS107	HSSR2-SS108	HSSR2-SS109	HSSR2-SS110	HSSR2-SS110	HSSR2-SS111	HSSR2-SS112	HSSR2-SS114	HSSR2-SS135	HSSR2-SS136	HSSR2-SS136
	Sample ID	HSSR2-SS106-0001	HSSR2-SS107-0001	HSSR2-SS107-0001-D	HSSR2-SS108-0001	HSSR2-SS109-0001	HSSR2-SS110-0001	HSSR2-SS110-0102	HSSR2-SS111-0001	HSSR2-SS112-0001	HSSR2-SS114-TCLP	HSSR2-SS135-0001	HSSR2-SS136-0001	HSSR2-SS136-0001-D
	Date	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	1/17/2012	1/17/2012	1/17/2012
Lead		480.0	J 260.0	J 190.0	J 130.0	J 8.6	J 7.9	J 9.3	J 28.0	J 380.0	J	J 8.6	J 8.7	J 7.1
Lead TCLP											0.02	U		
Lead Analytical Results	Location	HSSR2-SS137												
	Sample ID	HSSR2-SS137-0001												
	Date	1/17/2012												
Lead		11.0	J											
Lead TCLP														

Notes:
Exceedances of the project action limit for lead (400 mg/kg) and lead TCLP (5 mg/L) are shaded and bolded.
Data Qualifiers:
Blank (i.e., no qualifier) = the chemical was detected.
J = The chemical was detected but the concentration reported is an estimated value.
U = The chemical was not detected.
U = The chemical was not detected.
Acronyms:
TCLP = Toxicity characteristic leaching procedure
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter

FIGURES

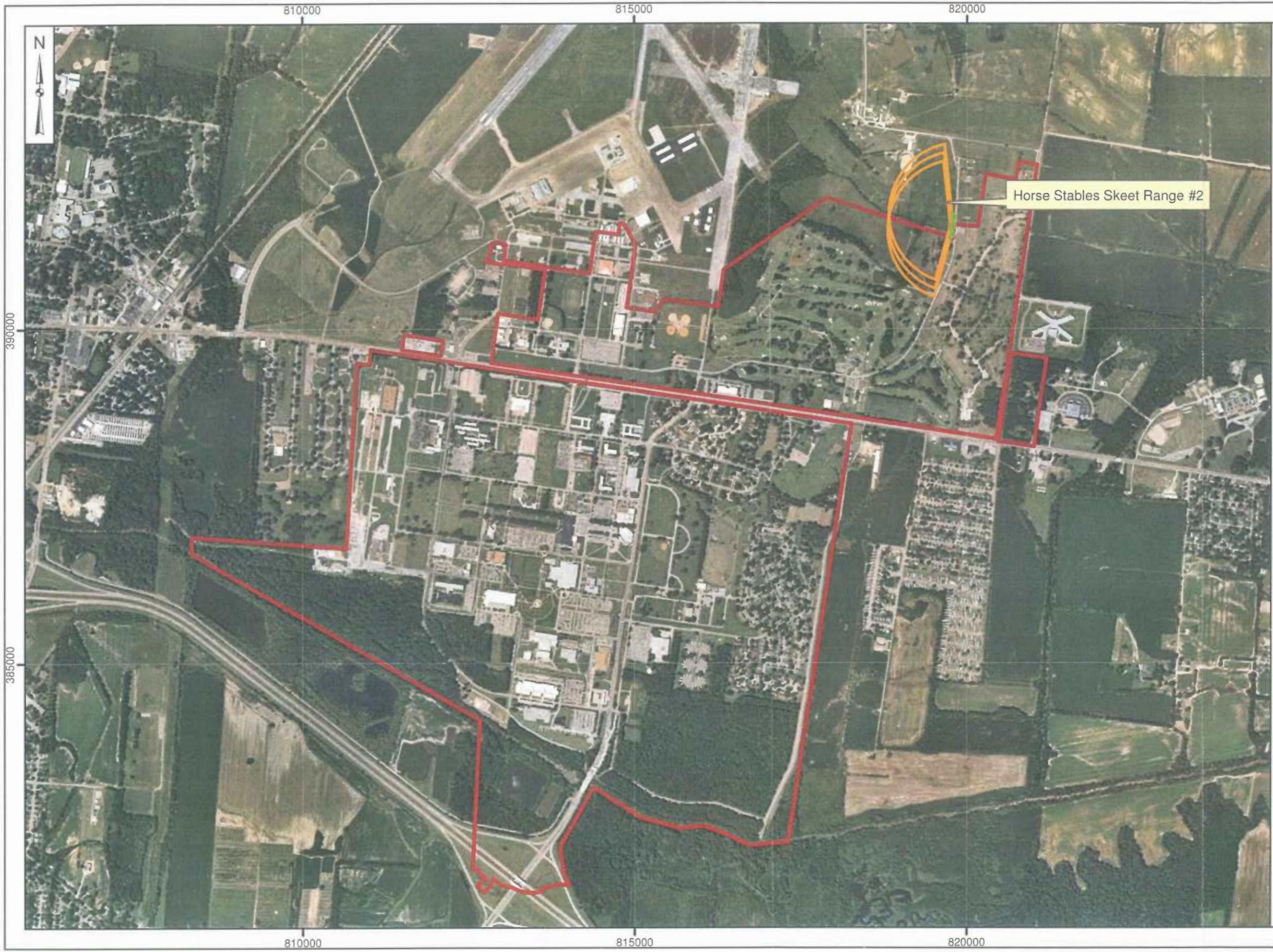


Figure 1
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

Legend

-  Former Firing Line
-  Horse Stables Skeet Range #2
-  Installation Boundary

NOTE:
 Aerial photo from ESRI's ArcGIS Online Layers, 2009



Drawn By: K. MOORE 2/28/12
 Checked By: L. ANDERSON 3/22/12
 Approved By:

Contract Number: 112G01506

819000

819500



391500

391500

391000

391000

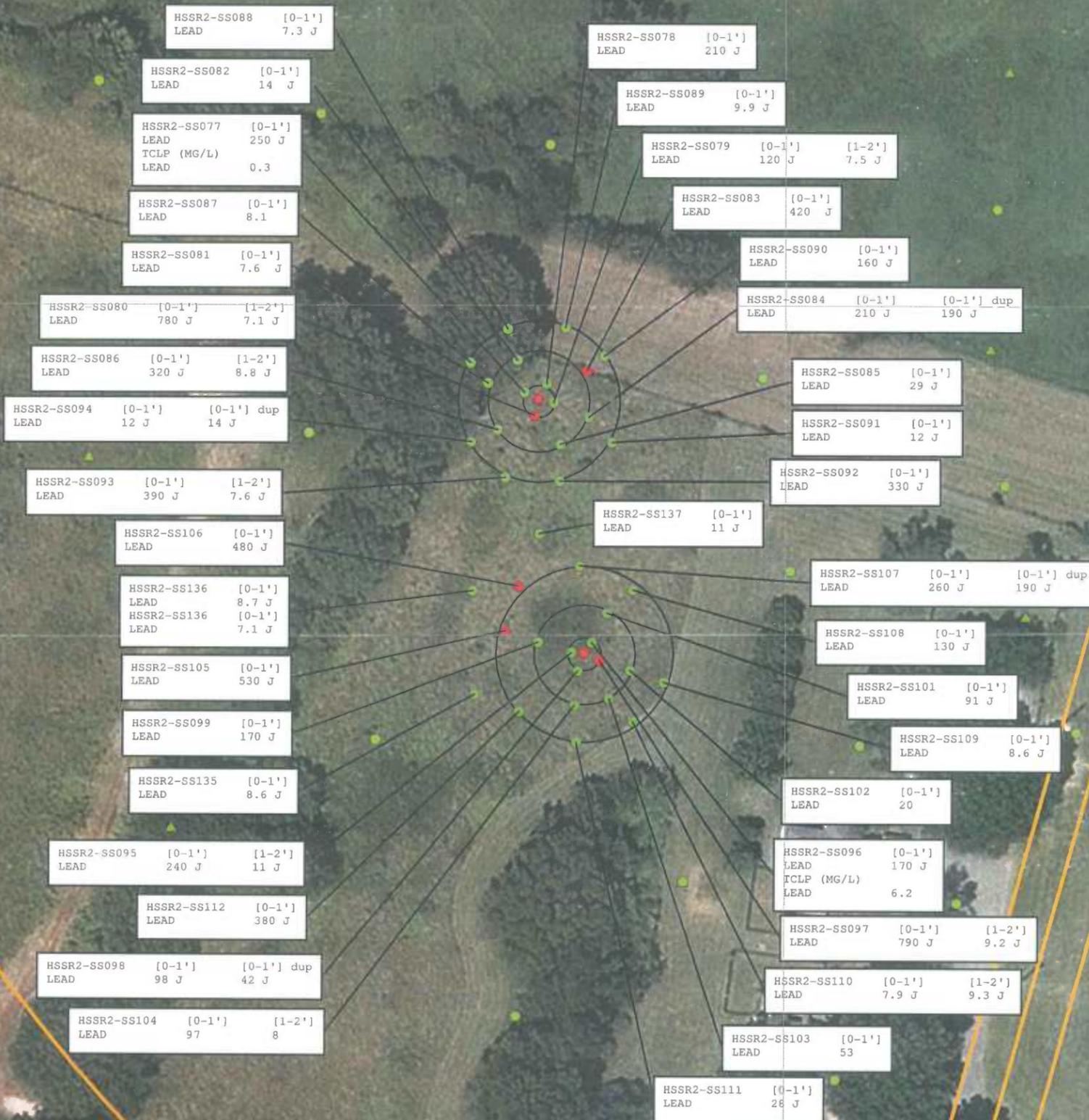


Figure 2
Lead Concentrations
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

Legend

- / ▲ FBL Sample Location
<400 mg/kg / >400 mg/kg
- ▲ / ▲ FBL-XRF Correlation Results
<400 mg/kg / >400 mg/kg
- FBL = Fixed Base Laboratory
- Sampling Grid
- Horse Stables Skeet Range #2
- Firing Line

NOTE:

Aerial photo from ESRI's ArcGIS Online Layers, 2009



Drawn By: K. MOORE 2/28/12
 Checked By: R. BAILEY 3/22/12
 Revised By:

Contract Number: 112G01506

819000

819500



391000

391000

NOTE:
Aerial photo from ESRI's ArcGIS Online Layers, 2009



Figure 3
BEQ Concentrations
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

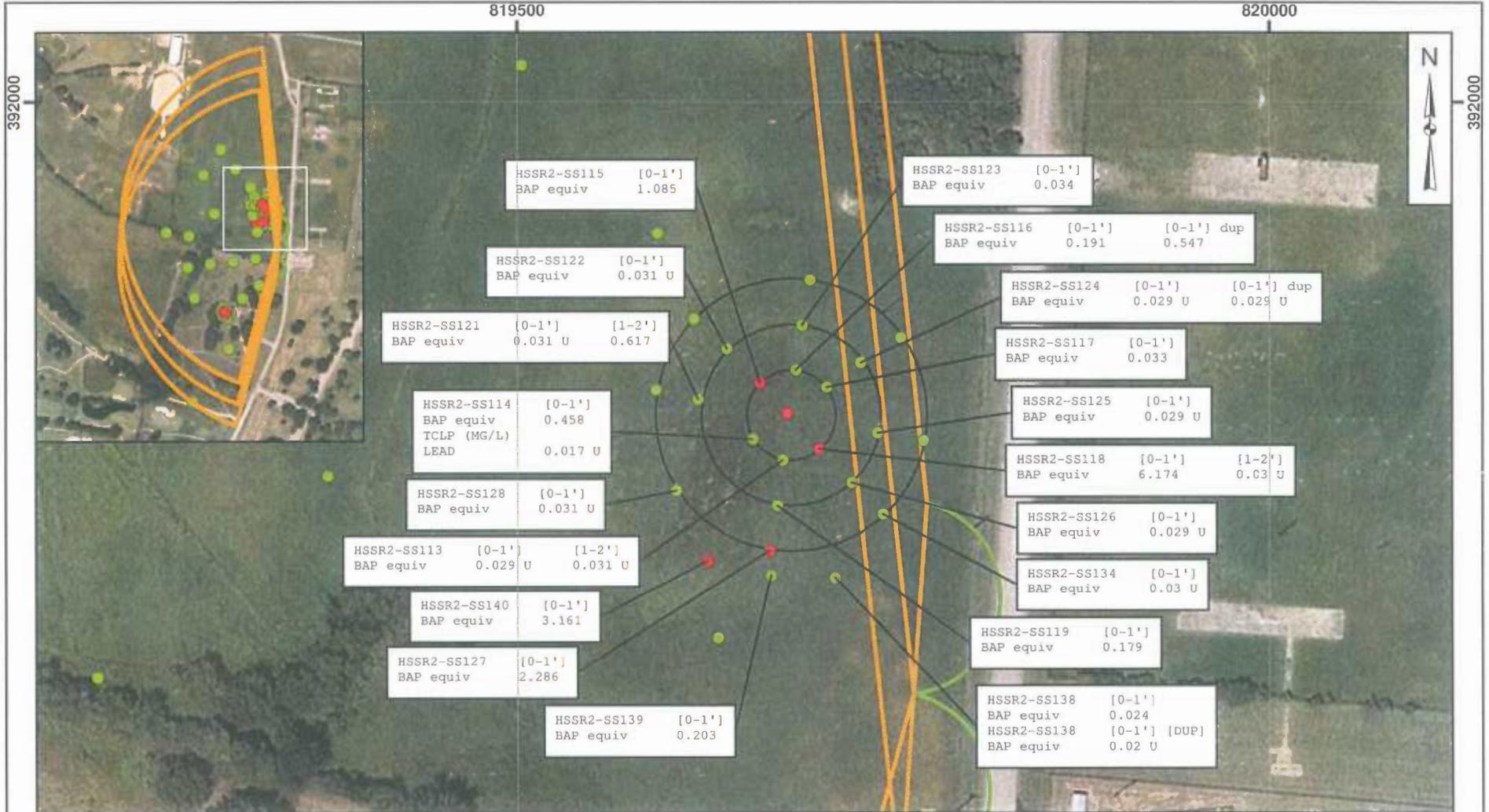
Legend

- BEQ > 0.565 mg/kg
- BEQ < 0.565 mg/kg
- Sampling Grid
- Horse Stables Skeet Range #2
- Firing Line



Drawn By: K. MOORE 2/28/12
Checked By: R. BAILEY 3/22/12
Revised By:

Contract Number: 112G01506



NOTE:
Aerial photo from ESRI's ArcGIS Online Layers, 2009



Figure 4
BEQ Concentrations
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

- Legend**
- BEQ > 0.565 mg/kg
 - BEQ < 0.565 mg/kg
 - Sampling Grid
 - Horse Stables Skeet Range #2
 - Firing Line

Drawn By: K. MOORE 2/28/12
Checked By: R. BAILEY 3/22/12
Revised By:

Contract Number: 112G01506



819250

391500

391500

391250

391250



Figure 5
Lead Excavation Area
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

- Legend**
- /● FBL Sample Location
<400 mg/kg / >400 mg/kg
 - ▲/▲ FBL-XRF Correlation Results
<400 mg/kg / >400 mg/kg
 - FBL = Fixed Base Laboratory
 - Sampling Grid
 - ▭ Excavation Area
 - ▭ Horse Stables Skeet Range #2
 - ▭ Firing Line

NOTE:
 Aerial photo from ESRI's ArcGIS Online Layers, 2009

Drawn By: K. MOORE 3/22/12
 Checked By: R. BAILEY 3/22/12
 Revised By:
 Contract Number: 112G01506



Figure 6
BEQ Excavation Area
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee



Legend

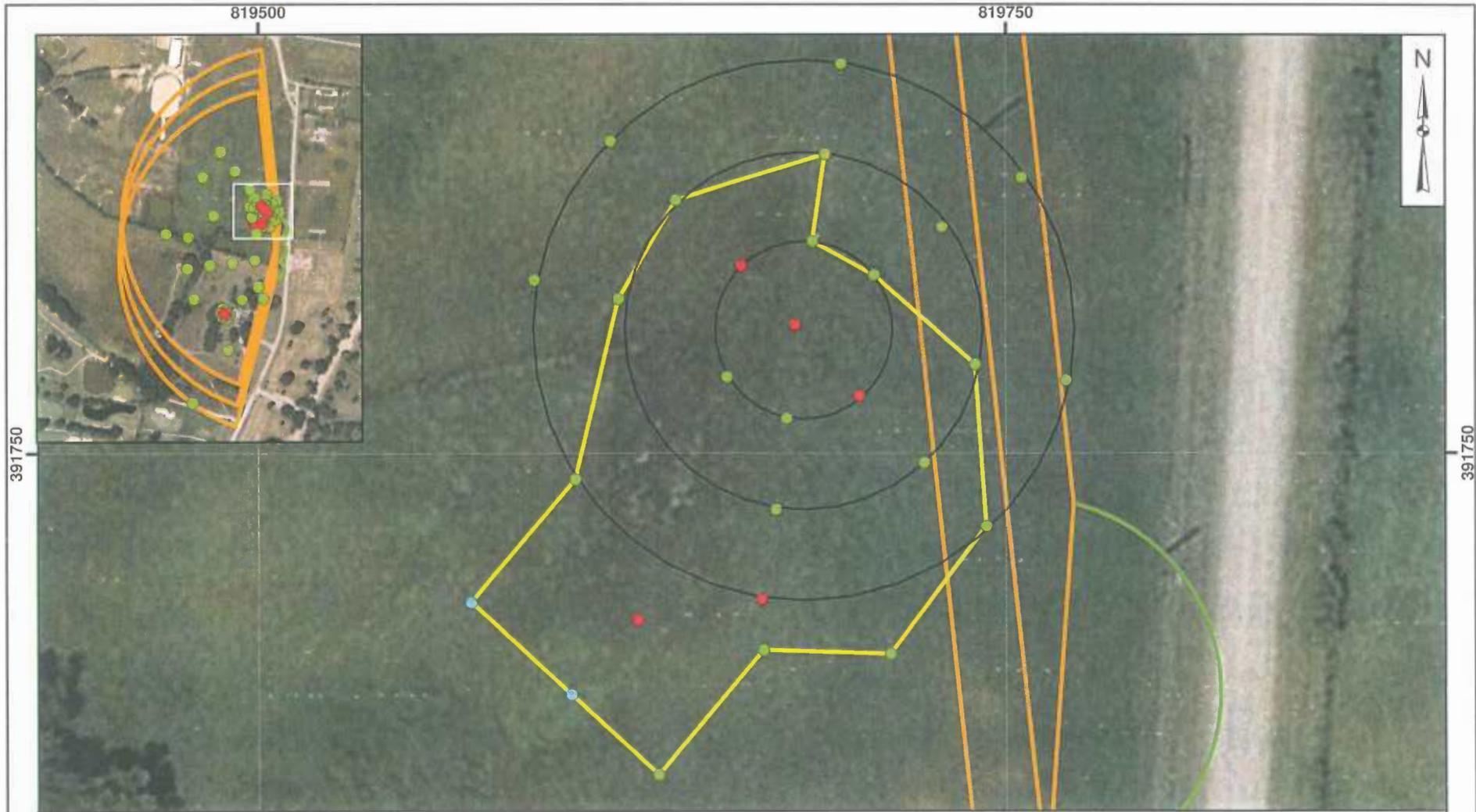
- BEQ > 0.565 mg/kg
- BEQ < 0.565 mg/kg
- Sampling Grid
- Excavation Area
- Horse Stables Skeet Range #2
- Firing Line

NOTE:
 Aerial photo from ESRI's ArcGIS Online Layers, 2009



Drawn By: K. MOORE 3/22/12
 Checked By: R. BAILEY 3/22/12
 Revised By:

Contract Number: 112G01506



391750

391750

819500

819750



Figure 7
BEQ Excavation Area
Horse Stables Skeet Range #2
NSA Mid-South
Millington, Tennessee

Legend

- BEQ > 0.565 mg/kg
- BEQ < 0.565 mg/kg
- Proposed Sample Location
- Sampling Grid
- Excavation Area
- Horse Stables Skeet Range #2
- Firing Line

NOTE:
 Aerial photo from ESRI's ArcGIS Online Layers, 2009



Drawn By: K. MOORE 3/22/12
 Checked By: G. POPE 3/26/12
 Revised By:

Contract Number: 112G01506

EXHIBIT A

DATA VALIDATION REPORTS
(transmitted as a separate electronic file)

EXHIBIT B

BACKGROUND BEQ MEMORANDUM



UNITED STATES ENVIRONM

RE/

61For
Atlanta, Geo

OPTIONAL FORM 88 (7-90)

FAX TRANSMITTAL

of pages 2

To	Brian Mulhearn	From	Brian Donaldson
Dept./Agency	Ensafe	Phone #	404-562-8554
Fax #	(901) 372-2454	Fax #	404-562-8518
NSN 7540-01-317-7308		5099-101 GENERAL SERVICES ADMINISTRATION	

October 9, 1997

38054.000

19.48.00.0013

1D-00632

4WD-OTS

MEMORANDUM

SUBJECT: Risk review comments, Human Health and Ecological aspects,
NSA Memphis
Memphis, TN

FROM: Ted W. Simon, Ph.D. D.A.B.T., Toxicologist
Office of Technical Services

TO: Brian Donaldson, RPM
FFB/BRAC

CC: Elmer W. Akin, Chief
Office of Technical Services

Per your request, I have reviewed the **Technical Memorandum, Revision 0: Distribution of Benzo(a)pyrene Equivalent Concentrations at NSA Memphis SWMUs**. Please feel free to share these comments without anyone you deem appropriate.

My purpose in this memo is to indicate a proposed screening level for B(a)P equivalents in surface soil that appears to be consistent with anthropogenic background at NSA Memphis. *This background screening level is 565 µg/kg in surface soil.*

Rationale

91 surface soil samples were obtained at various locations around NSA Memphis. The distribution of these soil samples was lognormal ($X^2=99.25$, $p<0.0001$) with a geometric mean of 579 µg/kg and a geometric standard deviation of 2.76 µg/kg. Visual inspection of a distribution of the actual data indicates that 69 of the data points are clustered between 150 and 700 µg/kg, and that 22 higher detections occurred up to almost 90000 µg/kg. Such a distribution is typical of anthropogenic background with site-specific waste-stream contamination superimposed.

The 69 values for Benzo(a)pyrene equivalents below 700 µg/kg occurred in a normal distribution ($X^2=22.0$, $p<0.0025$) with a mean 373.4 µg/kg and a standard deviation of 97.25 µg/kg.

The upper 95th percentile (mean + 1.96 st. dev.) of the normal distribution of the lower 69 values is 564 $\mu\text{g}/\text{kg}$. Rounding up to 565 $\mu\text{g}/\text{kg}$ provides the background screening level for benzo(a)pyrene equivalents. The choice of the upper 95th percentile in this case is consistent with previous Agency practice.

Mr. Brian Mulhearn of EnSafe who prepared this memo indicated that you have another version. The presence of this other version is not anticipated to change the background screening level to any great extent.

Please let me know if you need any further help.

T.W. Simon/tws:4WD-OTS:28642/10/09/97/A:\DISK2\OCT97\NSA_BG.BAP