
HERITAGE ENVIRONMENTAL SERVICES
AND U.S. NAVY, GLNTC

WORK PLAN FOR BIO-REMEDICATION OF
CONTAMINATED SOIL @ FFTU FACILITY
SOIL SOURCES: BLDG #103 AND #1600A

GREAT LAKES
NAVAL TRAINING CENTER
FACILITY

OCTOBER 1997

Prepared by:

BELING CONSULTANTS

P.O. # 79493

BELING CONSULTANTS

Professional Engineering and Environmental Services

October 21, 1997

Kevin Reinhard
Heritage Environmental Service
15330 Canalbank Road
Lamont, IL 60439

**SUBJECT: BIO-PILE CONSTRUCTION WORKPLAN
NAVY FFTU SITE, GREAT LAKES ILLINOIS**

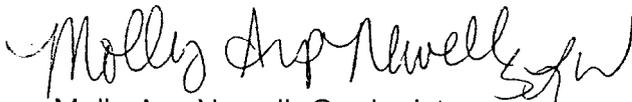
Dear Mr. Reinhard:

Beling Consultants, (BELING) is pleased to provide two copies of this workplan for bio-remediation services under PO # 79493. This brief work plan is provided to document the sources of the soils to be included in this program, summary of materials, baseline contamination, clean up objectives, and bio pile construction design.

The attached Workplan is the first product to be delivered under our contract dated October 13, 1997, which was authorized by you and signed on October 16, 1997. If you have any questions regarding the workplan or other services to be provided under contract, please call me at (309) 757-9849.

Sincerely,

BELING CONSULTANTS, INC.



Molly Arp Newell, Geologist
Project Manager FFTU Project

cc: K. E. Meier
File #29947

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1.0 INTRODUCTION AND OBJECTIVES

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1.1 BACKGROUND

This Workplan has been prepared in accordance with Beling's contract with Heritage Environmental Services dated October 13, 1997 and authorized on October 16, 1997 by Kevin Reinhard. Beling Consultants, (Beling) has prepared this brief work plan to describe activities scheduled to remediate petroleum - contaminated soil sourced from the Naval Base, and transported to the Fire Fighting Training Unit (FFTU) located in the Willow Glen Golf Course. This plan is intended to provide information regarding the scope of work, sequence of activities, general responsibilities, performance expectations and time schedule. It is not intended to serve as a bidding specification and as such does not specify quantities, ways and means for engineering or contractor requirements nor detailed material requirements.

The FFTU facility is currently under investigation and remediation for petroleum related contamination. Recently subsurface trenches facilitated the demolition of underground piping system and concrete storage tank units and other sub-surface vaults. Currently, approximately 4,000 cubic yards of petroleum-contaminated soils are undergoing remediation using an ex-situ bioremediation program utilizing horse manure, bio bulk agents including straw, and cultivated microbial populations together with nutrients applied through inoculation and irrigation procedures.

On September 18, 1997, Navy representatives J. P. Messier, Project Manager and Terry Aide, PWC representative, decided to pursue the potential to remediate soils sourced from Navy Buildings #103 and #1600A at the FFTU Site. The Navy desired to utilize the technology currently in use at their FFTU site, together with the established team of environmental professionals and contractors, to treat soil sourced from the other two base locations, Building #103 and Building #1600A.

Building #103

Prior to the removal of the tanks, a geo-physical investigation was undertaken at Building #103 which indicated the presence of six (6) underground storage tanks. Five (5) of the tanks were located on the South side of the building and one (1) of the tanks was on the North side;

- two (2) 10,000 gallon gasoline tanks
- one (1) 1,000 gallon kerosene tank
- one (1) 2,500 gallon diesel tank
- one (1) 3,000 gallon diesel tank
- one (1) 2,000 gallon fuel tank (confirmed only through geo-physics on the North side).

The six tanks at building were removed on October 7 & 8, 1997, and over - excavation yielded approximately 1,500 cubic yards of contaminated soil. The soil was transported to the FFTU site by a sub-contractor to Heritage. Baseline laboratory analyses were conducted on the contaminated soil to demonstrate compliance with the Illinois House Bill 2164 codified into 415 ILCS 5/22.48: non

special waste certification; effect on permit. Section 22.48(d) states "All information used to determine that the waste is not a special waste shall be attached to the certification. The information shall include but not be limited to :

- (1) The means by which the generator has determined that the waste is not a hazardous waste;
- (2) The means by which the generator has determined that the waste is not liquid;
- (3) If the waste undergoes testing, the analytical results obtained from testing signed and dated by the person responsible for completing the analysis;
- (4) If the waste does not undergo testing, an explanation as to why no testing is needed;
- (5) A description of the process generating the waste; and
- (6) Relevant Material Safety Data Sheets."

Beling understands that testing was conducted and was reviewed by IEPA. The petroleum-contaminated soil was apparently appropriate for transportation without a manifest to the FFTU site. A copy of the analytical tests for the contaminated soils from Naval Building #103 and #1600A are provided in Appendix A.

Building #1600A

Approximately 700 cubic yards of contaminated sandy soil was transported from Navy Building #1600A, the former base gas station to the FFTU site under the same program described above for Building #103. The contaminant of concern for

Building #1600A soils is gasoline (only). The Navy utilized the Illinois House Bill 2164 cited above to characterize the soils so that they could be transported to the FFTU site without a manifest. The laboratory results used to demonstrate compliance with the self permit rule for special waste as cited above are provided with analytical results from Building #103 in Appendix A.

1.1 IEPA PURVIEW

The Illinois IEPA is the implementing agency regarding clean up and closure of petroleum-contaminated soils resulting from Underground Storage Tank (UST) systems in Illinois. Reports regarding progress in closure will be provided to the IEPA. If additional LUST soil remediation is required to close this site, additional bioremediation may be recommended. TACO Tier 1 or Tier 2 clean up objectives may be determined applicable to this site under 35 Illinois Administrative Code Part 742.

1.2 CLEAN UP OBJECTIVES

The general objective of this bioremediation program is to mitigate and minimize threats to human health and the environment in accordance with state and federal laws. The cleanup objectives for petroleum contaminated soil as they pertain to this project are found in Title 35 Illinois Administrative Code Part 742: Tiered Approach to Clean Up Objectives.

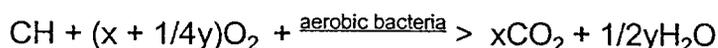
1.3 BIODEGRADATION PROCESS DESCRIPTION

The soil remediation procedure will use an ex-situ biological soil composting process.

The bio-pile process to be utilized is based on ex-situ aerobic biological degradation of the petroleum based compounds. The bio-pile purpose is to supply air, nutrients and micro-organisms to the contaminated soil. The bio-pile process encourages bioremediation by maximizing the portion of the remediation which occurs by oxygen replenishment and bio-metabolism. Use of slotted piping placed in the bio-pile eliminates the need for mechanical stripping of volatile compounds from the extracted soil. Biodegradation occurs as oxygen is replenished in the impacted soil.

A limited amount of groundwater can be effectively remediated using bio-pile technology, because water is used to irrigate the pile. The moisture encourages biological breakdown. Groundwater from the FFTU site may or may not be introduced to Bio-piles #103 and #1600A.

When oxygen is added via the slotted piping to the areas of contamination within the bio-pile, the metabolism of the petroleum compounds occur. Aerobic bacteria use hydrocarbon-containing compounds as an electron source and oxygen as an electron acceptor. Hydrocarbon compounds are converted to carbon dioxide and water by a reaction generally described by the following equation:



This destruction process is economically attractive. Within the bio-pile, hydrocarbons are destroyed and CO₂ and water are produced. In summary, the bio-pile process involves adding air, micro-organisms, nutrients, and moisture to the contaminated soil and allowing the process to proceed.

1.4 BIO-PILE TECHNOLOGY REVIEW

The soil remediation design has previously been successfully used by Beling as an effective and economic means for treatment of petroleum contaminated soils. Beling has published literature and successfully closed LUST and AST sites in Illinois and Iowa using this technology. The general design is also found in literature prepared by the Minnesota Department of Transportation.

In addition, the Bio-pile Design and Construction Manual provided by Naval Facilities Engineering Service Center, Port Hueneme (TM-2189-ENV), was utilized in development of this design.

2.0 RESEARCH AND INVESTIGATION

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2.1 RESPIROMETRY STUDY

A bench top respirometry study was not completed to develop a formula or timeline for treating the soils from Building #103 and #1600A. Extensive research and investigation had previously been undertaken regarding soils from the FFTU site, and the findings from that report indicated that additional bacteria may be necessary, for a time-effective, cost-effective remediation program.

Procedures planned, documented and completed regarding the bioremediation of soils generated at the FFTU site are to be utilized for the soils from Buildings #103 and #1600A.

2.2 BIO MASS

Bio-mass is the organic material which supplies the carbon source and long term nutrients to the microbial colonies. The remediation program for both soils source from the Building #103 and Building #1600A will utilize horse manure as the bio-mass material. The bio-mass manure will be provided by a contractor as follows:

John Ramirez - Contractor
Office Phone Number 1 (847) 541-8443
Office Phone Number 2 (847)-541-8440
Mobile Phone Number (847)-878-0245
Pager Number (708)-817-2058

Amount of manure to be delivered 2,000 cubic yards.

2.3 BULKING AGENTS

Bulking Agents include fill material which supply porosity to the soil mixture. Bulking agents are utilized in clay soils to provide clodding and enhance air movement within the bio-pile. Wood chips make good bulking agents as well as the bedding material (straw) found associated with the horse manure. Straw will be augmented with wood chip bulking agents if necessary.

2.4 MICROBIAL AUGMENTATION

Based on previous work at the site, microbial augmentation is beneficial, and works in concert with naturally occurring microbes in the soil. A commercially available microbial consortium known as BCT/MC dry microbes from Everclear maybe used. This microbial consortium was selected for its ability to degrade aliphatic and aromatic hydrocarbon.

3.0 BIO-PILE CONSTRUCTION

3.0 BIO - PILE CONSTRUCTION

The ex-situ bio-piles for Building #103 and Building #1600A will be constructed parallel to and in concert with the existing ex-situ bio-pile arrangement at the FFTU site. Refer to the figure 1, which approximates the current situation before and after the construction of the new bio-piles.

The dimensions for each bio-pile are estimated to be 16 feet wide by 50 feet long by 6 feet high. An equal volume of contaminated soil/chips and manure mixture will be required for each bio-pile. Heritage will construct as many piles as necessary to treat the soils from Navy Buildings #103 and #1600A.

3.1 BIO - PILE MATERIALS

The microbial consortium as well as the other products and materials required to construct the bio-pile will be provided by Heritage Environmental Services. Products and materials to be acquired and provided by Heritage will include but not limited to the following per 1,000 cubic yards of contaminated soil:

- 1,000 cubic yards or more of manure (Mr. Ramirez to deliver);
- 650 cubic yards medium grain sand for substrate construction
- 150 gallons of 28-12-6 liquid fertilizer (F&M Supplies)
- 1,400 pounds of 28-12-6 dry fertilizer (Menards);
- 7,200 feet of 4" diameter PVC slotted drain tile;
- 720 pipes 10 feet each (Menards)
- 900 feet of 4" diameter PVC slotted drain tile (Menards);
- 10 rolls of 20' wide black six millimeter plastic sheeting;

- 10 rolls of 32' wide black six millimeter plastic sheeting;
- 3,600 ' of flexible drip hose (Menards);
- 300 feet of 3/4 " flexible garden hose (Menards);
- 12 rolls of grey tape (Menards);
- BCT/MC dry microbes (Everclear);
- Perforated piping (Menards);

3.2 SOIL PREPARATION

Following the construction of the sandy substrate with lechate collection provisions, the contaminated soils will be mixed with the bio bulk and bio mass material using a backhoe to mix and aerate the materials to be composted.

Lechate water, if generated, will be collected in the bio reactor and reapplied to the compost piles on an as-needed basis.

3.3 CONSTRUCTION LIFTS

The bio-pile should contain three lifts consisting of sand, contaminated soils/chips/manure mixture and chips/manure placed on a layer of poly ethylene plastic (See Appendix B, figures 2,& 3.) Lifts are to constructed simultaneously starting at the furthest end of the pile continuing until the desired length is reached. This is done to prevent the loader from driving over the bottom layer and compacting the compost.

3.4 CONSTRUCTION CONSULTATION

Beling Consultants will provide on site construction consultation to insure that:

- layers of poly sheeting are adequately placed;
- the sand substrate is adequate to collect lechate, if generated;
- lifts are of adequate mixture and depth to aerate and decontaminate the soils;
- adequate placement of PVC drain tiles are spaced to provide aeration of the piles over the winter months;
- soaker hoses to inoculate and irrigate the piles are adequately placed;
- plastic sheeting is adequately tied down and positioned to allow the pile to compost over the winter months;

3.5 BIO-REACTOR CONSTRUCTION

The bio-reactor consists of one 1,000 gallon holding tank equipped with a liquid circulation pump and an air injection pump. The bio-reactor previously constructed for use at the facility will be used for remediation of the Navy Building #103 and #1600A soils.

4.0 BIO-PILE OPERATION AND MAINTENANCE

4.0 BIO-PILE OPERATION AND MAINTENANCE

4.1 BASELINE SAMPLING

The soils were sampled prior to being transported to the FFTU site. The baseline samples for the Building #103 and Building #1600A samples, provided in Appendix A , will be compared to monitoring samples throughout a twelve month period.

Beling Consultants' Project Engineer will examine the bio-pile periodically over a twelve month period and collect samples to assess the temperature, moisture, apparent volatile organic compound readings, and contaminant concentration.

Results of the periodic monitoring will determine the final time table for closure, anticipated to be forty weeks after pile construction.

4.2 OPERATION AND MAINTENANCE

The Project Engineer will periodically document the following:

- soil moisture content between 20 and 40 percent dry weight
- soil pH maintained between 6.5 and 7.5
- periodic addition of water and nutrients as necessary to maintain the soil moisture
- chemical analysis to be conducted for BETX method 8020 and PNAs Method 8310

A separate operation and maintenance (O & M) manual will be provided to the Navy by Beling. Periodic progress reports will be provided over the 10-12 month treatment period.

5.0 BIO-PILE CLOSURE PLAN

5.0 BIO-PILE CLOSURE PLAN

Closure sampling of the bio-pile will be conducted in two consecutive bio-pile monitoring events, both of which provide sample results below the specific site clean up objectives. The closure sampling will consist of six grab samples from six borings into the bio-pile. Samples will be collected at one foot depths and proceed until the base of the pile is encountered at grade. The soil samples will be collected using stainless steel hand augers and packed with zero head space in 500 ml jars with Teflon lined lids. The collected samples will be screened using a PID meter the soil sample with the highest PID reading per boring will be analyzed per SW-846 Method 8020 for BETX and Method 8310 for PNAs.

6.0 SCHEDULE OF EVENTS

6.0 SCHEDULE OF EVENTS

The following schedule of events table is provided in weeks. The schedule is approximate, and is dependent on progress noted over the treatment period.

TABLE 1 - REMEDIATION SCHEDULE

	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	
Construct Pile -----																						
Utilize Bio-Reactor X								X				X			X					X		
Remediation -----																						
Pile Monitoring		X						X				X			X					X		
Pile Sampling		X		X				X					X					X				
Closure Sampling																					X	X
Closure Report																						X

APPENDICES

APPENDIX A

LABORATORY REPORTS



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-967-6666
FAX 847-967-6735

LABORATORY REPORT

171011

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lemont, IL 60439

Project No.: 9660
Project Name: Building 103
Sample Description: Soil Grab - Building 103
Sample No.: 23697

Report Date: 10/7/97
Sample Received: 10/1/97
Date Sampled: 9/30/97

Analyte	Result	Date Completed	By	Method
Ash content	80.1%	10/06/97	SS	2540E(2)
Water Compatibility	NO REACTION SINKS	10/02/97	DM	D5058-90(21)
Total Cyanide	<2.00	10/02/97	AG	9010A(6)
Open Cup Flash Point	>180. °F	10/02/97	DM	D92-90(21)
Odor of sample	NONE	10/02/97	DM	D4979-89(21)
Paint Filter	PASS	10/02/97	DM	9095(6)
Total Phenolics	<1.00	10/02/97	AG	9065(6)
Physical Appearance	ROCKY BROWN CLAY AND SAND	10/02/97	DM	D4979-89(21)
Total Solids	85.3%	10/06/97	SS	2540B(2)
Reactive Sulfide	33.2	10/02/97	RG	7.3.4(6)
pH (10% Solution)	8.61 units	10/02/97	DM	9045(6)

Analysis Performed on TCLP Extract

Arsenic	<0.200	10/02/97	MG	6010A(6)
Barium	<0.50	10/02/97	MG	6010A(6)
Cadmium	<0.004	10/02/97	MG	6010A(6)
Chromium	<0.10	10/02/97	MG	6010A(6)
Copper	<0.10	10/02/97	MG	6010A(6)
Lead	0.13	10/02/97	MG	6010A(6)
Mercury	<0.00009	10/02/97	ML	7470A(6)
Nickel	<0.10	10/02/97	MG	6010A(6)
Selenium	<0.200	10/02/97	MG	6010A(6)
Silver	<0.20	10/02/97	MG	6010A(6)
Zinc	1.87	10/02/97	MG	6010A(6)

All results expressed as ppm unless otherwise indicated

Note on pH (10% Solution): RESULT IS AN AVERAGE OF THREE. SAMPLE IS HETEROGENEOUS.
Note on Lead on TCLP: THE ANALYTICAL RESULT IS >LOD AND <LOQ.

(2) Analysis performed using "Standard Methods for the Examination of Wastewater", 19th Edition
(21) Analysis performed using ASTM Method
(6) Methods performed according to SW-846 "Test Methods for Evaluating Solid Waste"

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except in its entirety

LABORATORY DIRECTOR



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
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FAX: 847-967-6735

LABORATORY REPORT

171011-A

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lemont, IL 60439

Project No.: 9660
Project Name: Building 103
Sample Description: Soil Grab - Building 103
Sample No.: 23697

Report Date: 10/7/97
Sample Received: 10/1/97
Date Sampled: 9/30/97

Reportable Compound	Concentration Found IN		ADLS Soil
	Sample	Blank	
<u>PNA'S and Naphthalene</u>	ppb	ppb	ppb
1. Naphthalene	<660	<0.5	660
2. Acenaphthene	<1200	<0.5	1200
3. Anthracene	<660	<0.5	660
4. Fluoranthene	<660	<0.5	660
5. Fluorene	<140	<0.2	140
6. Pyrene	<180	<0.4	180
Carcinogenic PNAs (Total)			
7. Benzo(a)anthracene	43.6	<0.13	8.7
8. Benzo(a)pyrene	26	<0.23	15
9. Benzo(b)fluoranthene	44.7	<0.18	11
10. Benzo(k)fluoranthene	14.1	<0.17	11
11. Chrysene	<100	<0.2	100
12. Dibenzo(a,h)anthracene	<20	<0.3	20
13. Indeno(1,2,3,-c,d)pyrene	<29	<0.43	29
Non-Carcinogenic PNAs (Total)			
14. Acenaphthylene	<660	<0.3	660
15. Benzo(g,h,i)perylene	<51	<0.76	51
16. Phenanthrene	<660	<0.2	660

All results expressed as ppb unless otherwise indicated.

Analysees performed using EPA method 8270 in accordance with SW 846, Third Edition.

The contents of this report apply only to the sample analyzed. No duplication of this report is allowed except in its entirety.

LABORATORY DIRECTOR

10/07/97 TUE 09:23 FAX 847 9878733

ENVIRONMENTAL MONITORING

0004



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-967-6666
FAX: 847-967-6735

LABORATORY REPORT

171011-B

Heritage Environmental Services, Inc.
15390 Canal Bank Road
Lemont, IL 60439

Project No.: 9660
Project Name: Building 103
Sample Description: Soil Grab - Building 103
Sample No.: 23697

Report Date: 10/7/97
Sample Received: 10/1/97
Date Sampled: 9/30/97

<u>Compounds</u>	<u>Concentration Found In</u>		<u>Method</u>	<u>Regulatory</u>
	<u>Sample</u>	<u>Blank</u>	<u>Detection Limit (MDL)</u>	<u>Limit</u>
1. Benzene	<0.25	<0.01	0.01	0.50
2. Carbon Tetrachloride	<0.25	<0.01	0.01	0.50
3. Chlorobenzene	<50.0	<0.01	0.01	100.00
4. Chloroform	<3.0	<0.01	0.01	6.00
5. o-Cresol	<100.0	<0.01	0.01	200.00
6. m-Cresol	<100.0	<0.01	0.01	200.00
7. p-Cresol	<100.0	<0.01	0.01	200.00
Total Cresol	<100.0	<0.01	0.01	200.00
8. 1,4-Dichlorobenzene	<3.75	<0.01	0.01	7.50
9. 1,2-Dichloroethane	<0.25	<0.01	0.01	0.50
10. 1,1-Dichloroethene	<0.35	<0.01	0.01	0.700
11. 2,4-Dinitrotoluene	<0.07	<0.01	0.01	0.13
12. Hexachlorobenzene	<0.07	<0.01	0.01	0.13
13. Hexachloro-1,3-butadiene	<0.25	<0.01	0.01	0.50
14. Hexachloroethane	<1.50	<0.01	0.01	3.00
15. Methyl Ethyl Ketone	<100.0	<0.01	0.01	200.00
16. Nitrobenzene	<1.00	<0.01	0.01	2.00
17. Pentachlorophenol	<50.00	<0.01	0.01	100.00
18. Pyridine	<2.50	<0.01	0.01	5.00
19. Tetrachloroethylene	<0.35	<0.01	0.01	0.70
20. Trichloroethylene	<0.25	<0.01	0.01	0.50
21. 2,4,5-Trichlorophenol	<200.00	<0.01	0.01	400.00
22. 2,4,6-Trichlorophenol	<1.00	<0.01	0.01	2.00
23. Vinyl Chloride	<0.10	<0.01	0.01	0.20

All results expressed as ppm unless otherwise indicated.
Methods performed according to SW-846, "Test methods for Evaluating Solid Waste".

Analysis performed on Extract from TCLP.

The contents of this report apply only to the sample analyzed. No duplication of this report is allowed except in its entirety.

Leah E. Zehner

LABORATORY DIRECTOR

10-01-97 WED 10:39 FAX 847 9876733

ENVIRONMENTAL MONITORING

21002



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-987-6666
FAX: 847-967-6735

LABORATORY REPORT

170668

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lemont, IL 60439

Report Date: 10/1/97
Sample Received: 9/25/97

Project No.: 10319
Project Name: Navy Bldg 1600A
Sample Description: Soil Grab - BLDG 1600A
Sample No.: 23026

Analyte	Result	Date Completed	By	Method
Ash content	92.7%	09/26/97	SS	2540E(2)
Water Competibility	no reaction sinks	09/25/97	DM	D5058-90(21)
Cyanide	<5.0	09/26/97	SM	D5049-90(21)
Odor of sample	none	09/25/97	DM	D4979-89(21)
Open Cup Flash Point	>180.°F	09/26/97	DM	D92-90(21)
Paint Filter	pass	09/25/97	DM	9095(6)
Total Phenolics	<10.0	09/26/97	SM	9065(6)
Physical Appearance	tan sand	09/25/97	DM	D4979-89(21)
Total Solids	93.6%	09/26/97	SS	2540B(2)
Sulfide	>10	09/25/97	RG	D4978-89(21)
Reactive Sulfide	<25.0	09/30/97	RG	7.3.4(6)
pH (10% Solution)	9.08units	09/25/97	DM	9045(6)

Analysis Performed on TCLP Extract

Arsenic	<0.200	09/26/97	MG	6010A(6)
Barium	<0.50	09/26/97	MG	6010A(6)
Cadmium	<0.02	09/26/97	MG	6010A(6)
Chromium	<0.10	09/26/97	MG	6010A(6)
Copper	<0.10	09/26/97	MG	6010A(6)
Lead	<0.20	09/26/97	MG	6010A(6)
Mercury	<0.0100	09/26/97	ML	7470A(6)
Nickel	<0.10	09/26/97	MG	6010A(6)
Selenium	<0.200	09/26/97	MG	6010A(6)
Silver	<0.20	09/26/97	MG	6010A(6)
Zinc	<0.50	09/26/97	MG	6010A(6)

All results expressed as ppm unless otherwise indicated

(2) Analysis performed using "Standard Methods for the Examination of Wastewater", 19th Edition

(21) Analysis performed using ASTM Method

(6) Methods performed according to EW-546 "Test Methods for Evaluating Solid Waste"

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except in its entirety

LABORATORY DIRECTOR

10/01/97 WED 10:33 FAX 847 9676735

ENVIRONMENTAL MONITORING

2003



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-967-6646
FAX: 847-967-6735

LABORATORY REPORT

170668-C

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lenont, IL 60439

Report Date: 10/1/97
Sample Received: 9/25/97

Project No.: 10319
Project Name: Navy Bldg 1600A
Sample Description: Soil Grab - BLDG 1600A
Sample No.: 23026

Compounds	Concentration Found In		Method Detection Limit (MCL)	Regulatory Limit
	Sample	Blank		
1. Benzene	<0.25	<0.01	0.01	0.50
2. Carbon Tetrachloride	<0.25	<0.01	0.01	0.50
3. Chlorobenzene	<50.0	<0.01	0.01	100.00
4. Chloroform	<3.0	<0.01	0.01	6.00
5. o-Cresol	<100.0	<0.01	0.01	200.00
6. m-Cresol	<100.0	<0.01	0.01	200.00
7. p-Cresol	<100.0	<0.01	0.01	200.00
Total Cresol	<100.0	<0.01	0.01	200.00
8. 1,4-Dichlorobenzene	<3.75	<0.01	0.01	7.50
9. 1,2-Dichloroethane	<0.25	<0.01	0.01	0.50
10. 1,1-Dichloroethene	<0.35	<0.01	0.01	0.700
11. 2,4-Dinitrotoluene	<0.07	<0.01	0.01	0.13
12. Hexachlorobenzene	<0.07	<0.01	0.01	0.13
13. Hexachloro-1,3-butadiene	<0.25	<0.01	0.01	0.50
14. Hexachloroethane	<1.50	<0.01	0.01	3.00
15. Methyl Ethyl Ketone	<100.0	<0.01	0.01	200.00
16. Nitrobenzene	<1.00	<0.01	0.01	2.00
17. Pentachlorophenol	<50.00	<0.01	0.01	100.00
18. Pyridine	<2.50	<0.01	0.01	5.00
19. Tetrachloroethylene	<0.35	<0.01	0.01	0.70
20. Trichloroethylene	<0.25	<0.01	0.01	0.50
21. 2,4,5-Trichlorophenol	<200.00	<0.01	0.01	400.00
22. 2,4,6-Trichlorophenol	<1.00	<0.01	0.01	2.00
23. Vinyl Chloride	<0.10	<0.01	0.01	0.20

All results expressed as ppm unless otherwise indicated.

Methods performed according to SW-846, "Test methods for Evaluating Solid Waste".

Analysis performed on Extract from TCLP.

The contents of this report apply only to the sample analyzed. No duplication of this report is allowed except in its entirety.

Leah E. Zuber
LABORATORY DIRECTOR



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-967-6666
FAX: 847-967-6735

LABORATORY REPORT

170668-A

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lemont, IL 60439

Project No.: 10319
Project Name: Navy Bldg 1600A
Sample Description: Soil Grab - ELDG 160CA
Sample No.: 23026

Report Date: 10/1/97
Date Sampled: 9/24/97
Date Sample Received: 9/25/97
Date Extracted: 9/25/97
Date Analyzed: 9/26/97

	Concentration Found In Sample (mg/kg)	Method Detection Limit (MDL) (mg/kg)
Diesel Range Organics	51.7	10

The sample contains Diesel.
Sample was received in incorrect container.

-Samples received on ice
-All results expressed in ppm on a dry weight basis unless otherwise indicated.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

LABORATORY DIRECTOR

10/01/97 WED 10:40 FAX 947 9676735

ENVIRONMENTAL MONITORING

203



ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
847-967-6666
FAX: 847-967-6735

LABORATORY REPORT

170668-B

Heritage Environmental Services, Inc.
15330 Canal Bank Road
Lemont, IL 60439

Project No.: 10319
Project Name: Navy Bldg 1600A
Sample Description: Soil Grab - BLDG 1600A
Sample No.: 23026

Report Date: 10/1/97
Date Sampled: 9/24/97
Date Sample Received: 9/25/97
Date Extracted: 9/25/97
Date Analyzed: 9/26/97

	Concentration Found In Sample (<u>mg/kg</u>)	Method Detection Limit (MDL) (<u>mg/kg</u>)
Gasoline Range Organics	<10	10

1. The sample was received without MeOH preservation.
2. The sample was run as a normal 8015 sample for TPH.

-Samples received on ice

-All results expressed in ppm on a dry weight basis unless otherwise indicated.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

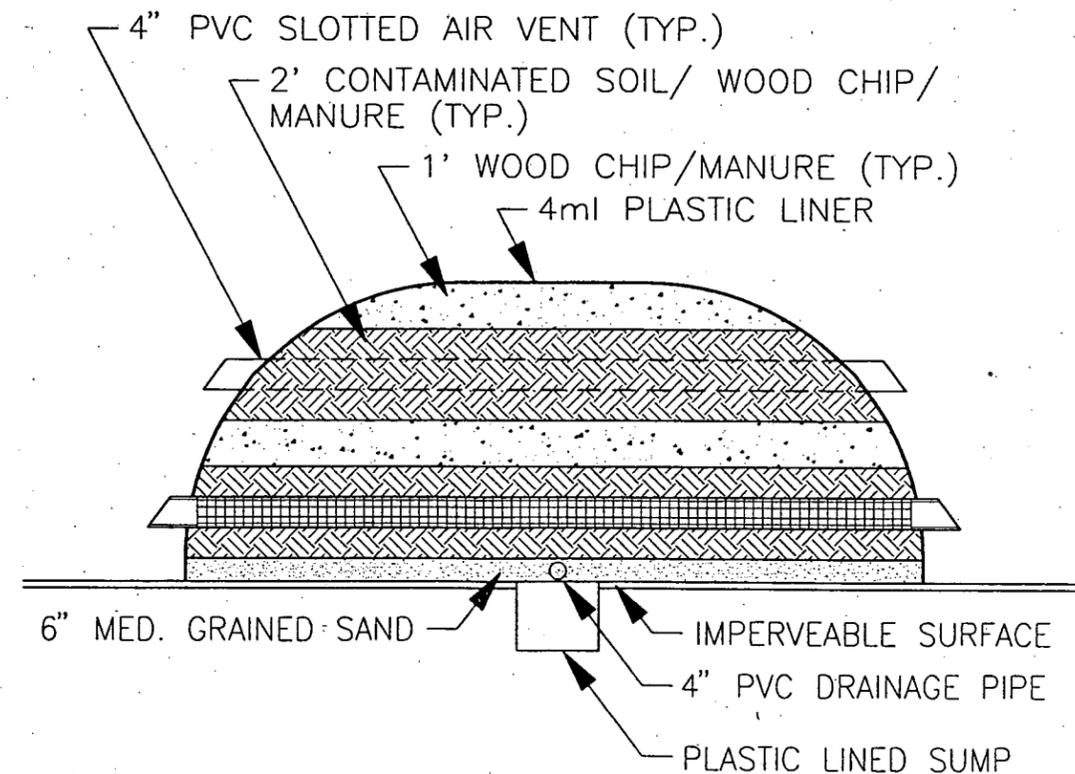
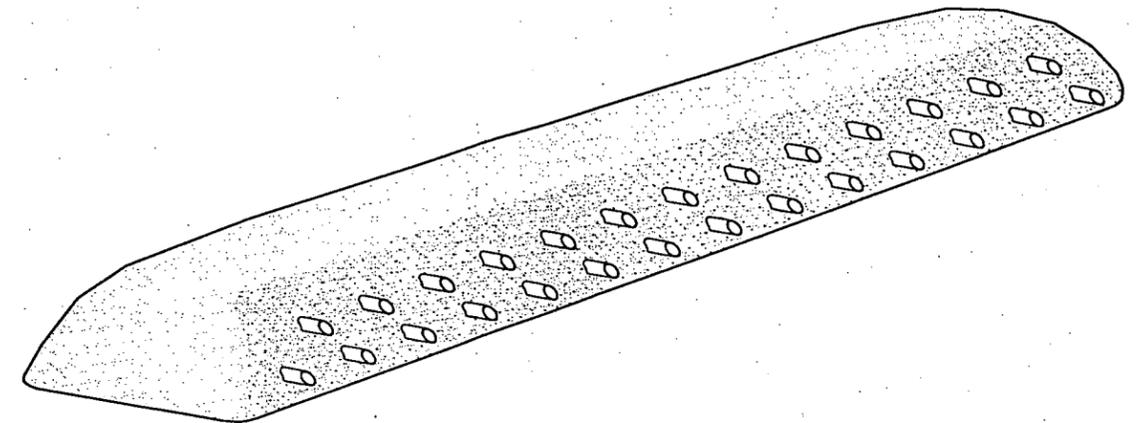
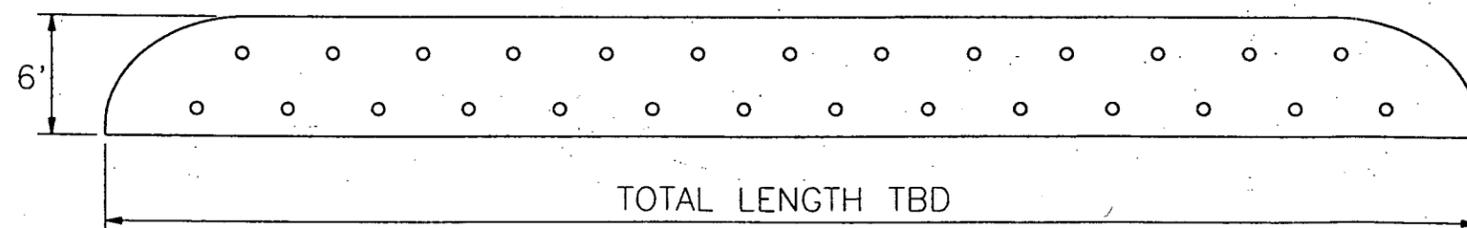
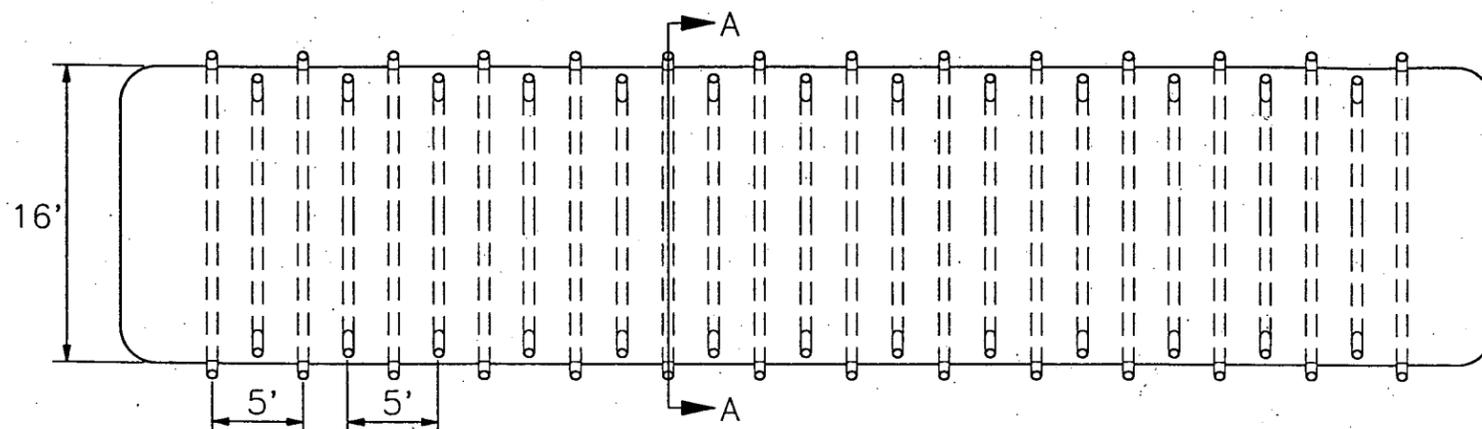
Leah E. Zuber

LABORATORY DIRECTOR

APPENDIX B

DRAWINGS

- 1. Site Plan with Piles and Proposed Piles**
- 2. Compost Pile Design**



NOTE: 5 ml BLACK POLYETHELENE PLASTIC TO BE USED TO ENCLOSE TOP AND BOTTOM OF PILE.

SECTION A-A

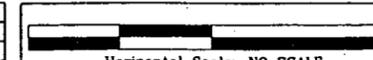
REVISION	DATE	REMARKS
1	4-28-97	

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COMPOST PILE DESIGN

**WORKPLAN
FOR BIOREMEDIATION
OF CONTAMINATED SOIL
AT FFTU FACILITY**

SHEET
FIGURE 2

PROJECT NUMBER
29947

DATE
OCT. 1997

BELING CONSULTANTS

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