MEETING MINUTES

RESTORATION ADVISORY BOARD
For
PLUM BROOK ORDNANCE WORKS
February 23, 2006

ATTENDEES

Mark Bohne, RAB Community Co-Chairperson
Peg Kingsley, RAB
Jan Bohne, RAB
Michael Parker, RAB
Bob Hermes, RAB
Starr Truscott, RAB
Julie Weatherington-Rice, TAPP
Paul Jayko, OEPA NWDO
Archie Lunsey, OEPA NWDO
Rick Meadows, RAB USACE Co-Chairperson
Lisa Humphreys, USACE Huntington
Kim Chambers, WTI
Linda Ingram, USACE Nashville
Lannae Long, USACE Nashville
Jim Beaujon, USACE Nashville
Victor Medina, USACE ERDC
Al Hardesty, Jacobs Engineering
Helen Owens, Streamborn

Agenda

- *Treatability Study – Reservoir No. 2 Burn Grounds*
- *Delineation Study – Reservoir No. 2 Burn Grounds*
- *Evaluation of Remedial Alternatives – Reservoir No. 2 Burn Grounds*
- *Update of TNT Area B Activities – Completed and Planned*

The RAB Meeting was conducted on February 23, 2006 at Firelands College. The meeting opened with the introductions of Paul Jayko with OEPA NWDO, Victor Medina with USACE ERDC, Kim Chambers with WTI and a reintroduction of Mike Parker, the newest RAB member. Paul Jayko will be taking over for Ron Nabors on the PBOW project. Victor Medina worked with Jacobs Engineering in conducting the treatability studies on the 2 BG soils, and Kim Chambers is a contractor for USACE Huntington on the TNT Area B remediation activities.

Delineation Study – Reservoir No. 2 Burn Grounds

Al Hardesty (Jacobs Engineering) provided a summary of the findings of the delineation study conducted at the 2BG. The most recent investigation did not identify the southern boundary of the contaminated soil, however, the contractor recommends proceeding with the EECA. The presentation is provided as an attachment to the meeting minutes.

Treatability Study – Reservoir No. 2 Burn Grounds

Victor Medina (USACE Engineer Research and Development Center) presented the findings of the Treatability study conducted on the 2BG soils. The presentation is provided as an attachment to the meeting minutes.

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Evaluation of Remedial Alternatives – Reservoir No. 2 Burn Grounds
Al Hardesty (Jacobs Engineering) reviewed the components of the Engineering Evaluation Cost Analysis (EECA) – cost, effectiveness, and implementability. The presentation identified the alternatives to be considered for the remedial activities. The presentation is provided as an attachment to the meeting minutes.

Update of TNT Area B Activities – Completed and Planned
Kim Chambers (WTI) presented a summary of activities at TNT Area B that were initiated in 2003 and suspended due to insufficient funding. The presentation reviewed the areas that were excavated, composted and /or treated to stabilize lead and subsequently disposed off-site. With the availability of funding, USACE will continue activities at TNT Area B beginning in spring 2006. The presentation reviewed maps of the areas where the removal activities will resume. The presentation is provided as an attachment to the meeting minutes.

Other Business
- USACE discussed the renewal of the TAPP contract. Prior to the discussion, all contractors were asked to leave the room. The USACE and RAB agreed to renew the contract with a revised Scope of Work. USACE will review the TAPP efforts in 6 months to evaluate compliance with the contract.
- For the record, the RAB Community Co-Chair voiced his concern about disposing of material from the site in the Erie County Landfill. In order to transport material to an alternate landfill, the generator must obtain a waiver from Erie County Department of Environmental Services (DOES).
- The PBOW website provides public access to the PBOW project documents. If you have questions about the documents or if you experience difficulty in accessing the information please contact USACE at 800-822-8413. The website is http://www.lrh.usace.army.mil/projects/current/derp-fuds/pbow.
- The TAPP contractor pointed out the Geological Society of America – North Central Section Meeting will be held at the University of Akron, April 20-21, 2006. For more information go to http://www.geosociety.org/sectdiv/Northc/06ncmtg.htm.

Meeting Schedule
The next meeting is tentatively scheduled for May 18, 2006. For additional information, please contact Lisa Humphreys at (800) 822-8413 or Helen Owens, RAB Support Contractor at (937) 478-2322.

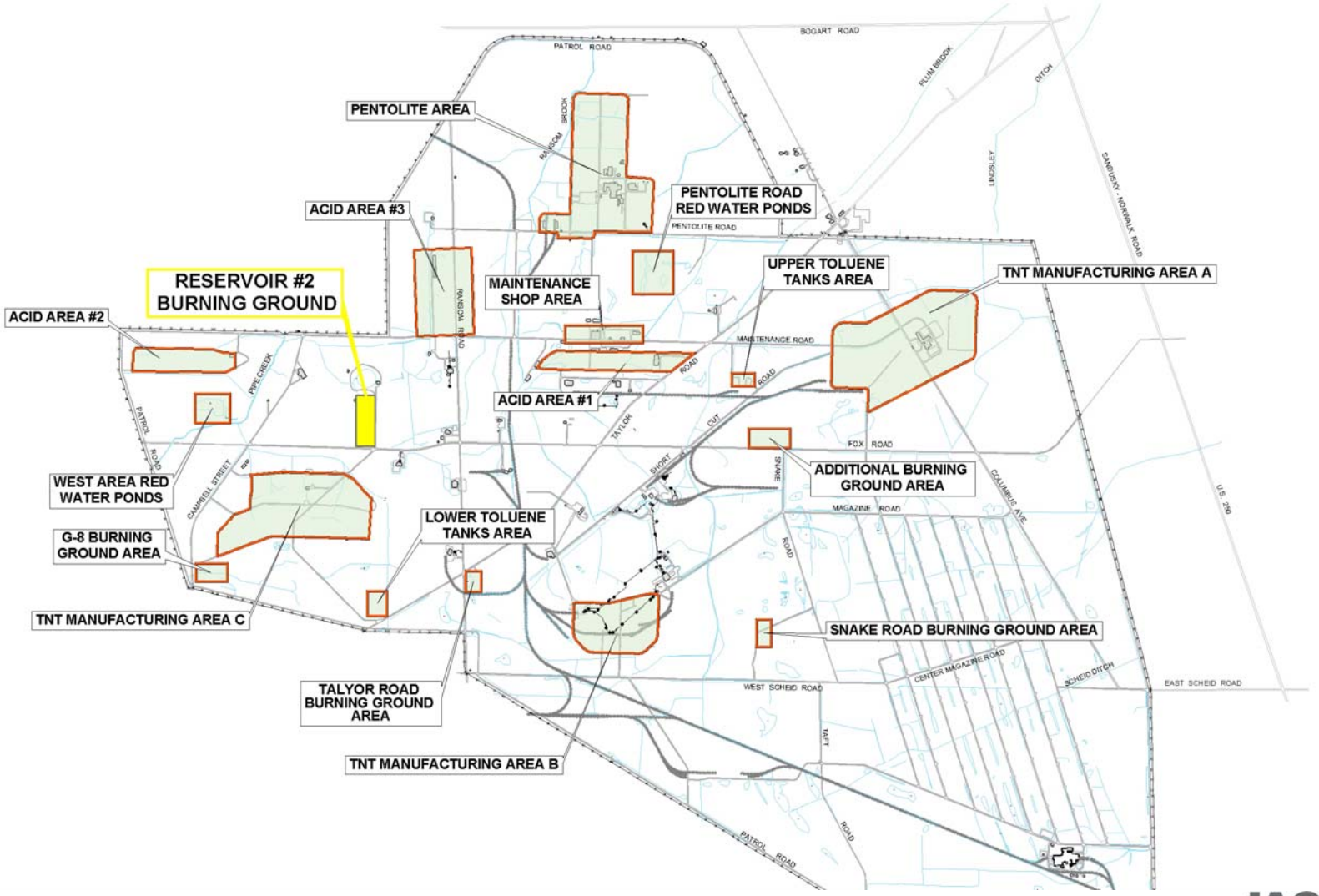
Delineation Sampling
Reservoir #2 Burning Grounds

Presented to:
Restoration Advisory Board

Presented by:
Al Hardesty
Jacobs

February 23, 2006

Location Map



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Investigation Activities

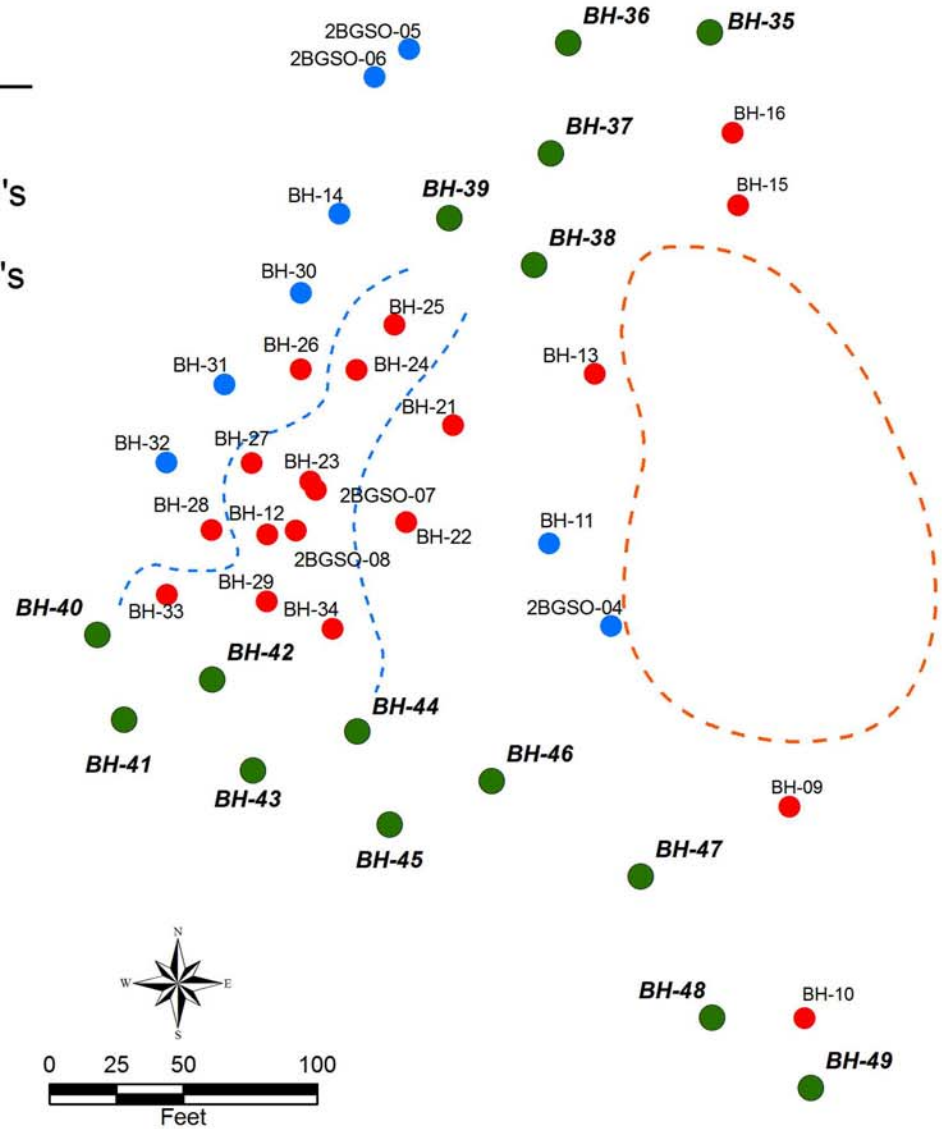
- Surface Soil Sampling West of Burn Area
- Laboratory Analysis (Target Analytes)
  - PCBs
  - Nitroaromatics (TNT, DNT)
  - PAHs (Benzo(a)pyrene)
  - TAL Metals (Lead)

Sample Locations

- Proposed Surface Soil Samples — December 2005
- Surface Soil Sample Above PRG's
- Surface Soil Sample Below PRG's

Boundary of Surface Soil Exceeding Region 9 PRG's

Interpreted Burn Pit Boundary Based on Trenching Data



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Investigation Results

- 11 of 15 locations exceeded PRGs
- 11 exceedences for PCBs
- 4 exceedance for benzo(a)pyrene
- 1 exceedance for explosives
- 1 exceedance for lead

PCB Contamination

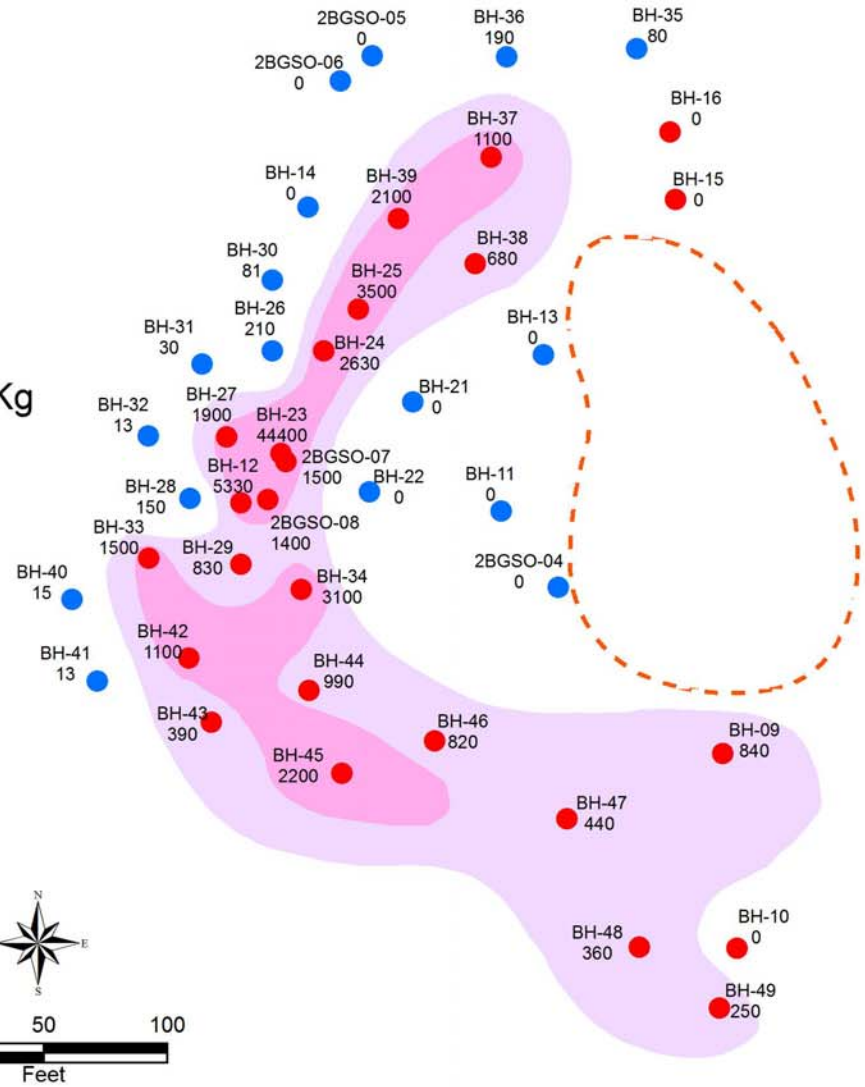
BH-45 2200 — Surface Soil Sample Above PRG's — Result (µg/Kg)

Surface Soil Sample Below PRG's

Boundary of Surface Soil Exceeding Region 9 PRG's for PCB's. PRG for PCB's = 220 µg/Kg

Surface Soil PCB's values > 1000 µg/Kg

Interpreted Burn Pit Boundary Based on Trenching Data



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Lead Contamination

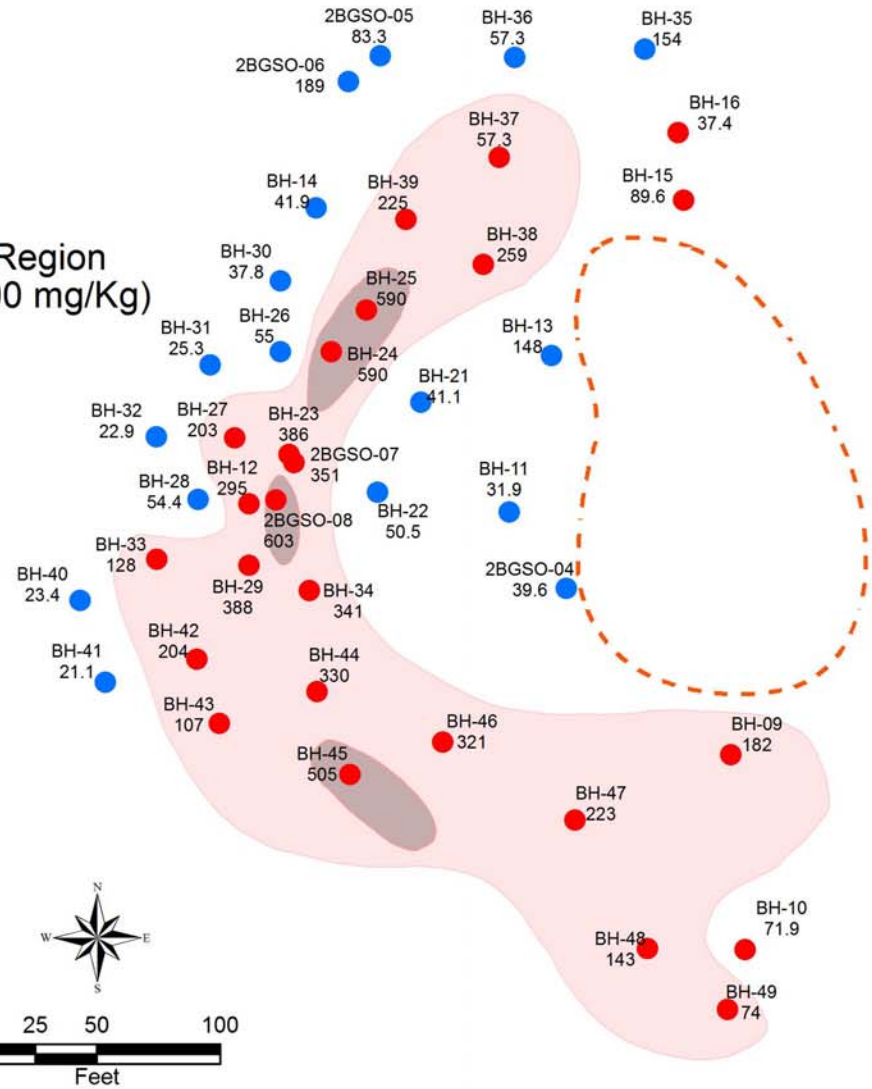
BH-45 505 — Surface Soil Sample Above PRG's — Result (mg/Kg)

Surface Soil Sample Below PRG's

Boundary of Surface Soil Exceeding Region 9 PRG's for Lead (PRG for Lead = 400 mg/Kg)

Boundary of Surface Soil Exceeding Region 9 PRG's for PCB's

Interpreted Burn Pit Boundary Based on Trenching Data



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Explosives Contamination

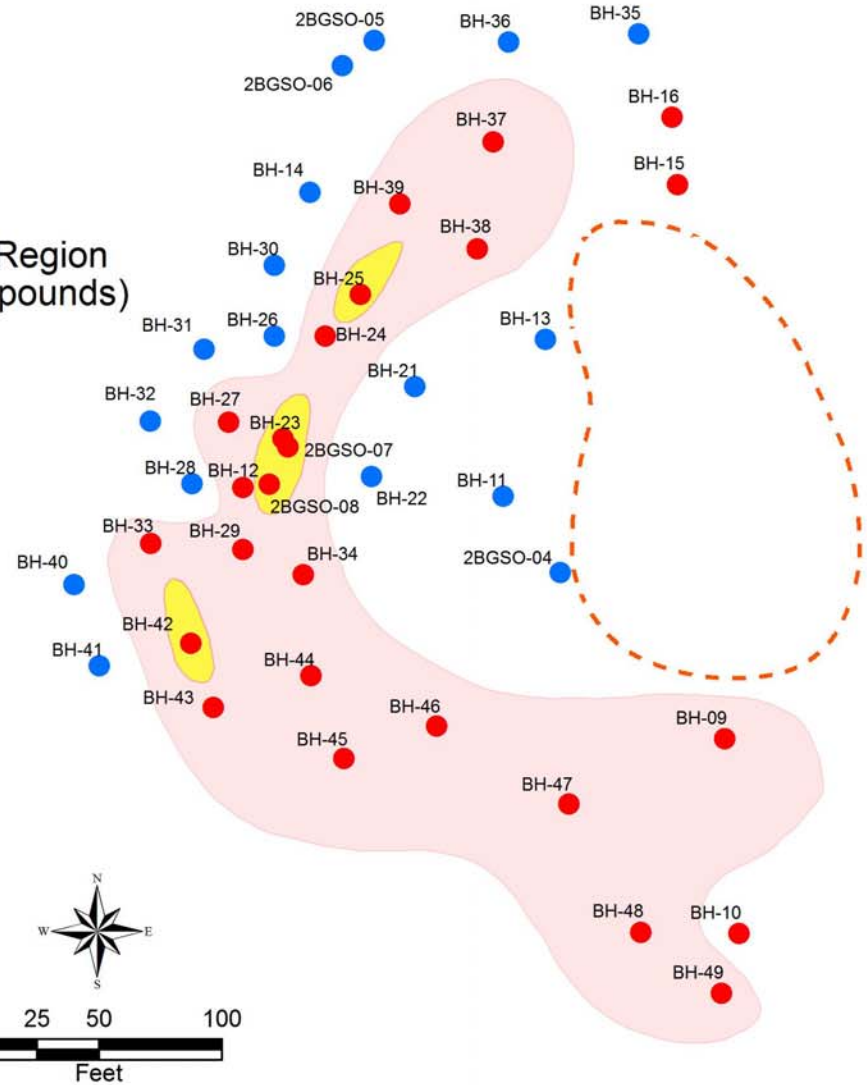
Surface Soil Sample Above PRG's

Surface Soil Sample Below PRG's

Boundary of Surface Soil Exceeding Region 9 PRG's for Explosives (multiple compounds)

Boundary of Surface Soil Exceeding Region 9 PRG's for PCB's

Interpreted Burn Pit Boundary Based on Trenching Data



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PAH Contamination

BH-45
65

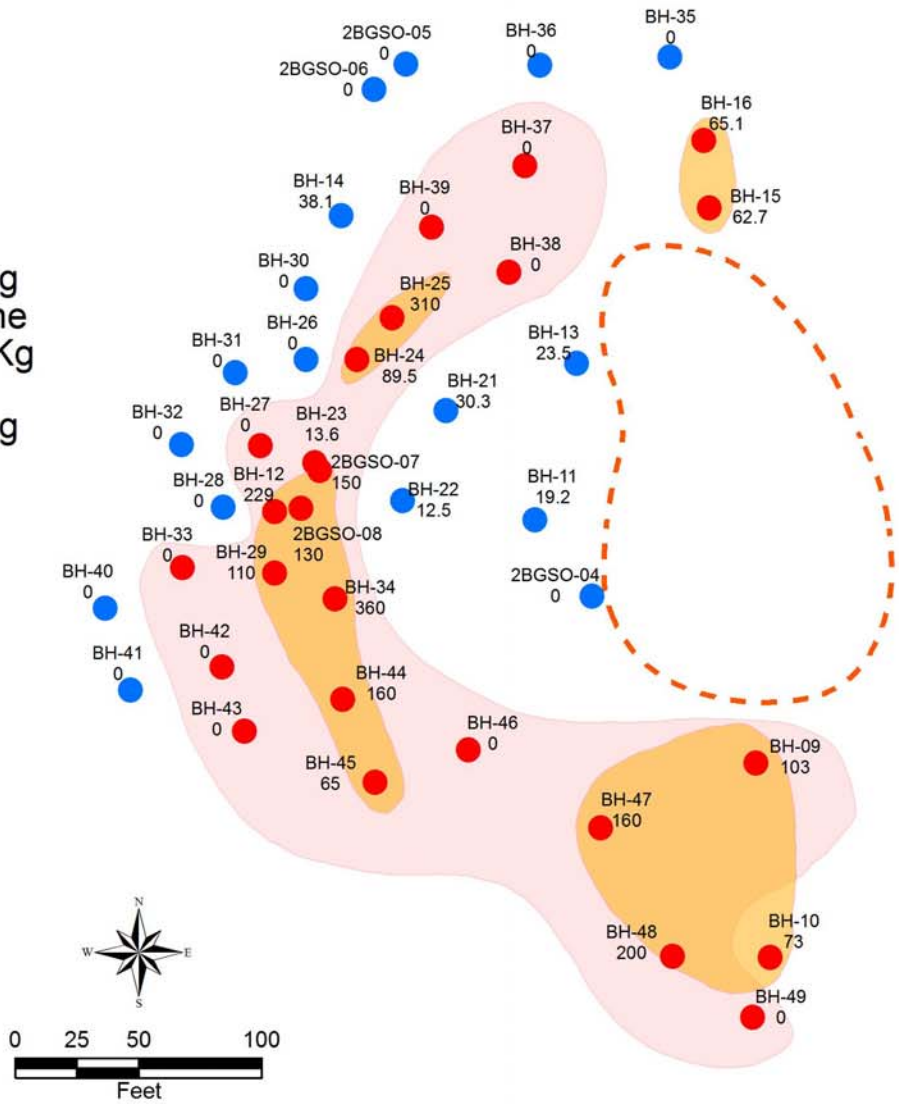
Surface Soil Sample Above PRG's — Result (µg/Kg)

Surface Soil Sample Below PRG's

Boundary of Surface Soil Exceeding Region 9 PRG's for Benzo(a) pyrene PRG for Benzo(a) pyrene = 62 µg/Kg

Boundary of Surface Soil Exceeding Region 9 PRG's for PCB's

Interpreted Burn Pit Boundary Based on Trenching Data



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Environmental Engineering Branch

Evaluation of Lime and Persulfate Treatment of Plum Brook Ordnance Works Soils

Victor Medina, Ph.D., P.E.

United States Army Engineer Research & Development Center ERDC

Vicksburg, MS

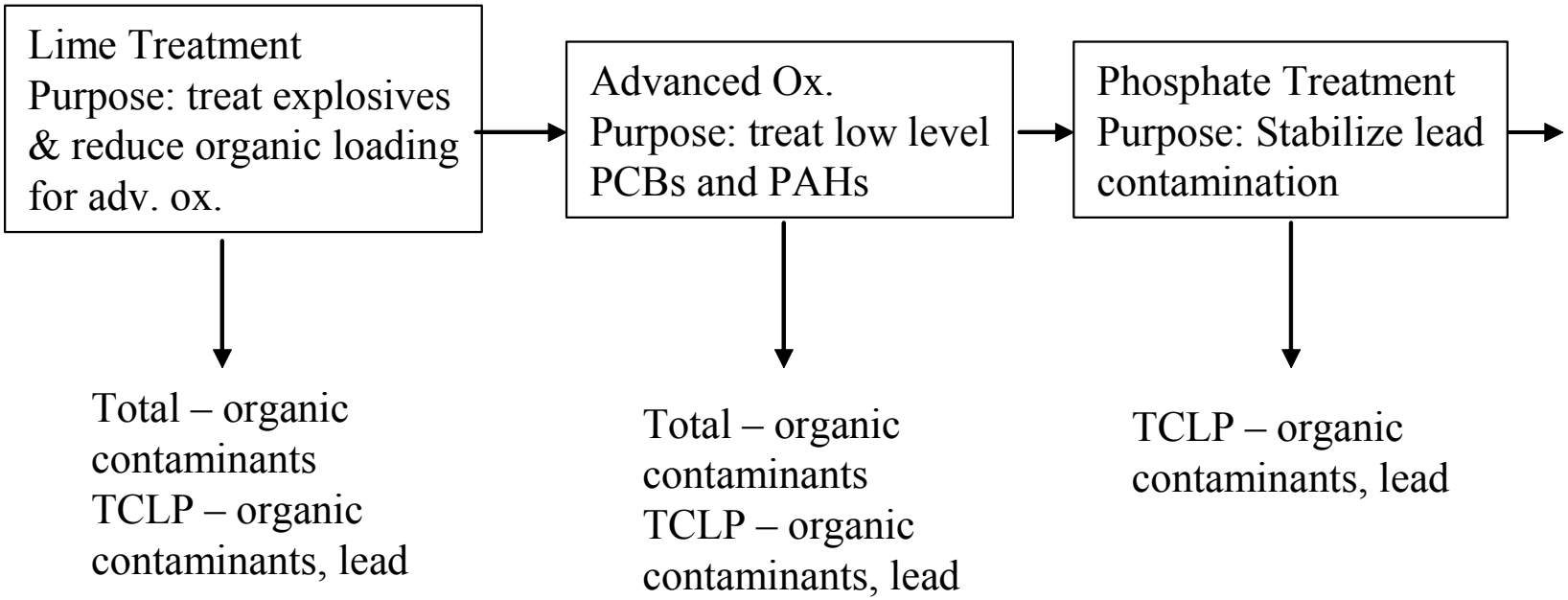
Outline

- Purpose
- Approach: Treatment Train
- Preliminary Remediation Goals & Untreated Contaminant Levels
- Treatment of Organic Contaminants: Lime and Lime-Persulfate Combination
- Treatment of Lead
- Conclusions/Recommendations

Background/Purpose

- **Background**
  - Challenging soil matrix
    - Explosives, PCBs, PAHs, and Lead.
    - Distinctive soil types (burn layer, west of burn area, surface above burn zone).
  - Short time frame
    - About 6 weeks
- **Purpose**
  - Evaluate chemical treatment as a means for treating the various soil contaminants.

Approach: Treatment Train



Preliminary Remediation Goals & Background Levels

EPA Region 9 Preliminary Remediation Goals for Total Contaminants		
Contaminant	PRG Residential (mg kg^{-1})	PRG Industrial (mg kg^{-1})
TNT	16	57
2.4-DNT	120	1200
2,6-DNT	61	620
PCBs	0.22	0.74
Benzo(a)pyrene	0.062	0.21
Lead	400	800

Measurements of Organic Compounds in Untreated Soils				
Sample	TNT (mg kg^{-1})	DNT (mg kg^{-1})	PCB (mg kg^{-1})	Benzo(a)pyrene* (μg/kg)
Surface 1	3.71 ± 29.2%	4.51 ± 146%	**9.98 ± 17.5%**	8.5 ± 25%
Surface 2	5.61 ± 86.0%	0.00 ± 0%	**3.65 ± 6.8%**	--
West 1	6.48 ± 40.3%	2.62 ± 223%	**2.87 ± 21.7%**	11.3 ± 39.6%
West 2	14.85 ± 8.6%	8.35 ± 170%	**2.33 ± 6.0%**	--
Burn 1	**1548 ± 5.4%**	**243 ± 75%**	**22.6± 21.0%**	44.4 ± 5.7%
Burn 2	**237.8 ± 15.4%**	26.6 ± 223%	**1.32 ± 24.1%**	--

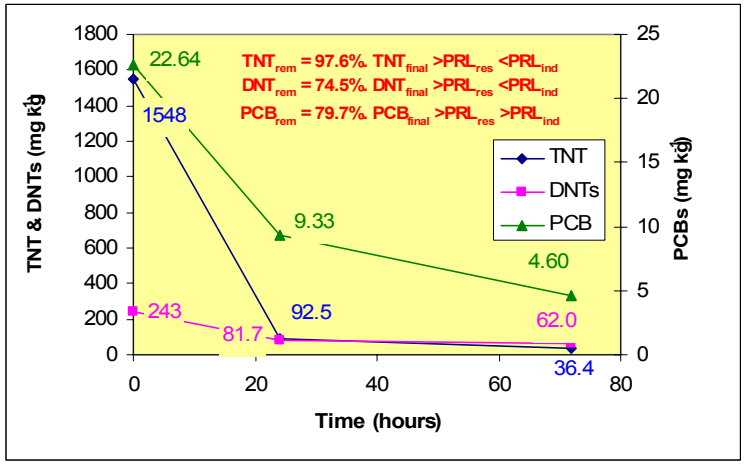
Bold numbers were above residential PRG.

*Other PAHs were also detected. All were below 62 μg/kg.

Lime, and Lime-Persulfate Combination

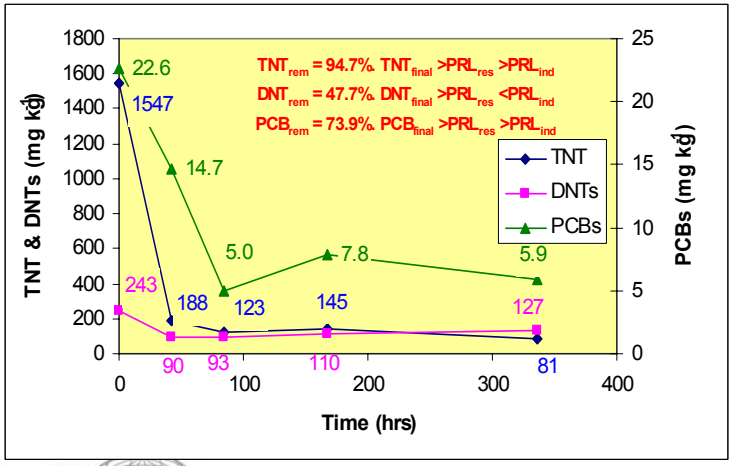
Environmental Engineering Branch

Lime Treatment

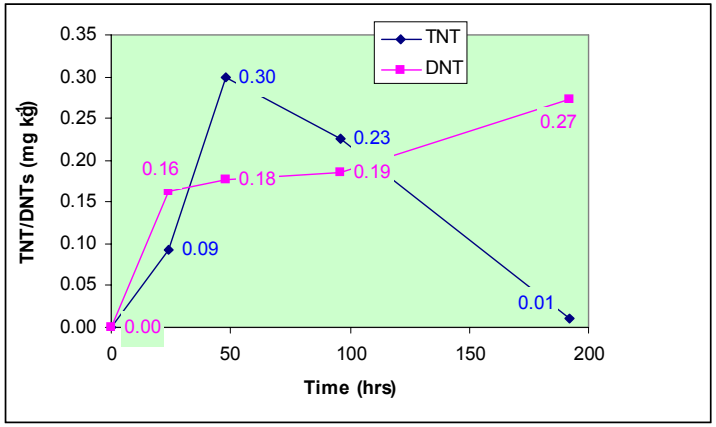


Slurry Reactors

Lime/Persulfate Treatment

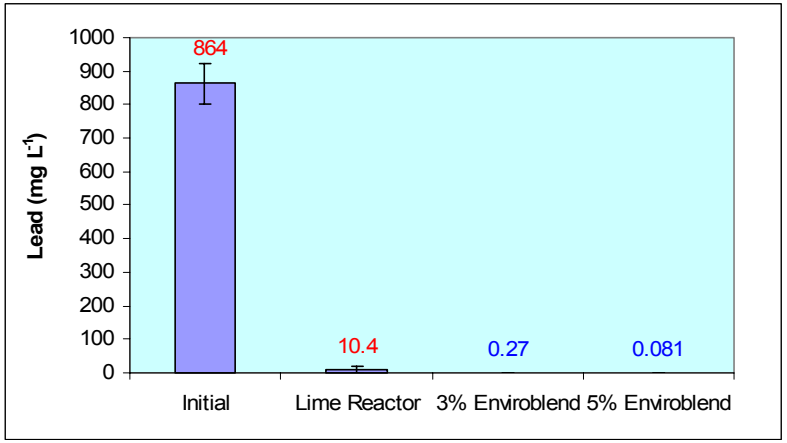


Liquid Concentrations



Lead Treatment & Cobbles

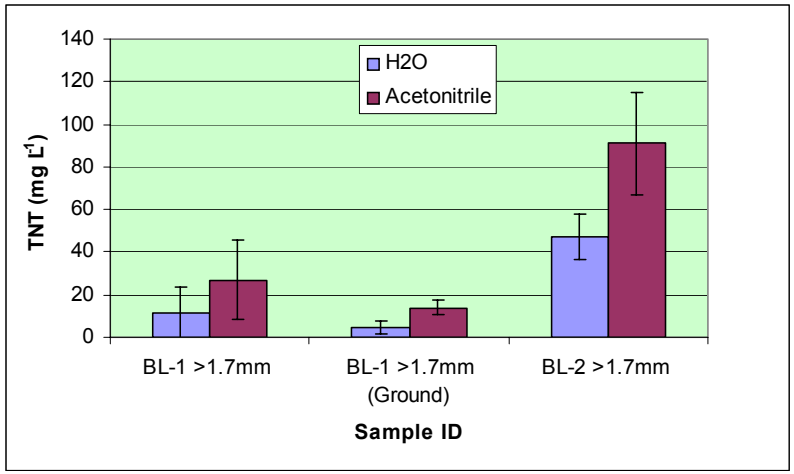
Phosphate Treatment of Lead



TCLP Extractions for Lead

Cobbles & Ground Cobbles

Cobble Study Results



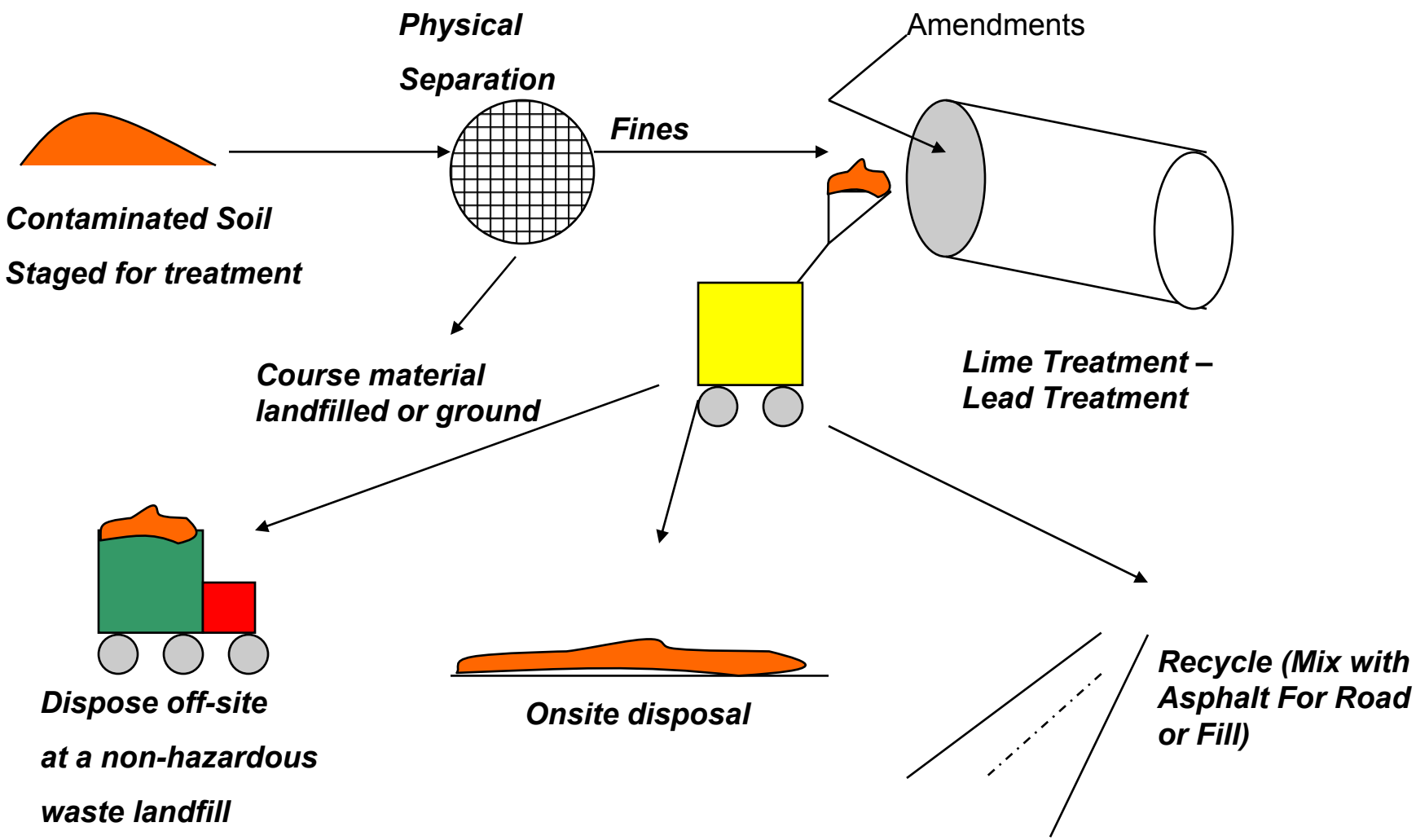
Conclusions & Recommendations

- Treatments had similar levels of performance
  - Since Lime is the simplest and lowest cost.
  - Extractability of contaminant may limit treatment
- TNT
  - On the order of 93 to 97% removal
- DNT
  - On the order of 50 to 70% removal
- PCBs
  - 80 to 90% removal
- PAHs
  - Modest removal (low levels to start)
- Lead was effectively stabilized

Summary of Organic Treatments

Burn Layer. Initial Conc. (mg kg^{-1}): TNT = 1548, DNTs = 243, PCBs = 22.64, PAHs = 0.017												
Treatment	TNT			DNTs			PCBs			PAH		
	End Conc	% rem.	Ind PRG?	End Conc	% rem.	Ind PRG?	End Conc	% rem.	Ind PRG?	End Conc	% rem.	Ind PRG?
1.5% Lime. 72 hr	36.4	97.6	Y	62.0	74.5	Y	4.6	79.7	N	0.010	41.2	Y
5000 mg L^{-1} Persulfate (40 C). 6 days.	108	93.0	N	129			3.2	85.9	N	0.010	41.2	Y
Lime Persulfate (room temp). 8 days	81	94.7	N	127	47.7	Y	5.9	73.9	N	--	--	--
Lime Persulfate (40 C) 8 days	87	94.4	N	157	35.3	Y	5.6	75.4	N	--	--	--
10,000 mg L^{-1} persulfate (50 C) 72 hr	135	91.3	N	158	35.0	Y	4.3	81.0	N	--	--	--
Fenton's Chem. <1 hr	231	85.1	N	138	43.2	Y	4.9	78.4	N	--	--	--
West Soil Initial (mg kg^{-1}): TNT = 14.9, DNTs = 25, PCBs = 2.87, PAHs = 0.089												
Treatment	TNT			DNTs			PCBs			PAH		
	End TNT	% rem.	Ind PRG?	End DNT	% rem.	Ind PRG?	End PCB	% rem.	Ind PRG?	End PAH	% rem.	Ind PRG?
1.5% Lime. 72 hr	0.74	95.5	Y	1.15	83.4	Y	0.85	70.4	N	0.080	14.5	Y
5000 mg L^{-1} Persulfate (40 C)	3.46	76.0	Y	2.62	89.5	Y	1.96	31.7	N	0.070	26.5	Y

Conceptual Application



Remedial Alternatives Assessment Reservoir #2 Burning Grounds

Presented to:
Restoration Advisory Board

Presented by:
Al Hardesty
Jacobs

February 23, 2006

Alternative Categories

- No Action
- Institutional Control
- Excavation & Disposal
- Ex-Situ Treatment
- In-Situ Treatment

Land-Use Scenarios

- Continuation of NASA Activities (Industrial)
- Recreational Use (Hunters)
- Sale by GSA to other Parties(Unrestricted)
- Agricultural
- Residential
- Training Area for National Guard
- Construction Activities (Industrial)

Institutional Control

- Fencing
- Capping
- Land Use Restrictions

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Excavation & Disposal

- On-site Disposal
- Off-site Disposal
- Combination

Ex-Situ Treatment

- Lime
- Persulfate
- Enviroblend
- Low Temperature Thermal Desorption
- Composting

In-Situ Treatment

- Tilling (Lime or other)
- Bioremediation Injection
- ElectroChemical GeoOxidation
- Grouting / Chemical Stabilization
- Phytoremediation

Recommended EE/CA Alternatives

- No Action
- Excavation & Off-site Disposal
- Ex-Situ Lime Treatment
- In-Situ Tilling with Lime
- Industrial & Residential Scenarios
- Phased Excavation / Multiple Disposal Scenarios

PCBs in Surface Soil
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units
BH32	4/22/2005	11:45	ELAB	SW8082	PCB-1260 (Aroclor 1260)	13		5.8	23	ug/Kg
BH41	12/7/2005	11:36	ELAB	SW8082	PCB-1260 (Aroclor 1260)	13	J	11	22	ug/Kg
BH40	12/7/2005	11:15	ELAB	SW8082	PCB-1260 (Aroclor 1260)	15	J	12	24	ug/Kg
BH31	4/22/2005	11:30	ELAB	SW8082	PCB-1260 (Aroclor 1260)	30		5.6	22	ug/Kg
2BGSO04	10/1/96	13:20	KNX	SW8081	PCB-1260 (Aroclor 1260)	80		42	42	ug/Kg
BH30	4/22/2005	11:15	ELAB	SW8082	PCB-1260 (Aroclor 1260)	81		5.3	21	ug/Kg
BH28	4/22/2005	10:40	ELAB	SW8082	PCB-1260 (Aroclor 1260)	150		5.2	21	ug/Kg
2BGSO05	10/1/96	13:30	KNX	SW8081	PCB-1260 (Aroclor 1260)	170		85	85	ug/Kg
BH26	4/22/2005	10:00	ELAB	SW8082	PCB-1260 (Aroclor 1260)	200		5.2	21	ug/Kg
BH26	4/22/2005	10:00	ELAB	SW8082	PCB-1260 (Aroclor 1260)	210		5.3	21	ug/Kg
BH49	12/7/2005	15:20	ELAB	SW8082	PCB-1260 (Aroclor 1260)	250		11	22	ug/Kg
BH48	12/7/2005	15:00	ELAB	SW8082	PCB-1260 (Aroclor 1260)	360		21	42	ug/Kg
BH43	12/7/2005	13:35	ELAB	SW8082	PCB-1260 (Aroclor 1260)	390		21	42	ug/Kg
BH47	12/7/2005	14:45	ELAB	SW8082	PCB-1260 (Aroclor 1260)	440		53	110	ug/Kg
BH38	12/6/2005	15:30	ELAB	SW8082	PCB-1260 (Aroclor 1260)	680		54	108	ug/Kg
BH46	12/7/2005	14:20	ELAB	SW8082	PCB-1260 (Aroclor 1260)	820		53	110	ug/Kg
BH29	4/22/2005	10:50	ELAB	SW8082	PCB-1260 (Aroclor 1260)	830		27	110	ug/Kg
BH46	12/7/2005	14:20	ELAB	SW8082	PCB-1260 (Aroclor 1260)	830		27	54	ug/Kg
BH09	5/20/2004	14:25	ECEN	SW8082	PCB-1260 (Aroclor 1260)	840	J	452	915	ug/Kg
BH44	12/7/2005	13:50	ELAB	SW8082	PCB-1260 (Aroclor 1260)	990		52	100	ug/Kg
BH37	12/6/2005	15:10	ELAB	SW8082	PCB-1260 (Aroclor 1260)	1100		53	110	ug/Kg
BH42	12/7/2005	11:55	ELAB	SW8082	PCB-1260 (Aroclor 1260)	1100		100	200	ug/Kg
2BGSO08	10/1/96	13:50	KNX	SW8081	PCB-1260 (Aroclor 1260)	1400		400	400	ug/Kg
2BGSO07	10/1/96	13:45	KNX	SW8081	PCB-1260 (Aroclor 1260)	1500		410	410	ug/Kg
BH33	4/22/2005	13:00	ELAB	SW8082	PCB-1260 (Aroclor 1260)	1500	J	53	210	ug/Kg
2BGSO02	10/1/96	13:00	KNX	SW8081	PCB-1260 (Aroclor 1260)	1700		400	400	ug/Kg
BH27	4/22/2005	10:20	ELAB	SW8082	PCB-1260 (Aroclor 1260)	1900	J	52	210	ug/Kg
BH39	12/6/2005	15:50	ELAB	SW8082	PCB-1260 (Aroclor 1260)	2100		100	200	ug/Kg
2BGSO02	10/1/96	13:00	KNX	SW8081	PCB-1260 (Aroclor 1260)	2200		420	420	ug/Kg
BH45	12/7/2005	14:05	ELAB	SW8082	PCB-1260 (Aroclor 1260)	2200		210	420	ug/Kg
BH24	5/22/2004	11:55	ECEN	SW8082	PCB-1260 (Aroclor 1260)	2630	J	1160	2350	ug/Kg
BH34	4/22/2005	13:15	ELAB	SW8082	PCB-1260 (Aroclor 1260)	3100	J	120	470	ug/Kg
2BGSO01	10/1/96	12:45	KNX	SW8081	PCB-1260 (Aroclor 1260)	3300		830	830	ug/Kg
BH25	4/22/2005	9:55	ELAB	SW8082	PCB-1260 (Aroclor 1260)	3500	J	100	420	ug/Kg
BH12	5/22/2004	13:15	ECEN	SW8082	PCB-1260 (Aroclor 1260)	5330		1310	2660	ug/Kg
2BGSO03	10/1/96	13:10	KNX	SW8081	PCB-1260 (Aroclor 1260)	6800		2100	2100	ug/Kg
BH19	5/21/2004	9:25	ECEN	SW8082	PCB-1260 (Aroclor 1260)	8140	J	5350	10800	ug/Kg
BH18	5/21/2004	8:55	ECEN	SW8082	PCB-1260 (Aroclor 1260)	8940	J	5060	10200	ug/Kg
BH17	5/20/2004	15:35	ECEN	SW8082	PCB-1260 (Aroclor 1260)	11600	J	7330	14800	ug/Kg
BH23	5/22/2004	11:38	ECEN	SW8082	PCB-1260 (Aroclor 1260)	44400	J	28500	57600	ug/Kg

Pre-treatment PCB concentration levels (ug/kg)

	220	no action needed, below PRGs
	1100	80% reduction, meets residential PRGs
	2200	90% reduction, meets residential PRGs
	3700	80% reduction, meets industrial PRGs
	7400	90% reduction, meets industrial PRGs
	> 7400	treatment will not meet industial PRGs

PCBs in Burn Layer Material
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units
TR07-1	5/19/2004	14:26	ECEN	SW8082	PCB-1260 (Aroclor 1260)	632	J	462	936	ug/Kg
TR09-1	5/19/2004	16:35	ECEN	SW8082	PCB-1260 (Aroclor 1260)	1220	J	860	1740	ug/Kg
TR06-1	5/19/2004	11:15	ECEN	SW8082	PCB-1254 (Aroclor 1254)	1660	J	1440	2520	ug/Kg
2BGSO03	10/2/96	9:05	KNX	SW8082	PCB-1260 (Aroclor 1260)	1800		400	400	ug/Kg
TR06-1	5/19/2004	11:15	ECEN	SW8082	PCB-1260 (Aroclor 1260)	1870		872	1760	ug/Kg
TR08-1	5/19/2004	15:45	ECEN	SW8082	PCB-1254 (Aroclor 1254)	3670	J	3120	5480	ug/Kg
TR08-1	5/19/2004	15:45	ECEN	SW8082	PCB-1260 (Aroclor 1260)	4010		1900	3840	ug/Kg

Pre-treatment PCB concentration levels (ug/kg)

220	no action needed, below PRGs
1100	80% reduction, meets residential PRGs
2200	90% reduction, meets residential PRGs
3700	80% reduction, meets industrial PRGs
7400	90% reduction, meets industrial PRGs
> 7400	treatment will not meet industial PRGs

Lead in Surface Soil
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG	Type		TCLP Est (Mg/L)
BH32	4/22/05	11:45	ELAB	SW6010B	Lead	22.9		0.43	0.85	mg/Kg	400	48.6	N1	14.4
BH31	4/22/05	11:30	ELAB	SW6010B	Lead	25.3		0.41	0.82	mg/Kg	400	48.6	N1	15.9
BH11	5/20/04	11:55	GEL	SW6010B	Lead	31.9		0.353	0.622	mg/Kg	400	48.6	N1	20.1
BH16	5/22/04	13:37	GEL	SW6010B	Lead	37.4	J	0.348	0.614	mg/Kg	400	48.6	N1	23.6
BH30	4/22/05	11:15	ELAB	SW6010B	Lead	37.8		0.37	0.74	mg/Kg	400	48.6	N1	23.8
2BGSO04	10/1/96	13:20	KNX	SW6010	Lead	39.6		0.38	0.38	mg/Kg	400	48.6	N1	24.9
BH21	5/21/04	15:00	GEL	SW6010B	Lead	41.1	J	0.353	0.622	mg/Kg	400	48.6	N1	25.9
BH14	5/21/04	11:20	GEL	SW6010B	Lead	41.9	J	0.353	0.622	mg/Kg	400	48.6	N1	26.4
BH22	5/22/04	11:20	GEL	SW6010B	Lead	50.5	J	0.359	0.632	mg/Kg	400	48.6	N1	31.8
BH28	4/22/05	10:40	ELAB	SW6010B	Lead	54.4		0.4	0.8	mg/Kg	400	48.6	N1	34.3
BH26	4/22/05	10:00	ELAB	SW6010B	Lead	55		0.38	0.76	mg/Kg	400	48.6	N1	34.7
BH21	5/21/04	15:00	GEL	SW6010B	Lead	61.6	J	0.366	0.646	mg/Kg	400	48.6	FD1	38.8
BH26	4/22/05	10:00	ELAB	SW6010B	Lead	68.3		0.4	0.79	mg/Kg	400	48.6	FD1	43.0
BH10	5/20/04	13:55	GEL	SW6010B	Lead	71.9		0.353	0.623	mg/Kg	400	48.6	N1	45.3
2BGSO05	10/1/96	13:30	KNX	SW6010	Lead	83.3		0.39	0.39	mg/Kg	400	48.6	N1	52.5
BH15	5/21/04	14:10	GEL	SW6010B	Lead	89.6	J	0.355	0.625	mg/Kg	400	48.6	N1	56.4
BH15	5/21/04	14:10	GEL	SW6010B	Lead	116	J	0.34	0.599	mg/Kg	400	48.6	FD1	73.1
BH33	4/22/05	13:00	ELAB	SW6010B	Lead	128		0.38	0.76	mg/Kg	400	48.6	N1	80.6
BH13	5/21/04	10:10	GEL	SW6010B	Lead	148	J	0.362	0.638	mg/Kg	400	48.6	N1	93.2
BH20	5/21/04	9:45	GEL	SW6010B	Lead	155	J	0.351	0.619	mg/Kg	400	48.6	N1	97.7
2BGSO01	10/1/96	12:45	KNX	SW6010	Lead	165		0.38	0.38	mg/Kg	400	48.6	N1	104.0
BH09	5/20/04	14:25	GEL	SW6010B	Lead	182		0.35	0.617	mg/Kg	400	48.6	N1	114.7
2BGSO06	10/1/96	13:40	KNX	SW6010	Lead	189		0.36	0.36	mg/Kg	400	48.6	N1	119.1
BH27	4/22/05	10:20	ELAB	SW6010B	Lead	203		0.41	0.82	mg/Kg	400	48.6	N1	127.9
BH12	5/22/04	13:15	GEL	SW6010B	Lead	295	J	0.379	0.668	mg/Kg	400	48.6	N1	185.9
BH34	4/22/05	13:15	ELAB	SW6010B	Lead	341		0.42	0.85	mg/Kg	400	48.6	N1	214.8
2BGSO07	10/1/96	13:45	KNX	SW6010	Lead	351		0.37	0.37	mg/Kg	400	48.6	N1	221.1
BH23	5/22/04	11:38	GEL	SW6010B	Lead	386	J	0.403	0.71	mg/Kg	400	48.6	N1	243.2
BH29	4/22/05	10:50	ELAB	SW6010B	Lead	388		0.51	1	mg/Kg	400	48.6	N1	244.4
2BGSO03	10/1/96	13:10	KNX	SW6010	Lead	391		0.38	0.38	mg/Kg	400	48.6	N1	246.3
2BGSO02	10/1/96	13:00	KNX	SW6010	Lead	555		0.38	0.38	mg/Kg	**400**	48.6	FD1	349.7
BH19	5/21/04	9:25	GEL	SW6010B	Lead	585	J	0.356	0.628	mg/Kg	**400**	48.6	N1	368.6
BH25	4/22/05	9:55	ELAB	SW6010B	Lead	590		0.38	0.77	mg/Kg	**400**	48.6	N1	371.7
BH24	5/22/04	11:55	GEL	SW6010B	Lead	590	J	0.389	0.686	mg/Kg	**400**	48.6	N1	371.7
BH18	5/21/04	8:55	GEL	SW6010B	Lead	598	J	0.347	0.612	mg/Kg	**400**	48.6	N1	376.7
2BGSO08	10/1/96	13:50	KNX	SW6010	Lead	603		0.37	0.37	mg/Kg	**400**	48.6	N1	379.9
BH17	5/20/04	15:35	GEL	SW6010B	Lead	730		0.339	0.597	mg/Kg	**400**	48.6	N1	459.9
2BGSO02	10/1/96	13:00	KNX	SW6010	Lead	1000		0.37	0.37	mg/Kg	**400**	48.6	N1	630.0

	48.6	background levels, no action
	399	below PRGs but TCLP conversion above RCRA
	661	Total Lead to TCLP conversion 63%, Lime treatment 98.8 % reduction in TCLP (meets RCRA TCLP)
	82625	Additional treatment w/Enviroblend, 99.2% reduction in TCLP
	> 82625	will not meet RCRA TCLP

Lead in Burn Layer Material
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG	Type		TCLP Est (Mg/L)
2BGSO01	10/1/96	16:20	KNX	SW6010	Lead	13.8		0.36	0.36	mg/Kg	400	48.6	N1	8.7
2BGSO02	10/1/96	17:00	KNX	SW6010	Lead	16.2		0.37	0.37	mg/Kg	400	48.6	N1	10.2
2BGSO03	10/2/96	9:05	KNX	SW6010	Lead	232		0.36	0.36	mg/Kg	**400**	48.6	N1	146.2
TR09-1	5/19/2004	16:35	GEL	SW6010B	Lead	551		0.372	0.655	mg/Kg	**400**	48.6	N1	347.1
TR08-1	5/19/2004	15:45	GEL	SW6010B	Lead	560		0.36	0.634	mg/Kg	**400**	48.6	N1	352.8
TR07-1	5/19/2004	14:26	GEL	SW6010B	Lead	891		0.338	0.596	mg/Kg	**400**	48.6	N1	561.3
TR06-1	5/19/2004	11:15	GEL	SW6010B	Lead	3640		0.355	0.626	mg/Kg	**400**	48.6	N1	2293.2
TR05-1	5/19/2004	8:50	GEL	SW6010B	Lead	4510	J	0.345	0.607	mg/Kg	**400**	48.6	N1	2841.3
TR05-1	5/19/2004	8:50	GEL	SW6010B	Lead	11930	J	4.22	7.45	mg/Kg	**400**	48.6	FD1	7515.9

48.6	background levels, no action
399	below PRGs but TCLP conversion above RCRA
661	Total Lead to TCLP conversion 63%, Lime treatment 98.8 % reduction in TCLP (meets RCRA TCLP)
82625	Additional treatment w/Enviroblend, 99.2% reduction in TCLP
> 82625	will not meet RCRA TCLP

TNT in Surface Soil
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG
BH36	12/7/2005	10:45	ELAB	05-SO-2BG-BH36-D	2,4,6-Trinitrotoluene	0.14	J	0.1	0.5	mg/Kg	16
BH26	4/22/2005	10:00	ELAB	SW8330	2,4,6-Trinitrotoluene	0.16	J	0.1	0.5	mg/Kg	16
BH28	4/22/2005	10:40	ELAB	SW8330	2,4,6-Trinitrotoluene	0.16	J	0.087	0.43	mg/Kg	16
BH21	5/21/2004	15:00	GEL	SW8330	2,4,6-Trinitrotoluene	0.284	J	0.125	0.375	mg/Kg	16
BH49	12/7/2005	15:20	ELAB	05-SO-2BG-BH49-A	2,4,6-Trinitrotoluene	0.29	J	0.1	0.5	mg/Kg	16
2BGSO05	10/1/96	13:30	KNX	SW8330	2,4,6-Trinitrotoluene	0.5		0.25	0.25	mg/Kg	16
BH43	12/7/2005	13:35	ELAB	05-SO-2BG-BH43-A	2,4,6-Trinitrotoluene	0.62		0.095	0.48	mg/Kg	16
BH47	12/7/2005	14:45	ELAB	05-SO-2BG-BH47-A	2,4,6-Trinitrotoluene	1		0.095	0.48	mg/Kg	16
BH38	12/6/2005	15:30	ELAB	05-SO-2BG-BH38-A	2,4,6-Trinitrotoluene	1.1		0.095	0.48	mg/Kg	16
BH46	12/7/2005	14:20	ELAB	05-SO-2BG-BH46-D	2,4,6-Trinitrotoluene	1.8		0.095	0.48	mg/Kg	16
BH24	5/22/2004	11:55	GEL	SW8330	2,4,6-Trinitrotoluene	1.97	J	0.125	0.375	mg/Kg	16
BH44	12/7/2005	13:50	ELAB	05-SO-2BG-BH44-A	2,4,6-Trinitrotoluene	2		0.095	0.48	mg/Kg	16
BH48	12/7/2005	15:00	ELAB	05-SO-2BG-BH48-A	2,4,6-Trinitrotoluene	2		0.1	0.5	mg/Kg	16
BH37	12/6/2005	15:10	ELAB	05-SO-2BG-BH37A	2,4,6-Trinitrotoluene	2.9		0.1	0.5	mg/Kg	16
BH46	12/7/2005	14:20	ELAB	05-SO-2BG-BH46-A	2,4,6-Trinitrotoluene	3.3		0.091	0.45	mg/Kg	16
BH29	4/22/2005	10:50	ELAB	SW8330	2,4,6-Trinitrotoluene	4.6		0.091	0.45	mg/Kg	16
BH33	4/22/2005	13:00	ELAB	SW8330	2,4,6-Trinitrotoluene	4.7		0.083	0.42	mg/Kg	16
BH20	5/21/2004	9:45	GEL	SW8330	2,4,6-Trinitrotoluene	4.75		0.125	0.375	mg/Kg	16
BH34	4/22/2005	13:15	ELAB	SW8330	2,4,6-Trinitrotoluene	5.2		0.091	0.45	mg/Kg	16
BH17	5/20/2004	15:35	GEL	SW8330	2,4,6-Trinitrotoluene	6.54	J	0.125	0.375	mg/Kg	16
BH45	12/7/2005	14:05	ELAB	05-SO-2BG-BH45-A	2,4,6-Trinitrotoluene	9.2		0.091	0.45	mg/Kg	16
2BGSO02	10/1/96	13:00	KNX	SW8330	2,4,6-Trinitrotoluene	9.5		1.2	1.2	mg/Kg	16
BH39	12/6/2005	15:50	ELAB	05-SO-2BG-BH39-A	2,4,6-Trinitrotoluene	10		0.1	0.5	mg/Kg	16
BH27	4/22/2005	10:20	ELAB	SW8330	2,4,6-Trinitrotoluene	14		0.087	0.43	mg/Kg	16
BH25	4/22/2005	9:55	ELAB	SW8330	2,4,6-Trinitrotoluene	23		0.087	0.43	mg/Kg	**16**
2BGSO07	10/1/96	13:45	KNX	SW8330	2,4,6-Trinitrotoluene	31		5	5	mg/Kg	**16**
2BGSO01	10/1/96	12:45	KNX	SW8330	2,4,6-Trinitrotoluene	48		5	5	mg/Kg	**16**
BH18	5/21/2004	8:55	GEL	SW8330	2,4,6-Trinitrotoluene	60.3		0.125	0.375	mg/Kg	**16**
BH42	12/7/2005	11:55	ELAB	05-SO-2BG-BH42-A	2,4,6-Trinitrotoluene	110		0.095	0.48	mg/Kg	**16**
2BGSO02	10/1/96	13:00	KNX	SW8330	2,4,6-Trinitrotoluene	140		12	12	mg/Kg	**16**
2BGSO08	10/1/96	13:50	KNX	SW8330	2,4,6-Trinitrotoluene	210		12	12	mg/Kg	**16**
2BGSO03	10/1/96	13:10	KNX	SW8330	2,4,6-Trinitrotoluene	910		50	50	mg/Kg	**16**
BH23	5/22/2004	11:38	GEL	SW8330	2,4,6-Trinitrotoluene	2270		12.5	37.5	mg/Kg	**16**
BH19	5/21/2004	9:25	GEL	SW8330	2,4,6-Trinitrotoluene	3120		12.5	37.5	mg/Kg	**16**

	16	no action needed, below PRGs
	229	93% reduction, meets residential PRGs
	533	97% reduction, meets residential PRGs
	814	93% reduction, meets industrial PRGs
	1900	97% reduction, meets industrial PRGs
	> 1900	treatment will not meet industial PRGs

TNT in Burn Layer Material
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG
2BGSO01	10/1/96	16:20	KNX	SW8330	2,4,6-Trinitrotoluene	3.6		0.25	0.25	mg/Kg	16
TR06-1	5/19/2004	11:15	GEL	SW8330	2,4,6-Trinitrotoluene	74.9		0.125	0.375	mg/Kg	**16**
2BGSO03	10/2/96	9:05	KNX	SW8330	2,4,6-Trinitrotoluene	94		12	12	mg/Kg	**16**
TR05-1	5/19/2004	8:50	GEL	SW8330	2,4,6-Trinitrotoluene	885		1.25	3.75	mg/Kg	**16**
TR05-1	5/19/2004	8:50	GEL	SW8330	2,4,6-Trinitrotoluene	1120		2.5	7.5	mg/Kg	**16**
TR07-1	5/19/2004	14:26	GEL	SW8330	2,4,6-Trinitrotoluene	9580		25	75	mg/Kg	**16**
TR09-1	5/19/2004	16:35	GEL	SW8330	2,4,6-Trinitrotoluene	28700		62.5	188	mg/Kg	**16**
TR08-1	5/19/2004	15:45	GEL	SW8330	2,4,6-Trinitrotoluene	35400		62.5	188	mg/Kg	**16**

	16	no action needed, below PRGs
	229	93% reduction, meets residential PRGs
	533	97% reduction, meets residential PRGs
	814	93% reduction, meets industrial PRGs
	1900	97% reduction, meets industrial PRGs
	> 1900	treatment will not meet industial PRGs

Benzo(a)pyrene in Surface Soil
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG
BH22	5/22/2004	11:20	ECEN	SW8310	Benzo(a)pyrene	12.5	NJ	3.93	8.7	ug/Kg	62
BH23	5/22/2004	11:38	ECEN	SW8310	Benzo(a)pyrene	13.6	NJ	4.15	9.2	ug/Kg	62
BH21	5/21/2004	15:00	ECEN	SW8310	Benzo(a)pyrene	19.4	NJ	3.71	8.22	ug/Kg	62
BH13	5/21/2004	10:10	ECEN	SW8310	Benzo(a)pyrene	23.5	NJ	3.84	8.51	ug/Kg	62
BH21	5/21/2004	15:00	ECEN	SW8310	Benzo(a)pyrene	30.3	NJ	4.03	8.94	ug/Kg	62
BH15	5/21/2004	14:10	ECEN	SW8310	Benzo(a)pyrene	32.3	J	19.6	43.4	ug/Kg	62
BH14	5/21/2004	11:20	ECEN	SW8310	Benzo(a)pyrene	38.1	NJ	3.97	8.81	ug/Kg	62
BH20	5/21/2004	9:45	ECEN	SW8310	Benzo(a)pyrene	61.3	NJ	3.67	8.13	ug/Kg	62
BH15	5/21/2004	14:10	ECEN	SW8310	Benzo(a)pyrene	62.7	NJ	18.8	41.7	ug/Kg	**62**
BH17	5/20/2004	15:35	ECEN	SW8310	Benzo(a)pyrene	62.7	NJ	21.2	47.1	ug/Kg	**62**
BH45	12/7/2005	14:05	ELAB	SW8270	Benzo(a)pyrene	64		25	62	ug/Kg	**62**
BH16	5/22/2004	13:37	ECEN	SW8310	Benzo(a)pyrene	65.1	NJ	10.8	23.8	ug/Kg	**62**
BH24	5/22/2004	11:55	ECEN	SW8310	Benzo(a)pyrene	89.5	NJ	3.86	8.56	ug/Kg	**62**
BH18	5/21/2004	8:55	ECEN	SW8310	Benzo(a)pyrene	108	NJ	18	39.9	ug/Kg	**62**
BH29	4/22/2005	10:50	ELAB	SW8270	Benzo(a)pyrene	110	J	27	67	ug/Kg	**62**
2BGSO08	10/1/96	13:50	KNX	SW8270	Benzo(a)pyrene	130	J	130	400	ug/Kg	**62**
2BGSO07	10/1/96	13:45	KNX	SW8270	Benzo(a)pyrene	150	J	150	410	ug/Kg	**62**
BH44	12/7/2005	13:50	ELAB	SW8270	Benzo(a)pyrene	160		25	63	ug/Kg	**62**
BH47	12/7/2005	14:45	ELAB	SW8270	Benzo(a)pyrene	160		25	64	ug/Kg	**62**
BH48	12/7/2005	15:00	ELAB	SW8270	Benzo(a)pyrene	200		26	64	ug/Kg	**62**
BH12	5/22/2004	13:15	ECEN	SW8310	Benzo(a)pyrene	229	NJ	12	26.6	ug/Kg	**62**
BH25	4/22/2005	9:55	ELAB	SW8270	Benzo(a)pyrene	310	J	49	120	ug/Kg	**62**
BH34	4/22/2005	13:15	ELAB	SW8270	Benzo(a)pyrene	360	J	54	130	ug/Kg	**62**

Benzo(a)pyrene in Burn Layer Material
Reservoir No. 2 Burning Ground, PBOW

Location	Date	Time Samp.	Lab ID	Test	Analyte	Result	Qual	DL	RL	Units	Adjusted Soil PRG
TR06-1	5/19/2004	11:15	ECEN	SW8310	Benzo(a)pyrene	108	NJ	38.2	84.6	ug/Kg	**62**

		no action needed, below PRGs
	103	40% reduction (meets residential PRGs)
	350	40 % reduction (meets industrial PRGs)
	> 350	treatment will not meet industial PRGs

Interim Soil Removal Action
Plum Brook Ordnance Works
Sandusky, Ohio

Soil Excavation and Ex Situ Stabilization

TNTB

U. S. Army Corps of Engineers

Huntington District

February 2006

Location and History

- 9,009 acre former U.S. Army explosives manufacturing (1941-1945) site located approximately 4 miles south of Sandusky, OH and 59 miles west of Cleveland, OH
- Three separate manufacturing areas were used, TNTA, TNTB and TNTC
- Decontamination efforts were conducted by the Army and General Service Administration in 1945 and 1955
- NASA acquired the property in 1963, currently controls the major portion of the site and continues to conduct space research

Background

- Contaminated Soil and groundwater remained after the 1945 and 1955 cleanups
- To help determine extent and future action, Remedial Investigation/Feasibility Studies were completed from1997-2002
  - Revealed contaminated soil which posed an unacceptable risk to human health and the environment
- Action Memorandums for Interim Soil Removal Action were finalized in 2003
  - Recommended Remedial Objectives and Preliminary Remediation Goals for Contaminants of Concern

Remedial Objectives

- Specified in the U. S. Army Corps of Engineers, Huntington District, Final Action Memorandum
- Minimize the potential for human exposure via incidental ingestion, dermal contact, and the inhalation of soil contaminated with nitroaromatics, PCBs, PAHs and lead
- Minimize the potential for nitroaromatics, PCBs, PAHs and lead to migrate from the soil at the site to the groundwater

Preliminary Remediation Goals Contaminants of Concern

Contaminant of Concern	PRGs (mg/kg)[1]
Nitroaromatics	
2-amino-4,6-DNT	0.4
4-amino-2,6-DNT	0.4
2,4-DNT	7.5
2,6-DNT	2.75
2-nitrotoluene	74
2,4,6-TNT	3.36
PCBs	
Aroclor 1254	0.16
Aroclor 1260	2.87
PAHs	
Benzo(a)anthracene	5.43
Benzo(a)pyrene	0.54
Benzo(a)fluoranthene	5.43
Dibenz (a,h) anthracene	0.65
Indeno(1,2,3-cd)pyrene	5.43

mg/kg is equal to parts per million [1]

13 Former Building Locations (30 Areas) Identified

Nitroaromatic Contamination

- Building 417 – Wastewater Settling Tanks;
- Building 453 – Fortifier House;
- Building 456 – Wash House;
- Building 462 – Bi-Tri House;
- Building 466 – Wash House;
- Northwest Nail House;
- Building 472 – Bi-Tri House;
- Building 473 – Fortifier House;
- Building 476 – Wash House

Nitroaromatic and Lead Contamination

- Building 412 – Sweating and Graining House;
- Building 452 – Bi-Tri House;
- Building 456 – Wash House Area B;
- Building 463 – Fortifier House;
- Northeast Nail House

Excavation and Ex Situ Stabilization

- Chosen as the most efficient and cost effective way to meet the Remedial Objectives
- MACTITE treatment was used to stabilize lead
  - Lead was detected in Building 452 – Areas A and B were above the action level of 400 ppm
  - Analytical results of the MACTITE treated soil revealed that TCLP lead was non-detect
- Bioremediation (composting) was used to effectively reduce nitroaromatic contamination
  - Compost After Action Report (USACE ’06) gives overview and details of bioremediation activities

Hazard Index

- Even though extensive over excavation was performed, confirmation sample results in some of the former building locations continued to exceed the PRG's established for 2,4,6-TNT, 2-amino-4,6 DNT and 4-amino-2,6 DNT
- Therefore, with the approval of the Ohio EPA, a risk based approach was used, a hazard index for all locations was calculated and those locations with a Hazard Index of 1.0 or less would pose no health threat
- Hazard Index calculations were performed on each area excavated; if there was no detection of contamination in the confirmation sampling the Hazard Index was not calculated (i.e. = 0)

Summary and Conclusions

- 13 former building locations (30 Areas) were excavated as funds were available
  - 2,961 cubic yards were proposed to be removed by the Remedial Investigation/Feasibility Study
- It was discovered the amount of contaminated soil was greatly underestimated
  - 5,217 cubic yards were actually removed
- Building locations with nitroaromatic only contamination were excavated first
  - 8 were over excavated for closure having attained a Hazard Index of 1.0 or less

Summary and Conclusions cont'd

- Due to limited funding limitations further excavation was halted
- Test pits were dug and confirmation sample results used to find the horizontal extent of contamination
- 5 building locations need further excavation due to remaining contaminated soil
  - 6,716 cubic yards of material still need to be removed
- No further action decision document will be requested for all 13 former building locations upon completion

Recommendations

Location	Hazard Index	Estimated Contaminated Soil to be Removed	Recommendation
Building 417-Wastewater Settling Tanks			
Area A	0.2	0	Closure
Area B	0.7	0	Closure
Area C	0.8	0	Closure
Area D	0.6	0	Closure
Building 453-Fortifier House	0.1	0	Closure
Building 456-Wash House			
Area A	*0	0	Closure
Areas C, D, E, and F	0.6	0	Closure
Area G	*0	0	Closure
Building 462- Bi-Tri House	*0	0	Closure
Building 466- Wash House			
Area A	*0	0	Closure
Area B	*0	0	Closure
Area C	*0	0	Closure
Area D	0.5	0	Closure
Northwest Nail House	*0	0	Closure
Building 472- Bi-Tri House			Closure
Areas A and B	0.1	0	Closure
Building 473-Fortifier House	*0	0	Closure
Building 476-Wash House			Closure
Area A	0.1	0	Closure
Area B	0.1	0	Closure
Building 412—Sweating and Graining House			
Area B and C	0.0 and 0.2	0	Closure

* The hazard index for these building locations was not calculated to to Non Detect Result from Confirmation Sampling

Recommendations cont'd

Location	Hazard Index	Estimated Contaminated Soil for Removal	Recommendation
Building 456-Wash House			
Area B	*0	1,108.46	Over-excavation for Closure
Building 452-Bi-Tri House			
Area A and B	*0	2,053.46	Over-excavation for Closure
Building 463- Fortifier House	0.2	2657.98	Over-excavation for Closure
Building 412—Sweating and Graining House			
Area A	*0	646.52	Over-excavation for Closure
Northeast Nail House	*0	250	Over-excavation for Closure

* The hazard index for these building locations was not calculated to to Non Detect Result from Confirmation Sampling

Note: The horizontal extent of contamination was identified and the hazard index was calculated using the confirmation sampling results from the perimeter of the future excavation

Planned Action

- Excavation of remaining contaminated soil from 5 building locations:
  - Building 412 – Sweating and Graining House;
  - Building 452 – Bi-Tri House;
  - Building 456 – Wash House Area B;
  - Building 463 – Fortifier House;
  - Northeast Nail House

Resource Contact Information

Lisa Humphreys
U. S. Army Corps of Engineers
Huntington District

304-399-5953 (office)
304-360-2558 (cell)

Lisa.A.Humphreys@lrh01.usace.army.mil

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	300.00
	ACTUAL EXCAVATION	1,531.86
	FUTURE EXCAVATION	0.00

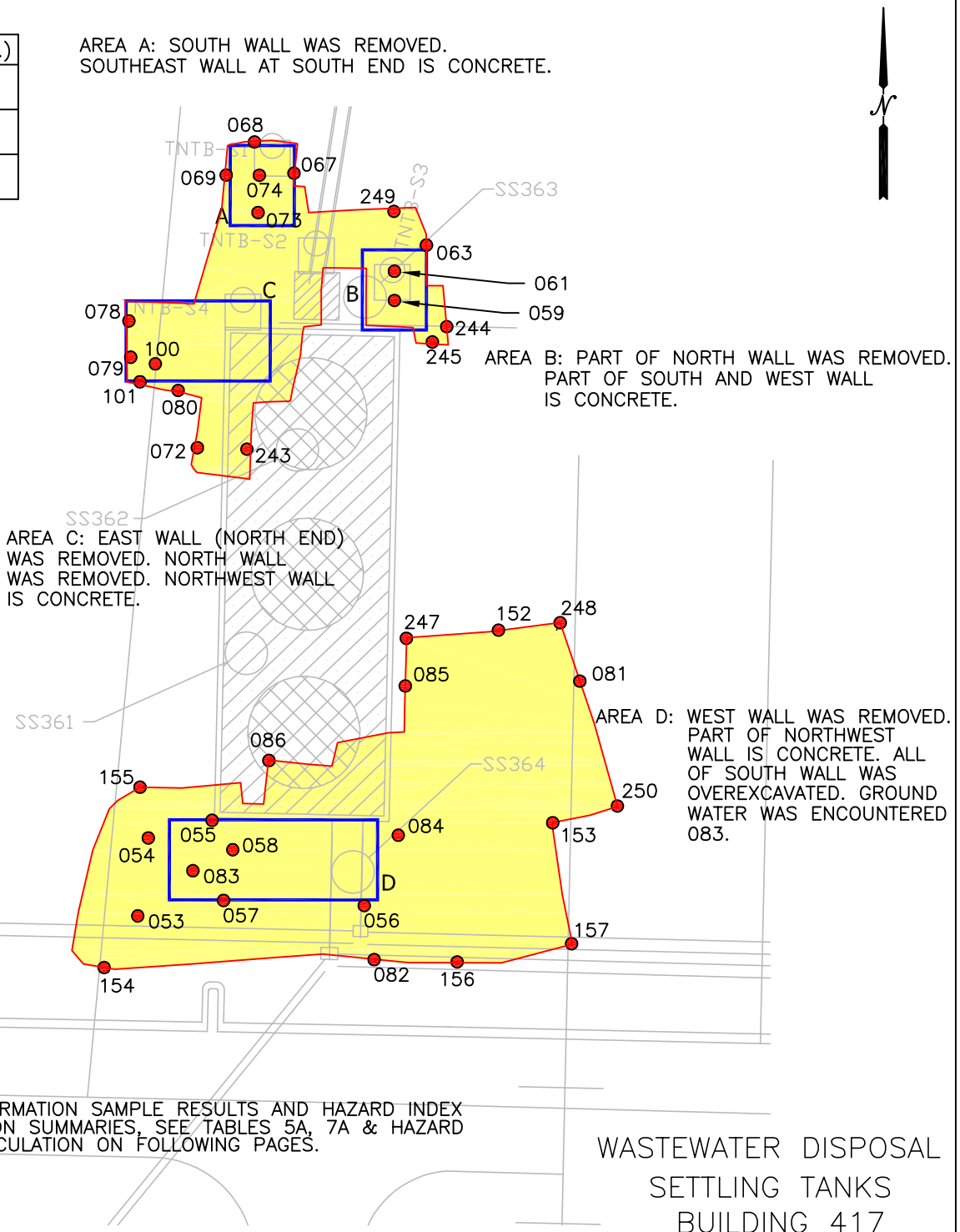
* INCLUDES AREAS A, B, C, & D

● SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	20' x 25' x 1.5'	28.00
B	20' x 25' x 1.5'	28.00
C	45' x 25' x 1.5'	63.00
D	65' x 25' x 1.5'	181.00



US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
WASTEWATER DISPOSAL SETTLING TANKS BUILDING 417
ACTUAL EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

PREPARED BY:
Mountain State Company
P.O. BOX 0 • CEDAR GROVE, WV 25039
2318 E. DuPONT AVE. • BELLE, WEST VIRGINIA
PHONE (304) 949-4762 FAX (304) 949-4764
jimi_msc@charter.net

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 5A, 7A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

DATE PREPARED: OCTOBER 2005

WASTEWATER DISPOSAL SETTLING TANKS BUILDING 417

\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_417-CUT.DWG, 2/13/2006 9:20:30 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	71.00
	ACTUAL EXCAVATION	61.53
	FUTURE EXCAVATION	0.00

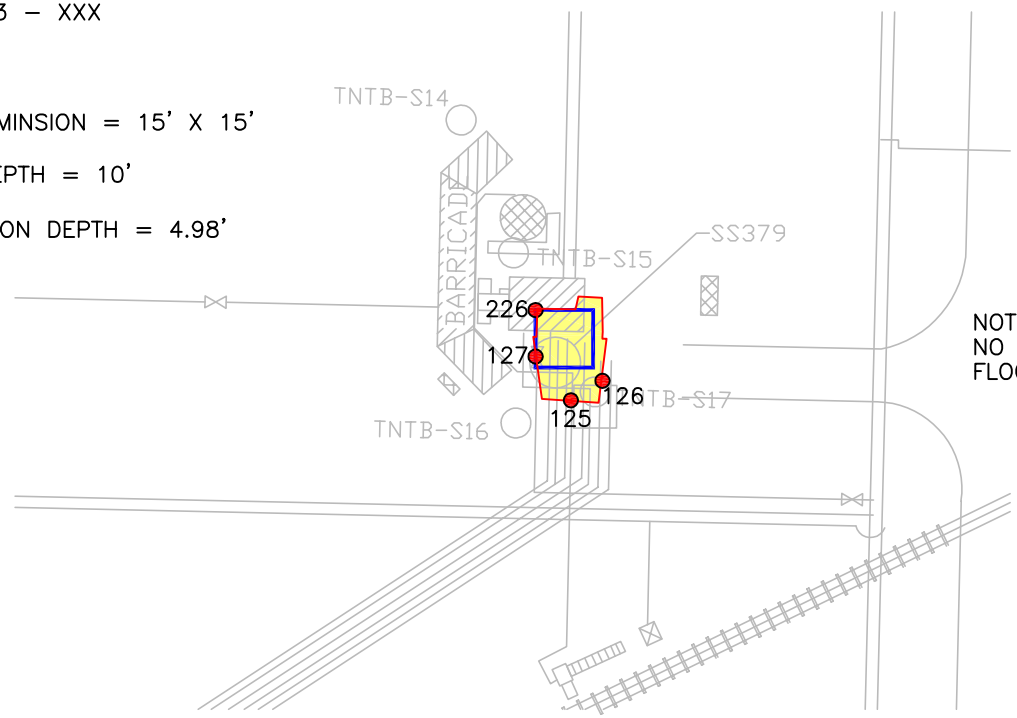
SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 15' X 15'

PROPOSED EXCAVATION DEPTH = 10'

ACTUAL AVERAGE EXCAVATION DEPTH = 4.98'



NOTE: NORTH WALL IS CONCRETE NO SAMPLE WAS COLLECTED OF FLOOR–HIT GROUNDWATER.

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 9A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
FORTIFIER HOUSE BUILDING 453

ACTUAL EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

PREPARED BY:
Mountain State Company
P.O. BOX 0 • CEDAR GROVE, WV 25039
2318 E. DuPONT AVE. • BELLE, WEST VIRGINIA
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

FORTIFIER HOUSE
BUILDING 453

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_453-CUT.DWG, 2/13/2006 9:22:52 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	141.00
	ACTUAL EXCAVATION	522.51
	FUTURE EXCAVATION	0.00

* INCLUDES AREAS A, C, D, E & F

SAMPLE NUMBER = 5393 – XXX

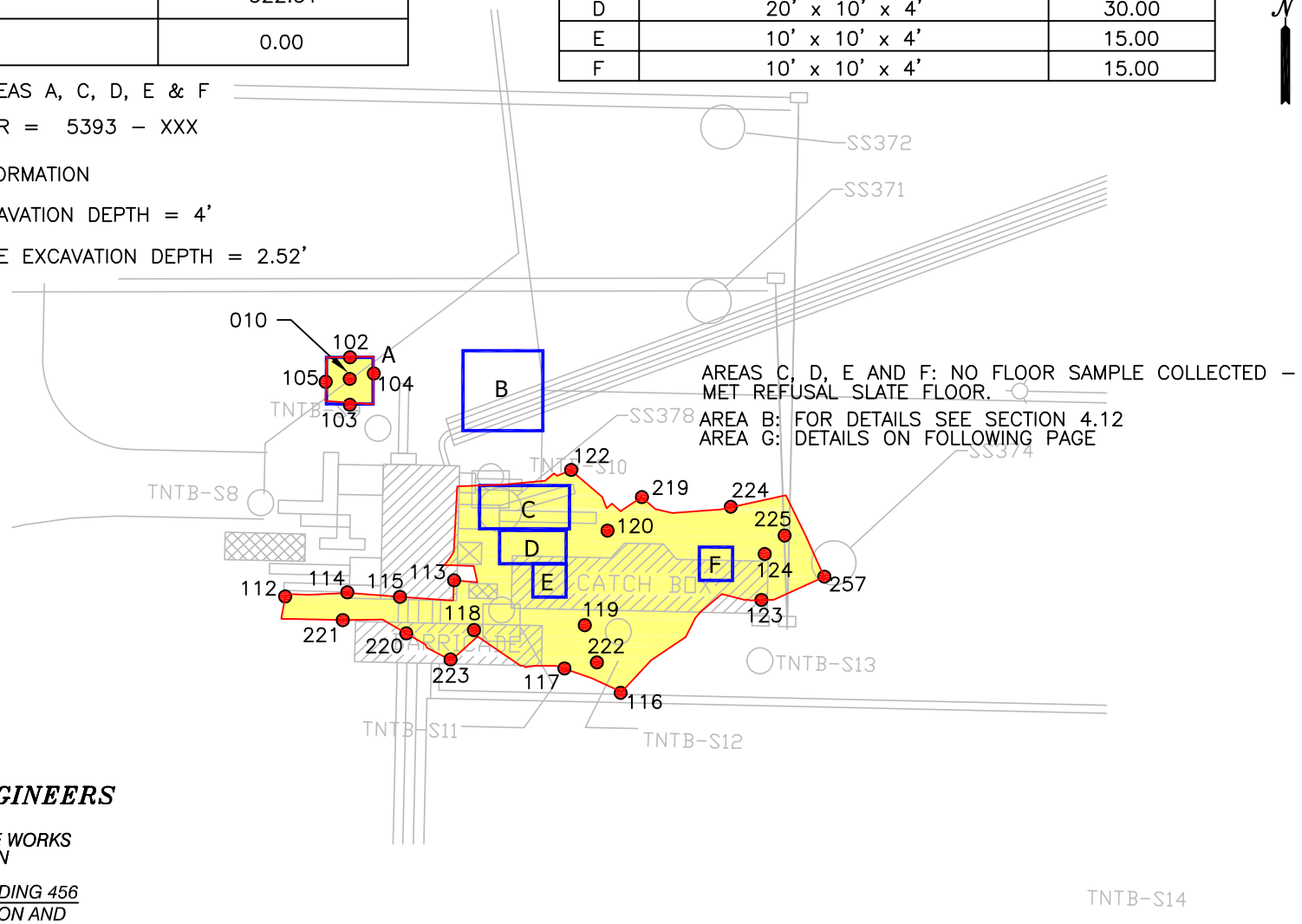
HISTORICAL INFORMATION

PROPOSED EXCAVATION DEPTH = 4'

ACTUAL AVERAGE EXCAVATION DEPTH = 2.52'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	14' x 14' x 4'	29.00
C	27' x 13' x 4'	52.00
D	20' x 10' x 4'	30.00
E	10' x 10' x 4'	15.00
F	10' x 10' x 4'	15.00



AREAS C, D, E AND F: NO FLOOR SAMPLE COLLECTED – MET REFUSAL SLATE FLOOR.

AREA B: FOR DETAILS SEE SECTION 4.12

AREA G: DETAILS ON FOLLOWING PAGE

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 11A, 13A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
WASH HOUSE - AREA A,C,D,E,F BUILDING 456

ACTUAL EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

PREPARED BY:

Mountain State Company
P.O. BOX 10 • CEDAR GROVE, WV 25039
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DATE PREPARED: OCTOBER 2005

WASH HOUSE AREAS A,C,D,E,F
BUILDING 456

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_456-CUT.DWG, 2/13/2006 9:30:02 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	15.00
	ACTUAL EXCAVATION	14.71
	FUTURE EXCAVATION	0.00

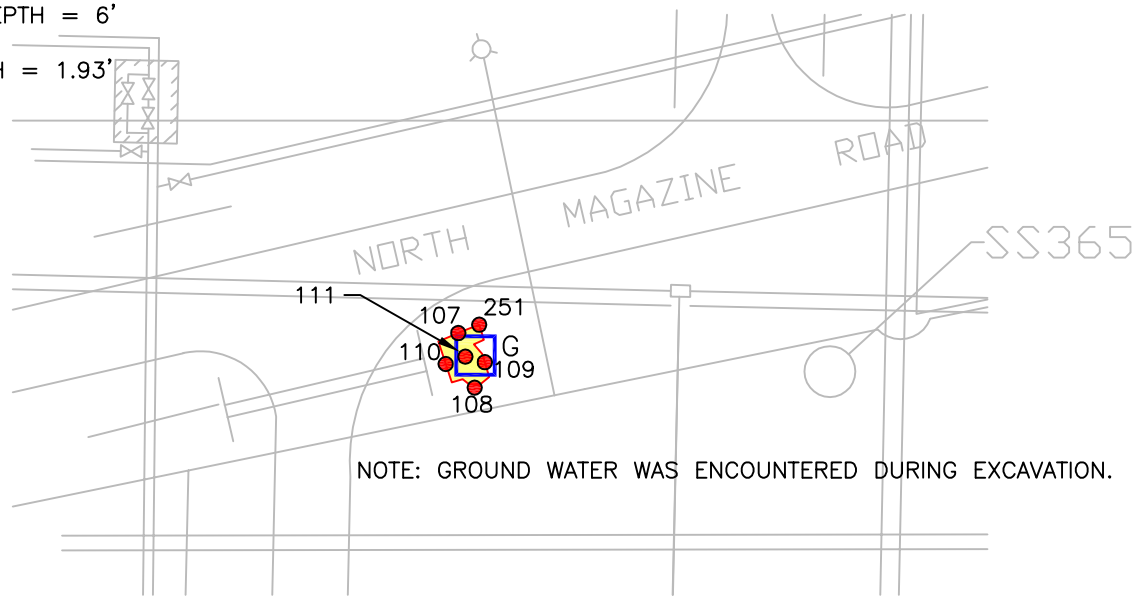
* INCLUDES AREAS A & B

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED AVERAGE EXCAVATION DEPTH = 6'

ACTUAL AVERAGE EXCAVATION DEPTH = 1.93'



NOTE: GROUND WATER WAS ENCOUNTERED DURING EXCAVATION.

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 5A, 7A & HI. TABLES 5HI & 7HI RESPECTIVELY ON FOLLOWING PAGES.

US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
BUILDING 456 AREA G

ACTUAL EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

PREPARED BY:
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DATE PREPARED: OCTOBER 2005

WASH HOUSE AREA G
BUILDING 456

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_456G-CUT.DWG, 2/13/2006 9:30:53 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	67.00
	ACTUAL EXCAVATION	87.58
	FUTURE EXCAVATION	0.00

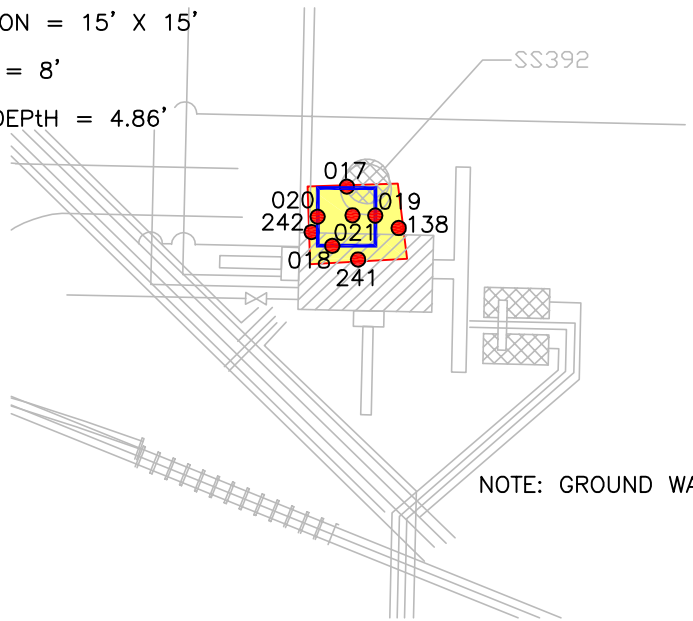
SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 15' X 15'

PROPOSED EXCAVATION DEPTH = 8'

ACTUAL AVERAGE EXCAVATION DEPtH = 4.86'



NOTE: GROUND WATER WAS ENCOUNTERED EXCAVATION.

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 17A & HAZARED INDEX CALCULATION ON FOLLOWING PAGES.

US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
BI-TRI HOUSE BUILDING 462

ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50

1"=50'

PREPARED BY:
Mountain State Company
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

BI–TRI HOUSE
BUILDING 462

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_462-CUT.DWG, 2/13/2006 9:31:36 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	753.00
	ACTUAL EXCAVATION	1,466.78
	FUTURE EXCAVATION	0.00

* INCLUDES AREAS A, B C & D

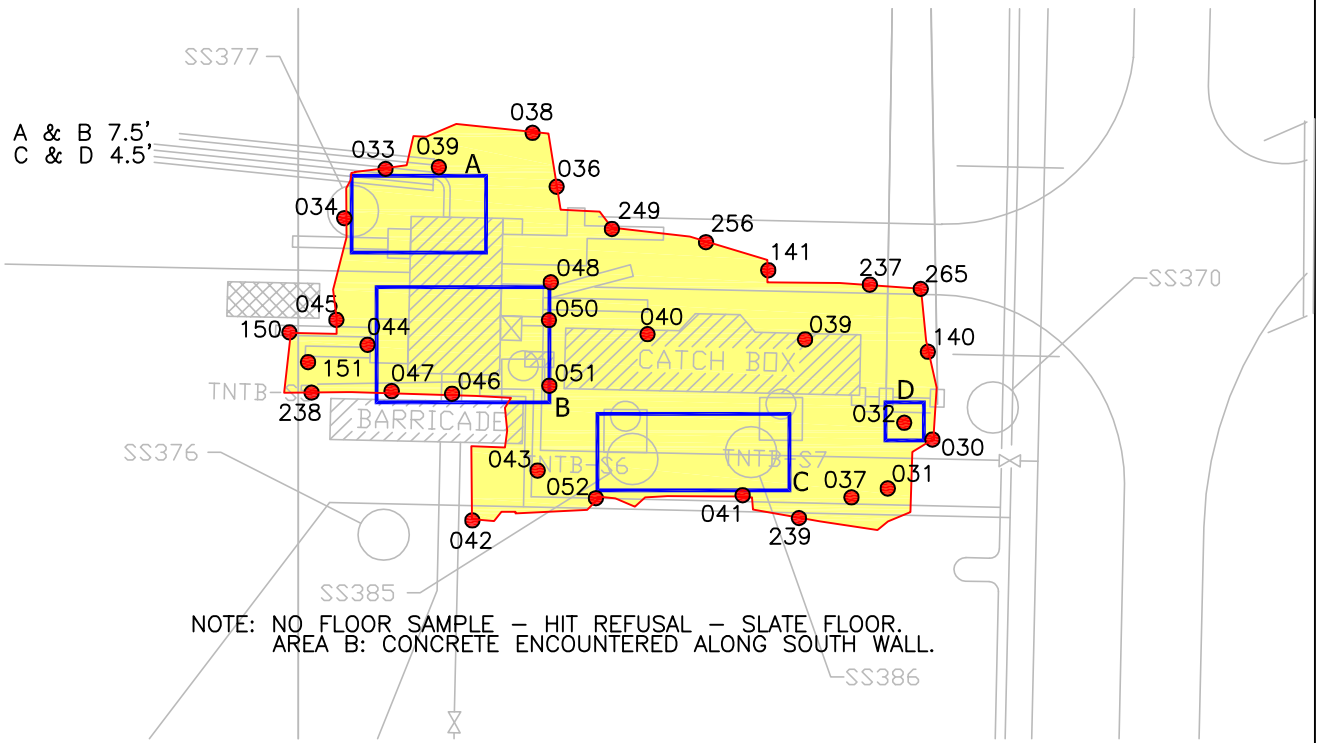
SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DEPTH = AREA A & B 7.5'
AREA C & D 4.5'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	35' x 20' x 7.5'	194.00
B	45' x 30' x 7.5'	378.00
C	50' x 20' x 4.5'	167.00
D	10' x 10' x 4.5'	17.00



NOTE: NO FLOOR SAMPLE – HIT REFUSAL – SLATE FLOOR.
AREA B: CONCRETE ENCOUNTERED ALONG SOUTH WALL.

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
WASH HOUSE - LINE 6 BUILDING 466
ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 19A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

PREPARED BY:
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DATE PREPARED: OCTOBER 2005

WASH HOUSE
BUILDING 466

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_466-CUT.DWG, 2/13/2006 9:33:33 AM, 1:50

LEGEND:

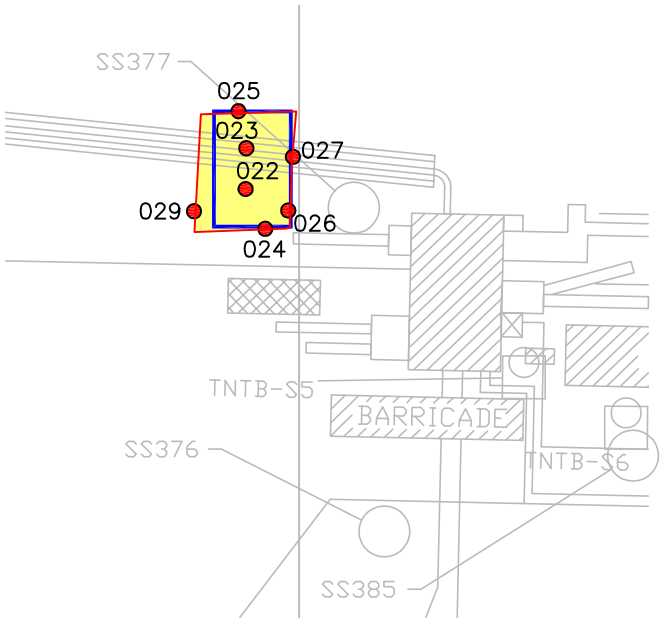
COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	78.00
	ACTUAL EXCAVATION	83.55
	FUTURE EXCAVATION	0.00

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 20' X 30'

PROPOSED EXCAVATION DEPTH = 3.5'



US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
NORTHWEST NAIL HOUSE

ACTUAL EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 21A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

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DATE PREPARED: OCTOBER 2005

NORTHWEST NAIL HOUSE

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_NORTHWEST_NAILHOUSE-CUT.DWG, 2/13/2006 9:38:42 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	190.00
	ACTUAL EXCAVATION	341.11
	FUTURE EXCAVATION	0.00

* INCLUDES AREAS A & B

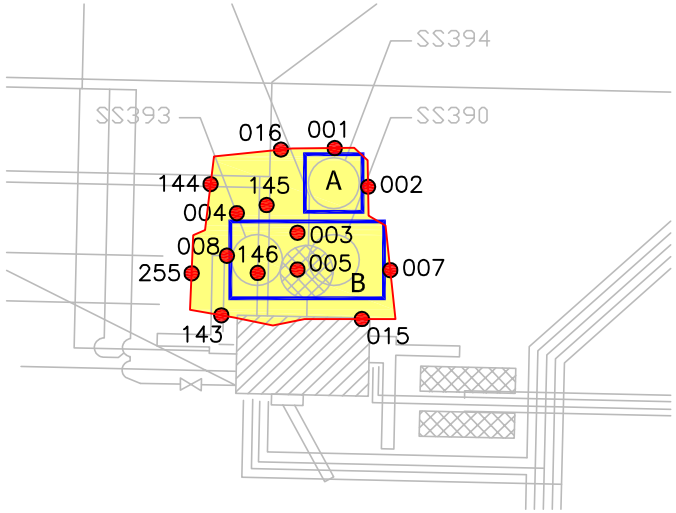
SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DEPTH = 5'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	15' x 15' x 5'	42.00
B	20' x 40' x 5'	148.00



US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
BI-TRI HOUSE BUILDING 472
ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 23A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

PREPARED BY:
Mountain State Company
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

BI–TRI HOUSE
BUILDING 472

E:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_472-CUT.DWG, 2/13/2006 9:34:25 AM, 1:50

LEGEND:

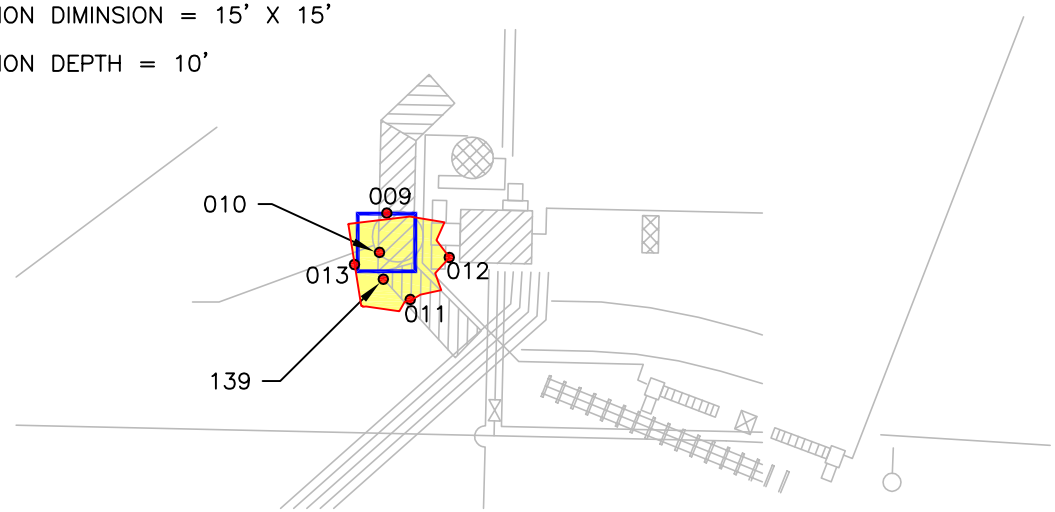
COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	83.00
	ACTUAL EXCAVATION	93.17
	FUTURE EXCAVATION	0.00

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 15' X 15'

PROPOSED EXCAVATION DEPTH = 10'



NOTES: THE EAST WALL OF THE PIT IS A CONCRETE WALL.
SAMPLE 5393–012 WAS COLLECTED BEHIND THE WALL.

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
FORTIFIER HOUSE BUILDING 473
ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 25A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

PREPARED BY:
Mountain State Company
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DATE PREPARED: OCTOBER 2005

FORTIFIER HOUSE
BUILDING 473

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_473-CUT.DWG, 2/13/2006 9:35:00 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	83.00
	ACTUAL EXCAVATION	96.09
	FUTURE EXCAVATION	0.00

* INCLUDES AREAS A & B

SAMPLE NUMBER = 5393 – XXX

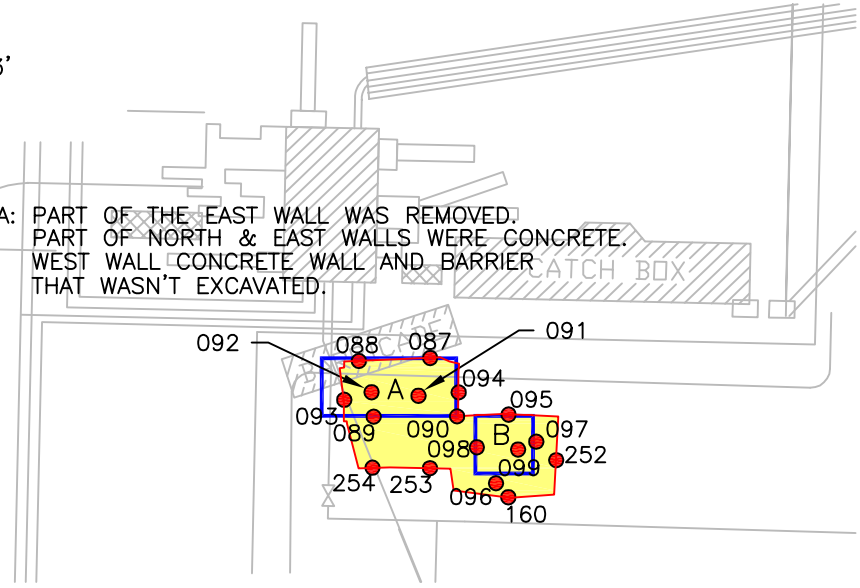
HISTORICAL INFORMATION

PROPOSED EXCAVATION DEPTH = 3'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	35' x 15' x 3'	58.00
B	15' x 15' x 3'	25.00

AREA A: PART OF THE EAST WALL WAS REMOVED.
PART OF NORTH & EAST WALLS WERE CONCRETE.
WEST WALL CONCRETE WALL AND BARRIER
THAT WASN'T EXCAVATED.



AREA B: WEST WALL WAS REMOVED.

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
WASH HOUSE - LINE 7 BUILDING 476
ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 17A & HAZARD INDEX CALCULATION RESPECTIVELY ON FOLLOWING PAGES.

PREPARED BY:
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

WASH HOUSE – LINE 7
BUILDING 476

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_476-CUT.DWG, 2/13/2006 9:35:43 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	266.00
	ACTUAL EXCAVATION	44.00
	FUTURE EXCAVATION	646.52

* INCLUDES AREAS A, B & C

SAMPLE NUMBER = 5393 – XXX

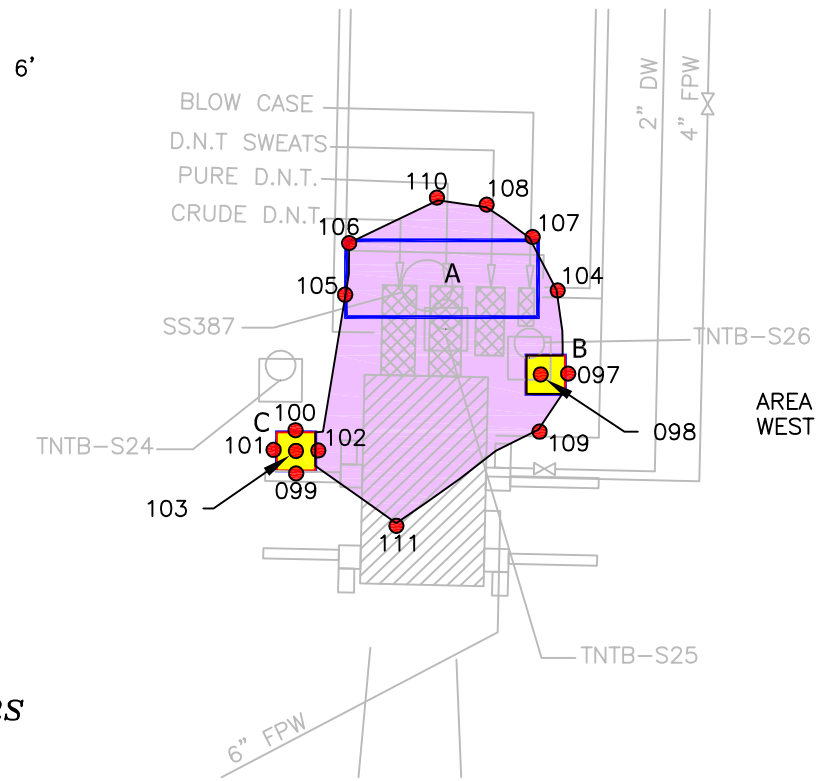
HISTORICAL INFORMATION

PROPOSED EXCAVATION DEPTH = 6'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	50' X 20' X 6'	222.00
B	10' X 10' X 6'	22.00
C	10' X 10' X 6'	22.00

AREA A: OVER EXCAVATE TO CLEAN AREA OF AREA C



AREA B: NORTH WALL AND WEST WALL IS PART OF AREA A

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 54A, 57A, 60A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
D.N.T. SWEATING & GRAINING HOUSE BUILDING 412

FUTURE EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

PREPARED BY:
Mountain State Company
P.O. BOX 10 • CEDAR GROVE, WV 25039
2318 E. DuPONT AVE. • BELLE, WEST VIRGINIA
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

D. N. T. SWEATING & GRAINING HOUSE BUILDING 412

F:\AUGUST-REVISIONS\SANDUSKY-FINAL_BUILDING_412-CUT.DWG, 2/13/2006 9:18:41 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	500.00
	ACTUAL EXCAVATION	409.77
	FUTURE EXCAVATION	2,053.46

* INCLUDES AREAS A & B

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

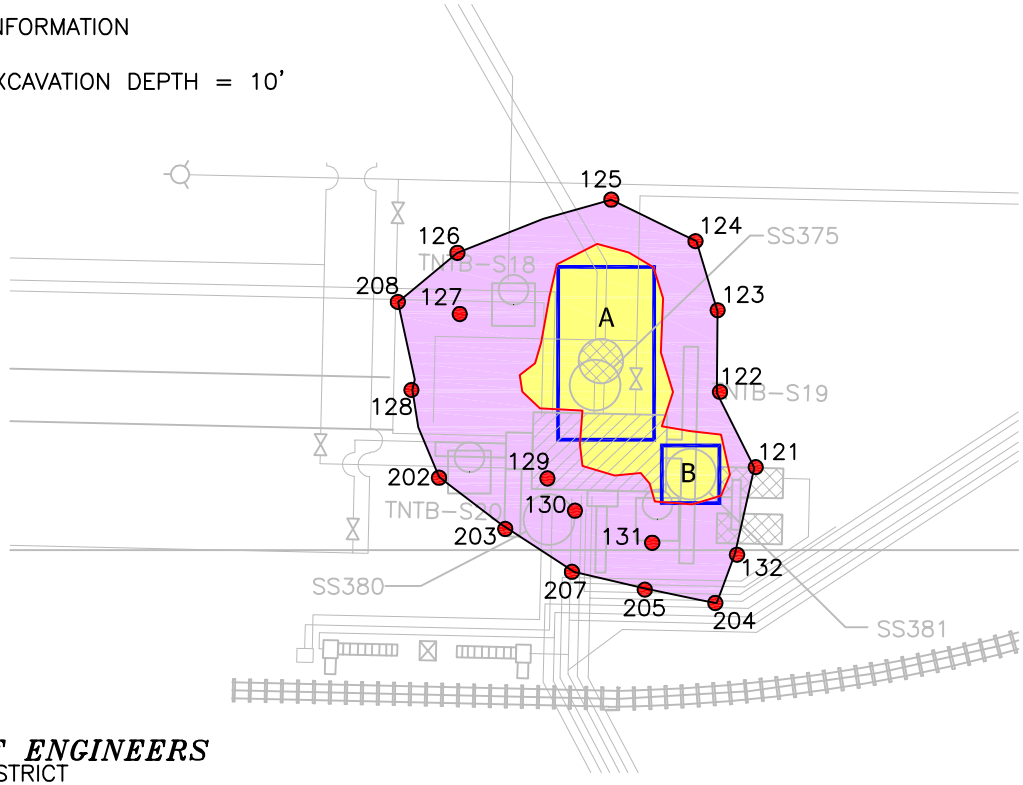
PROPOSED EXCAVATION DEPTH = 10'

DETAIL OF PROPOSED EXCAVATION

AREA	AREA (FT. L,W&D)	VOLUME (C.Y)
A	25' X 45' X 10'	417.00
B	15' X 15' X 10'	83.00

N

AREA A: CONCRETE ENCOUNTERED IN SOUTHWEST CORNER.



US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
BI-TRI HOUSE BUILDING 452
FUTURE EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 35A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

PREPARED BY:
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jimi_msc@charter.net

DATE PREPARED: OCTOBER 2005

BI–TRI HOUSE
BUILDING 452

F:\AUGUST-REVISIONS\SANDUSKY-PROPOSED_BUILDING_452-CUT.DWG, 2/13/2006 9:41:49 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	85.00
	ACTUAL EXCAVATION	85.00
	FUTURE EXCAVATION	1,108.46

SAMPLE NUMBER = 5393 – XXX

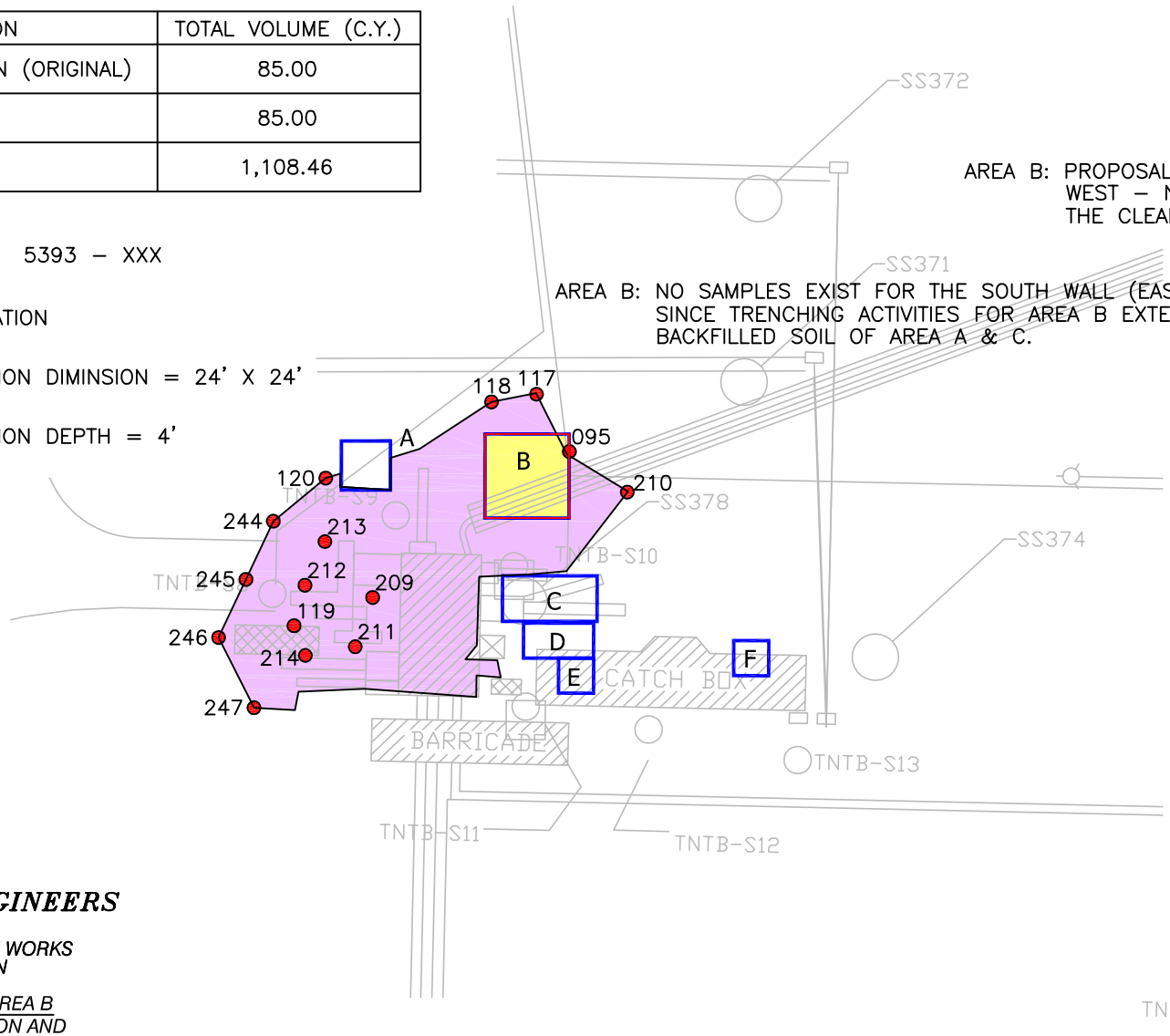
HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 24' X 24'

PROPOSED EXCAVATION DEPTH = 4'

AREA B: PROPOSAL TO OVER EXCAVATE WEST – NORTHWEST WALL TO THE CLEAN SOIL OF AREA A

AREA B: NO SAMPLES EXIST FOR THE SOUTH WALL (EAST AND WEST ENDS) SINCE TRENCHING ACTIVITIES FOR AREA B EXTENDED INTO THE CLEAN BACKFILLED SOIL OF AREA A & C.



US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
WASH HOUSE - 5 BUILDING 456 AREA B
FUTURE EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 49A & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

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DATE PREPARED: OCTOBER 2005

WASH HOUSE AREA B
BUILDING 456

E:\AUGUST-REVISIONS\SANDUSKY-PROPOSED_BUILDING_456-CUT.DWG, 2/13/2006 9:43:26 AM, 1:50

LEGEND:

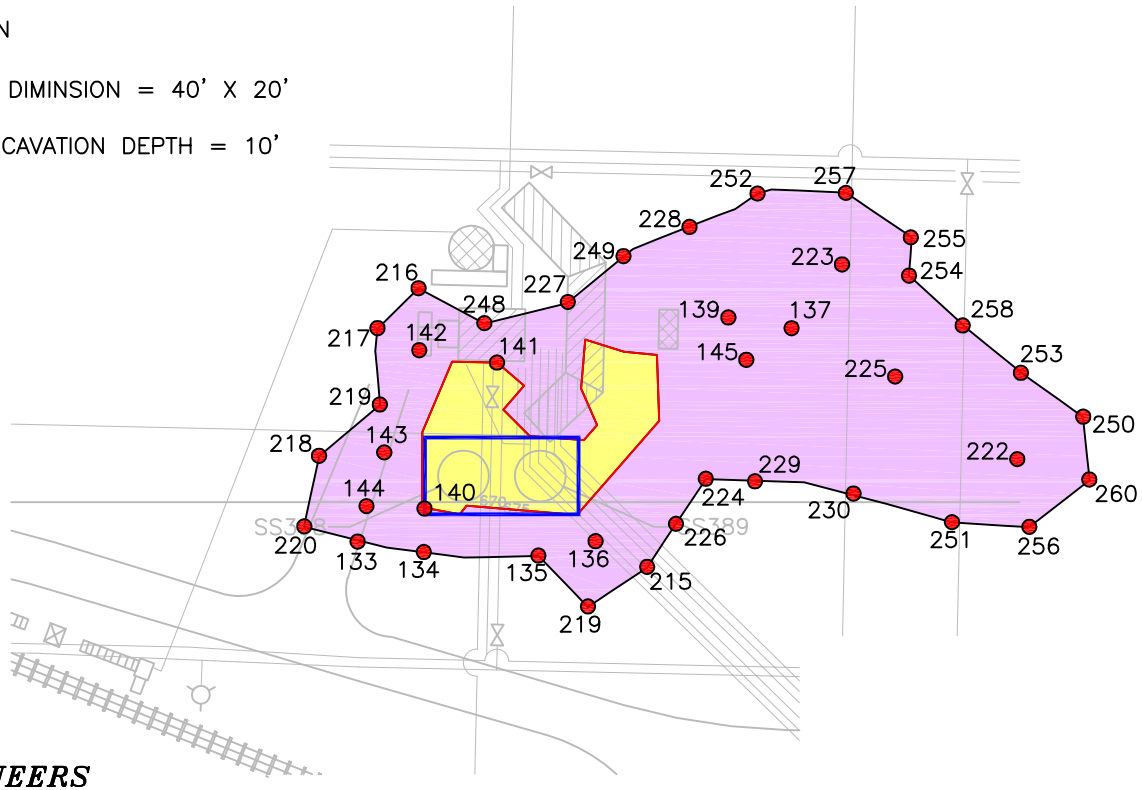
COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	296.00
	ACTUAL EXCAVATION	379.18
	FUTURE EXCAVATION	2,657.98

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 40' X 20'

PROPOSED AVERAGE EXCAVATION DEPTH = 10'



US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B
FORTIFIER HOUSE BUILDING 463
FUTURE EXCAVATION , STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50
1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 42A HAZARD INDEX CALCULATIONS ON FOLLOWING PAGES.

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DATE PREPARED: OCTOBER 2005

FORTIFIER HOUSE
BUILDING 463

F:\AUGUST-REVISIONS\SANDUSKY-PROPOSED_BUILDING_463-CUT.DWG, 2/13/2006 9:44:16 AM, 1:50

LEGEND:

COLOR	DESCRIPTION	* TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	33.00
	ACTUAL EXCAVATION	31.46
	FUTURE EXCAVATION	250.00

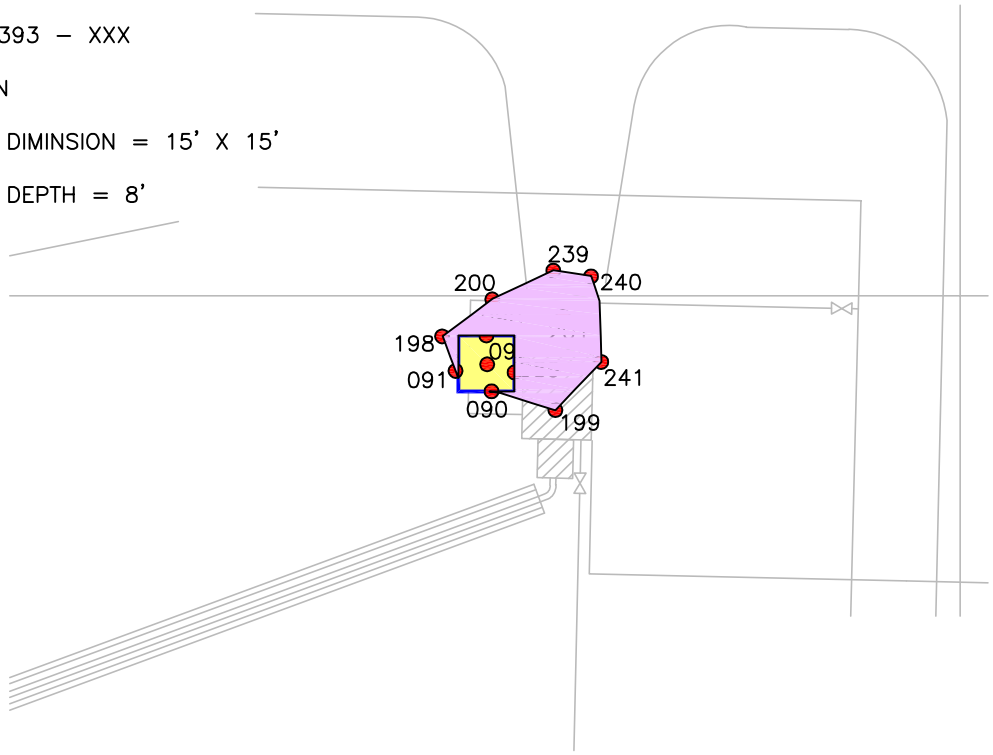
* INCLUDES AREAS A & B

SAMPLE NUMBER = 5393 – XXX

HISTORICAL INFORMATION

PROPOSED EXCAVATION DIMINSION = 15' X 15'

PROPOSED EXCAVATION DEPTH = 8'



US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
NORTHEAST NAILHOUSE
FUTURE EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

0 50

1"=50'

NOTE: FOR CONFIRMATION SAMPLE RESULTS AND HAZARD INDEX CALCULATION SUMMARIES, SEE TABLES 51A, & HAZARD INDEX CALCULATION ON FOLLOWING PAGES.

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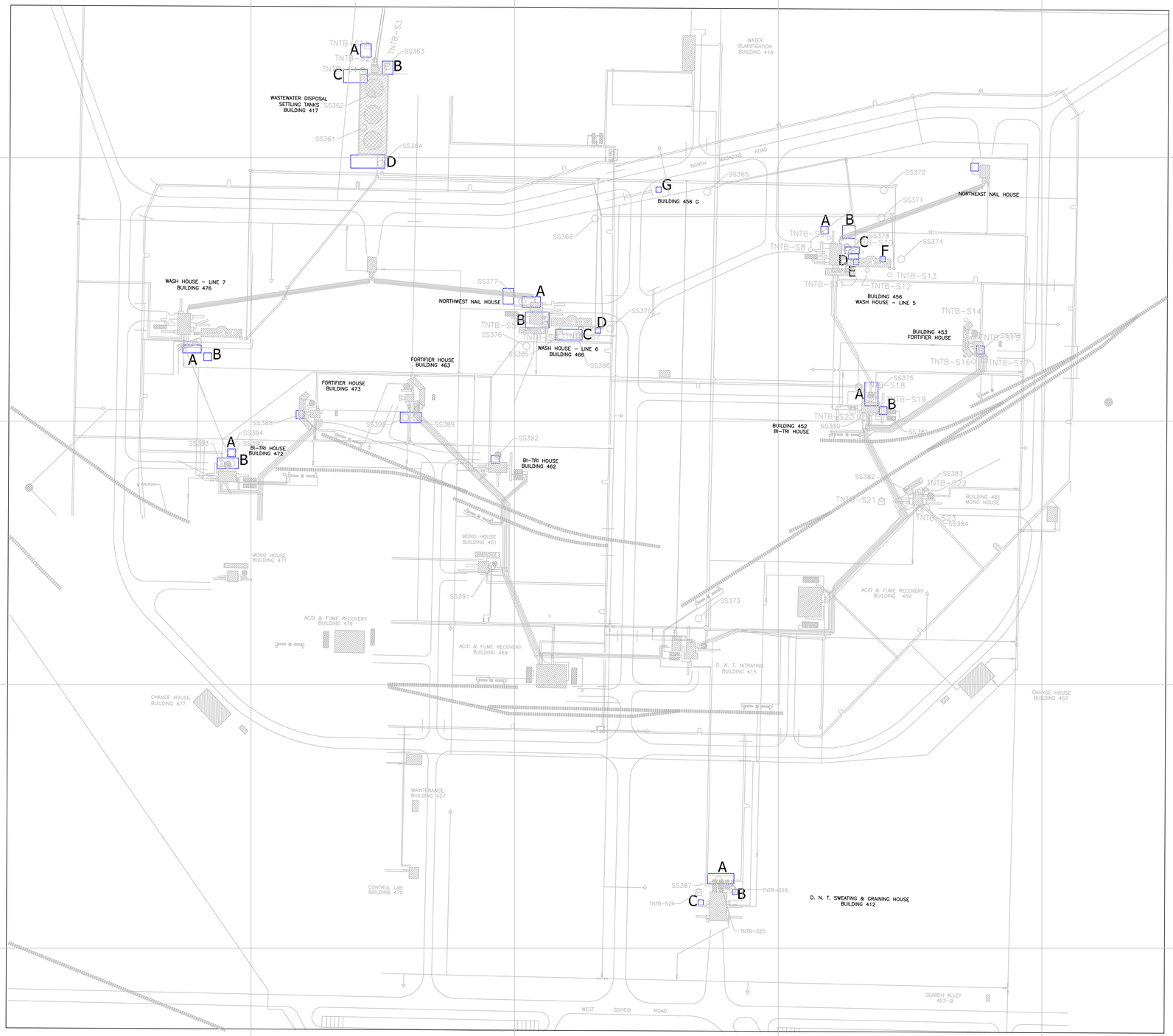
DATE PREPARED: OCTOBER 2005

NORTHEAST NAIL HOUSE



LEGEND:

PROPOSED EXCAVATION (ORIGINAL)
TOTAL VOLUME (C.Y.) = 2961.00

100 0 100
SCALE: 1"=100'

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B GENERAL SITE FEATURES MAP

ORIGINAL PROPOSED EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

PREPARED BY:
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SANDUSKY-PROPOSED_EXCAVATION

DATE PREPARED: OCTOBER 2005
DATE REVISED:

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LEGEND:

FUTURE EXCAVATION TOTAL VOLUME (C.Y.) = 6716.42

PROPOSED EXCAVATION (ORIGINAL) TOTAL VOLUME (C.Y.) = 2961.00

100 0 100
SCALE: 1"=100'

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B GENERAL SITE FEATURES MAP

FUTURE
FUTURE EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

PREPARED BY:
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DATE PREPARED: OCTOBER 2005
DATE REVISED:

SANDUSKY-FINAL-CONTINUED_EXCAVATION

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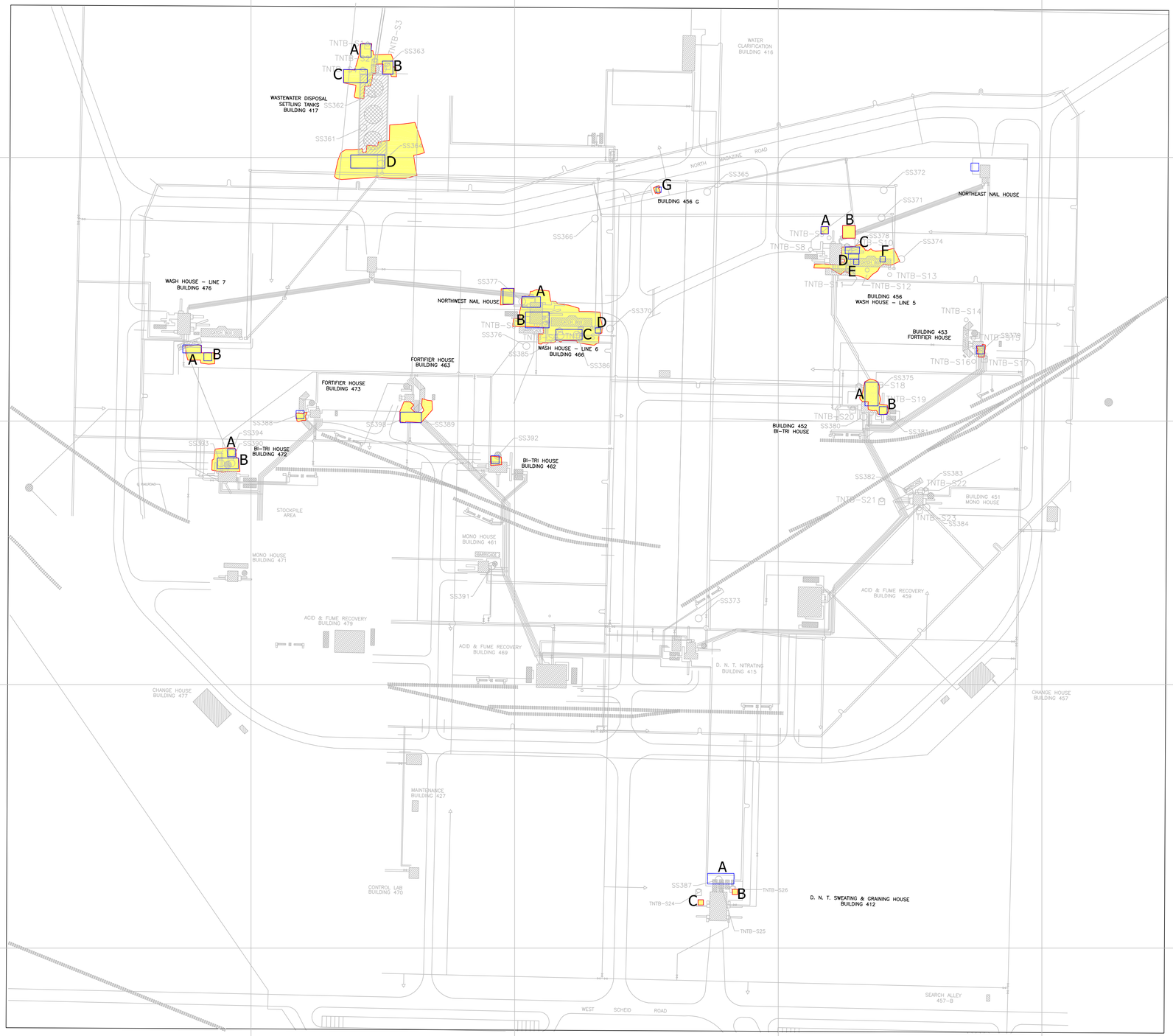

LEGEND:

ACTUAL EXCAVATION TOTAL VOLUME (C.Y.) = 5216.84

PROPOSED EXCAVATION (ORIGINAL) TOTAL VOLUME (C.Y.) = 2961.00

100 0 100

SCALE: 1"=100'

US ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B GENERAL SITE FEATURES MAP

ACTUAL EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

PREPARED BY:
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SANDUSKY-FINAL_EXCAVATION

DATE PREPARED: OCTOBER 2005
DATE REVISED:

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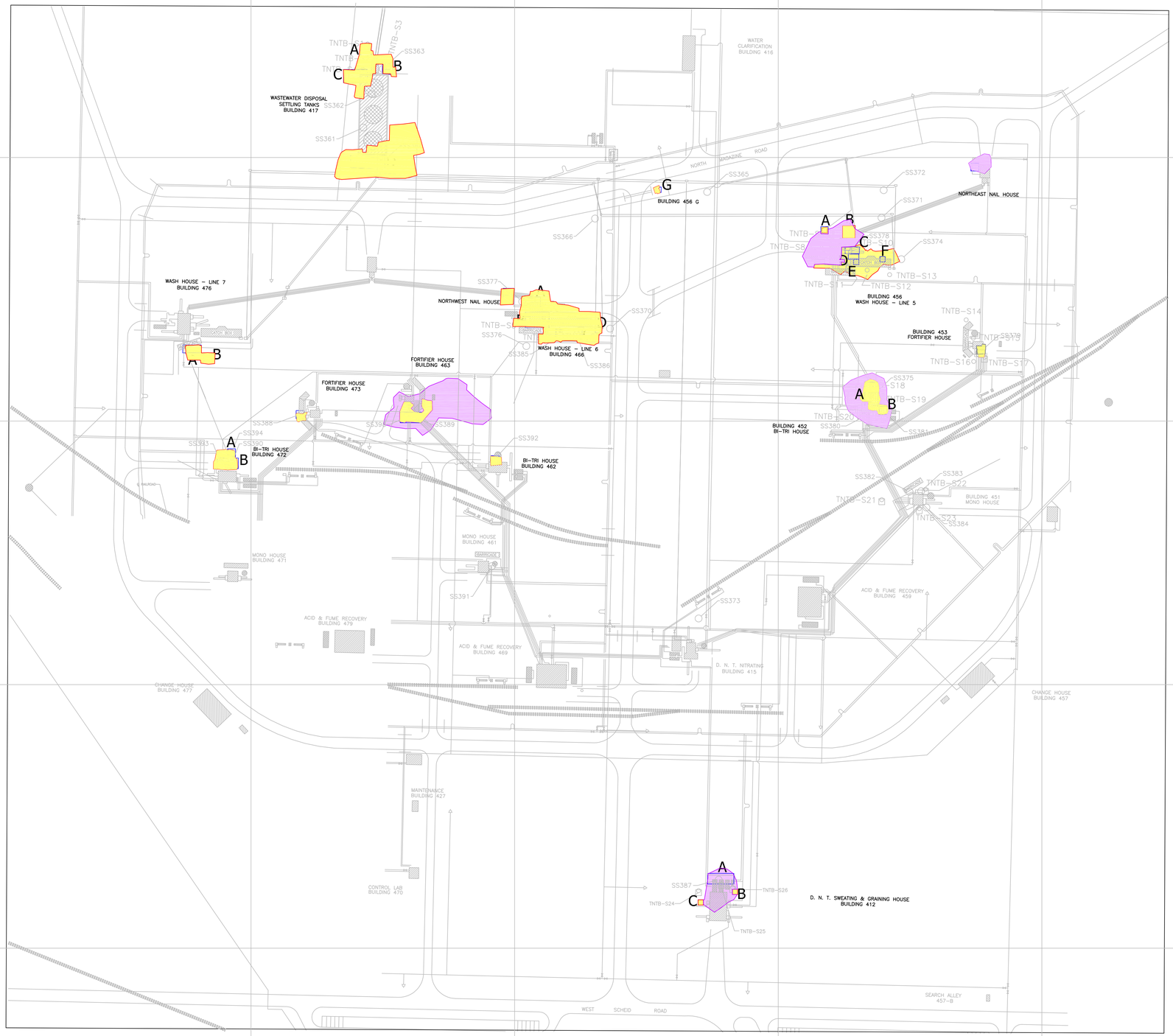

LEGEND:

COLOR	DESCRIPTION	TOTAL VOLUME (C.Y.)
	PROPOSED EXCAVATION (ORIGINAL)	2961.00
	ACTUAL EXCAVATION	5216.84
	FUTURE EXCAVATION	6716.42

100 0 100
SCALE: 1"=100'

US ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT

FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
TNT AREA B GENERAL SITE FEATURES MAP

ORIGINAL PROPOSED, ACTUAL & FUTURE EXCAVATION, STABILIZATION AND DISPOSAL OF CONTAMINATED SOIL

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SANDUSKY-TOTAL_EXCAVATION

DATE PREPARED: OCTOBER 2005
DATE REVISED:

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