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Determination of Site-Specific Benzo(a)pyrene and Dibenzo(a,h)anthracene Background Levels for the Miami-Erie Canal

Final

December 2002

Department of Energy
Miamisburg Closure Project

BWXT of Ohio, Inc.

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Acronyms

BaP	benzo(a)pyrene
COC	contaminant of concern
DbA	dibenzo(a,h)anthracene
DOE/MEMP	Department of Energy/Miamisburg Environmental Management Project
MEIMS	Mound Environmental Information Management System
OEPA	Ohio Environmental Protection Agency
PAH	polycyclic aromatic hydrocarbon
QC	quality control
RRE	Residual Risk Evaluation
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
SVOC	semivolatile organic compound
UTL	upper tolerance limit

1.0 PURPOSE

The Residual Risk Evaluation (RRE) for the remediated portion of the Miami-Erie Canal found benzo(a)pyrene (BaP) and dibenzo(a,h)anthracene (DbA) to be leading contributors to the residual risk from soil (Reference 1). BaP was reported in 111 of 128 verification samples, at levels ranging from 21 to 7900 µg/kg. DbA was reported in 59 of 128 verification samples, at levels ranging from 20 to 1500µg/kg. There is no site-specific (Mound) or regional background value for BaP or DbA in soil to use in the evaluation of the significance of these data.

BaP and DbA are polycyclic aromatic hydrocarbons (PAHs) (Reference 6). PAHs are a group of over 100 different chemicals (Reference 5). They are not produced or used commercially but are very commonly found since they are formed by the incomplete burning of coal, oil, and gas, or other organic substances (References 5, 6, 9, 10, 11). PAHs are usually found as a mixture containing two or more of these compounds (Reference 5). The anthropogenic (resulting from man-made sources) sources of PAHs can be categorized as stationary and mobile. Vehicle engines are the major contributors to the mobile emission sources. The stationary sources include a wide variety of combustion processes; residential heating, aluminum production, coke manufacture, incineration, power generation, and asphalt production (Reference 5, 6, 7). Natural sources of PAHs include forest fires and volcanic activity (Reference 7). PAHs have been described as "ubiquitous" in the environment (Reference 6, 7, 9, 10). In non-biological materials, concentrations of PAHs are elevated in the vicinity of urban industrial locales (Reference 7).

Without additional information, it is impossible to determine if the concentrations of PAHs detected during the Mound verification sampling of the canal are the result of Mound-related activities or due to other sources in the surrounding area. The primary objective for this investigation is to determine site-specific background concentrations of PAHs, specifically BaP and DbA. The second objective of this effort is to use this information in the Miami-Erie Canal RRE to evaluate the concentrations of PAHs

detected in the Miami-Erie Canal during verification sampling within the site-specific anthropogenic background concentration as determined from this effort. This information will help risk managers evaluate the contribution of PAHs from the Mound in comparison to the contribution of PAHs from anthropogenic sources outside of Mound's influence. This information will then be used to complete the Miami-Erie Canal RRE.

A Draft Sample and Analysis Plan (SAP) was submitted to the Department of Energy/ Miamisburg Environmental Management Project (DOE/MEMP) in November 2001. On January 31, 2002, the Ohio Environmental Protection Agency (OEPA) received the Draft SAP during a meeting to discuss appropriate sampling site locations. OEPA conducted an informal review and provided comments on the Draft SAP. The sampling proposed in the Draft SAP was conducted on February 14, 2002, prior to finalization of this report. The Core Team agreed the best use of resources was to stop further development of the Draft SAP and document what was done and the results obtained. The purpose of this report is to provide that documentation. As a result of this unusual progression, this report has elements of both the traditional SAP and Data Report.

2.0 SAMPLING

2.1 TYPE

All samples collected were from soil obtained from soil borings.

2.2 LOCATION, FREQUENCY, AND COORDINATES

The attributes of the background sampling locations aimed to mimic the conditions where verification samples were taken within the Miami-Erie Canal. These desired attributes included:

- The location must be within the banks of the canal;
- The location must not be in the drainage pattern of water/runoff coming from the Mound site;

- The location must be close enough to the Mound site such that it would have been exposed to the same anthropogenic contaminants as the remediated portion of the canal;
- The soil must be undisturbed; and
- The location must be randomly selected.

Figure 1 shows an aerial view of the Mound site and the sample locations. These areas are outside of the Mound Plant watershed (as reported in the OU9 RI/FS Site Wide Work Plan, Reference 2). The areas, as described by adjacent roads or other identifiable features, are as follows:

Location 1 is north of the Miamisburg/West Carrollton Corporation line. It is between Kendal Street in West Carrollton and Richard Street in Miamisburg. The location coincides with a railroad service building and personnel causeway, which crosses the historic canal, to provide personnel access to the building from a vehicle pull-off area along West Central Avenue (old State Route 25/Dixie Highway). There was no water present at the time of sampling, however visual evidence and topographical data would indicate a Southward flow of any water/runoff, which is toward the Mound site. The soil at this location appeared to be undisturbed.

Location 2 is within Miamisburg and is located northwest of the intersection of North 4th Street, Louis Street, and Richard Street. It is east of old State Route 25 (Dixie Highway) between Richard Street and Kendal Street in West Carrollton. The water present at the time of sampling was flowing in a southern direction toward the Mound site. The general area can be described as a mixture of residential and industrial. However, residential housing is nearest to the sampling location. The soil at this location appeared to be undisturbed.

Location 3 is located on the eastern side of Dayton-Cincinnati Pike (old State Route 25/Dixie Highway) across the street from the southern entrance to Rice Field. This location is between Benner and Chautauqua Roads. This is a recreational area. There was no water present at the time of sampling. Visual evidence and topographical data

would indicate a southern flow of any water/runoff, which is away from the Mound site and in an area that has not been influenced by the Mound site. The soil at this location appeared to be undisturbed.

Location 4 is just south of Shephard Road on the east side of Dayton-Cincinnati Pike (old State Route 25/Dixie Highway). The next cross road to the south is Crains Run Road. The area is best described as rural in nature with no housing nearby. No water was present at the time of sampling. Visual evidence and topographical data indicate a southern flow of any water/runoff, which is away from the Mound site. The sample location is in an area that has not been influenced by the Mound site. The soil at this location appeared to be undisturbed.

Three discrete samples were collected at each of the four locations for a total of twelve (12) samples. An equilateral triangle with sides approximately equal to 50 feet was established at each location. The three nodes of the triangle served as the discrete sampling points for that location. The intent was to obtain unbiased information. The exact location of each sampling point was not determined prior to the sampling effort. The team accessed the canal from the road at the approved location. The first point was selected at random, but within the banks of the canal. The triangle was then positioned so that the other two points likewise were located within the banks of the canal. A Global Positioning System was used to obtain the coordinates. Table 1 presents the easting, northing, and elevation for each of the samples. Horizontal locations were recorded in the Ohio State Plane Coordinate System. Figures 2 through 5 show the layout of the sample grid at each of the four locations.

Sample locations 1, 2, and 3 are located within the public right-of-way along Dayton-Cincinnati Pike. Therefore, permission for access from property owners was not an issue. The City of Miamisburg was asked to contact the Miami Conservancy District to notify them when and where sampling in the canal would occur. Sample location 4 is within the Dayton Power and Light right-of-way. A phone call was made to provide notification prior to entering the right-of-way to collect the samples.

2.3 ANALYTE JUSTIFICATION

BaP and DbA were the risk drivers observed during the Miami-Erie Canal RRE calculations. Therefore, they are the contaminants of concern (COCs) for this investigation.

2.4 DESIGNATION

Soil and quality control (QC) samples were identified and labeled according to procedures in Method: S-028, Sample Control and Documentation, of the Methods Compendium (Reference 3). Sample identification labels were used for each sample container. Sample containers were sealed immediately after sample collection. Labels were completed, when possible, prior to fieldwork to minimize the handling of the sample containers. Each label included the following information:

- -Sample identification
- -Time and date of collection
- -Parameters to be analyzed
- -Sampler's initials

Collected samples were uniquely identified according to the system

BAP-W-BXXX-YY-ZZZZZZ, where:

BAP = Mound Environmental Information Management System (MEIMS) Project Code (BaP characterization samples)

W = QC sample where:
0 = no QC sample
1 = field duplicate
2 = equipment rinsate
3 = trip blank

BXXX = boring location
YY = maximum depth in feet of the sampling interval
ZZZZZZ = a sequential, six digit sample identifier (i.e., 000001, 000002, etc.) to be used on the laboratory chain of custody (Appendix F) for incorporation of the data into MEIMS.

Matrix Spike and Matrix Spike Duplicate Samples were identified on the field tracking sheet (Appendix C), but no unique QC code was used for these samples.

2.5 PROCEDURES

Soil samples were collected from the ground surface to a depth of approximately 12-inches below grade. The samples were collected manually using a hand operated GeoProbe apparatus. A 2-inch diameter rod with an acetate liner was forced into the ground using a sliding hammer.

All rocks larger than ¼-inch diameter and all organic material were removed from the sample medium prior to transfer into laboratory containers.

Field activities followed standard operating procedures (SOPs) presented in the Methods Compendium (Reference 3). Applicable SOPs are summarized in Table 2, along with any additions or deviations.

Field notes were recorded in a logbook. A copy of the Field Logbook is included in Appendix D.

2.6 QC SAMPLES

QC samples were collected as follows:

- field duplicates: 2
- matrix spike: 1
- matrix spike duplicates: 1.

2.7 CONTAINERS, HOLDING TIMES, AND PRESERVATIVES

Table 3 presents the container requirements, preservatives, and holding times for the required offsite analyses.

2.8 OTHER SAMPLING

OEPA repeated this sampling event on March 14, 2002. A participant in the sampling event of February 14, 2002 accompanied the OEPA team. The samples obtained by OEPA were from soil adjacent to the locations sampled on February 14. Locator flags placed on February 14th were still in position. The locations of the OEPA samples were

surveyed. OEPA resampled these locations as a quality check on the data collected by DOE since OEPA was not notified of the sampling in a timely manner to conduct oversight.

3.0 ANALYSES

3.1 RADIOLOGICAL SCREENING

Since all the samples were from outside of the DOE Mound boundaries exposure to radionuclides was not expected, therefore radiological screening was not required.

3.2 OFFSITE CHEMICAL

All analyses were performed at an offsite laboratory in accordance with Compendium Method A-003, CLP Semi-Volatile Analysis (Appendix E). This method is equivalent to that used to analyze the Miami-Erie Canal samples and was expected to result in the most comparable data. Though the entire suite of semivolatile hydrocarbons (SVOCs) included in this analysis will be reported, BaP and DbA are the only analytes of concern.

4.0 EVALUATION AND REPORTING

Validation of ten-percent of the analytical results was performed as well as a general review of all of the data not validated.

Table 4 lists the analytical results for the samples collected as part of this investigation. The table lists all the SVOCs included in the laboratory method. The results for BaP are shown in bold type.

4.1 Data Evaluation

Table 5 shows the results of BaP, excluding QC data, for the twelve sample locations.

Figure 6 shows the locations and BaP concentrations of the samples collected as part of this investigation. Figure 7 shows the locations along the canal where verification samples were collected and their corresponding concentration of BaP.

The BaP results from the February 14, 2002 sampling event ranged from 56 μg/kg (estimated) to 7700 μg/kg. An average concentration of approximately 793 μg/kg for BaP was calculated. Data points that are indicated as non-detect (U) were reported with a concentration equal to the reporting limit (410 μg/kg). In determining the average concentration, one-half of the reporting limit value was used in the calculation. Data from QC samples were not included in calculating the average concentration. The 95% upper tolerance limit (UTL) was calculated (Reference 4) as 6306 μg/kg.

Table 6 shows the results for DbA, excluding QC data, for the twelve sample locations.

Figure 8 shows the locations and DbA concentrations of the samples collected as part of this investigation. Figure 9 shows the locations along the canal where verification samples were collected and their corresponding concentration of DbA.

The DbA results from the February 14, 2002 sampling event ranged from 27 μg/kg (estimated) to 430 μg/kg (U qualified). An average concentration of approximately 206 μg/kg was calculated. Qualified data and QC samples were treated the same way as they were for BaP. The 95% UTL was calculated as 424 μg/kg.

4.2 Discussion

The BaP results from the February 2002 sampling event ranged from 56 μg/kg (estimated) to 7700 μg/kg and had an average of 793 μg/kg (with a standard deviation of 2177μg/kg). The BaP results from the Miami-Erie Canal verification data set ranged from 21 μg/kg (estimated) to 7900 μg/kg and had an average of 550 μg/kg (with a standard deviation of 1144 μg/kg).

The DbA results from the February 2002 sampling event ranged from 27 μg/kg (estimated) to 430 μg/kg (U qualified) and had an average of 206 μg/kg (with a standard deviation of 73 μg/kg). The DbA results from the Miami-Erie Canal verification data set

ranged from 20 μg/kg (estimated) to 1500 μg/kg and had an average of 319 μg/kg (with a standard deviation of 241μg/kg).

The BaP and DbA results from the February 2002 sampling and the Miami-Erie Canal verification sampling are very similar. This indicates the BaP and DbA levels observed in the Miami-Erie Canal verification are typical of this urban area and not the result of Mound operations. This information will be used in the discussion of Risk Uncertainty in the Miami-Erie Canal Residual Risk Evaluation.

5.0 REFERENCES

Reference 1 Residual Risk Evaluation, OU-4 Miami-Erie Canal Area, Mound Plant, Miamisburg, Ohio, U.S. DOE, Draft Proposed Final, April 2000

Reference 2 Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan, Final, Mound Plant, Miamisburg, Ohio, U.S. DOE, April 1992

Reference 3 Technical Manual MD-80045, Issue 2, Methods Compendium, 22 January 2002

Reference 4 Operable Unit 9 Surface Water and Sediment Investigation Report, Revision 2, Mound Plant, Miamisburg, Ohio, U.S. DOE, September 1996

Reference 5 Polycyclic Aromatic Hydrocarbons (PAHs), Agency for Toxic Substances and Disease Registry (ATSDR) ToxFaqs, www.atsdr.cdc.gov/tfacts.69.html

Reference 6 Environmental Toxicology: Impacts of Environmental Toxicants on Living Systems., Ming-Hu Yu, Lewis Publishers, 2001, pp. 145-148

Reference 7 Handbook of Chemical Risk Assessment: Health Hazards to Humans, Plants, and Animals, Ronald Eisler, Lewis Publishers, 2000, pp. 1343-1397

Reference 8 Public Health Statement for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry (ATSDR), www.atsdr.cdc.gov/toxprofiles/phs69.html

Reference 9 Benzo(a)pyrene, Hazardous Substances Data Bank, U.S. National Library of Medicine, National Institutes of Health website, http://toxnet.nlm.nih.gov

Reference 10 Dibenzo(a,h)anthracene, Hazardous Substances Data Bank, U.S. National Library of Medicine, National Institutes of Health website, http://toxnet.nlm.nih.gov

Reference 11 Benzo(a)pyrene, Ohio EPA, Office of Groundwater and Drinking Water website, http://www.epa.gov/OGWDW/dwh/c-soc/benzopyr.html

APPENDIX A

Tables

Table 1: Survey Coordinates for Boring Locations

Boring Location	Easting	Northing	Elevation
1a	1469083.290	609334.282	715.132
1b	1469049.068	609299.157	709.414
1c	1469034.896	609339.661	702.388
2a	1467272.229	607148.342	710.966
2b	1467249.047	607199.415	712.832
2c	1467219.389	607146.815	717.517
3a	1464505.648	593034.834	703.897
3b	1464522.030	592993.356	694.339
3c	1464561.498	593034.069	725.813
4a	1465734.378	590391.465	696.320
4b	1465756.648	590432.381	681.024
4c	1465779.270	590367.154	690.759

Table 2: Summary of Applicable SOPs

SOP No. and Title	Procedure Description	Deviations
S-001: General Instructions for Field Personnel	• Followed procedures outlined in the SOP.	• None.
S-002: Soil Sampling with a Spade and Scoop	• Followed procedures outlined in the SOP.	• Manufacturer's procedures were followed for the hand held GeoProbe apparatus.
S-004: Guide to Management of Collected Investigative-Derived Material	• Followed procedures outlined in the SOP.	• None.
S-020: General Equipment Decontamination	• All sampling equipment was decontaminated between sampling intervals and locations.	• Methanol and hexane rinses for the decontamination of sampling equipment were not required.
S-028: Sample Control and Documentation	• Followed procedures outlined in the SOP.	• None.
S-029: Guide to Handling, Packaging, and Shipping of Samples	• Followed procedures outlined in the SOP.	• None.

Table 3: Containers, Holding Times, and Preservatives

Analysis	Method	Matrix	Bottle Type	Bottle Size	Preservation	Holding Time
SVOCs (PAH)	Compendium A-003; CLP-SOW	Soil	Wide mouth amber glass	8 ounce	Cool to 4°C	14 Days

Table 4: Analytical Results (in ug/Kg)

	Location 1				Location 2		
	a	b	c	c-dup	a	b	c
Naphthalene	61J	430U	410U	430U	410U	390U	2200U
2-Methylnaphthalene	82J	430U	410U	430U	410U	390U	2200U
Acenaphthylene	47J	430U	410U	430U	410U	390U	580J
Acenaphthene	400U	430U	410U	430U	410U	390U	730J
Dibenzofuran	29J	430U	410U	430U	410U	390U	280J
Fluorene	400 U	430U	410U	430U	410U	390U	760J
Phenanthrene	330J	43J	410U	290J	120J	73J	11000
Anthracene	58J	430U	410U	24J	23J	390U	2100J
Fluoranthene	710	110J	74J	890	290J	170J	19000E
Pyrene	620	120J	58J	700	250J	150J	15000
Chrysene	440	66J	44J	410J	160J	98J	8500
Benzo(a)anthracene	380J	56J	410U	120J	130J	74J	7400
Benzo(b)fluoranthene	390J	73J	410U	230J	130J	84J	6300
Benzo(k)fluoranthene	400	57J	410U	210J	140J	83J	7100
Benzo(a)pyrene	**380J**	**56J**	**410U**	**120J**	**140J**	**90J**	**7700**
Indeno(1,2,3-cd)pyrene	290J	38J	410U	110J	97JU	63J	5700
Dibenz(a,h)anthracene	**27J**	**430U**	**410U**	**430U**	**410U**	**390U**	**400J**
Benzo(g,h,I)perylene	280J	40J	410U	100J	100J	66J	6500

	Location 3				Location 4		
	a	b	b-dup	c	a	b	c
Naphthalene	410U	410U	410U	120J	410U	420U	410U
2-Methylnaphthalene	410U	410U	410U	210J	410U	420U	410U
Acenaphthylene	410U	410U	410U	400U	410U	29J	410U
Acenaphthene	410U	410U	410U	400U	410U	420U	410U
Dibenzofuran	410U	410U	410U	54J	410U	420U	410U
Fluorene	410U	410U	410U	400U	410U	420U	410U
Phenanthrene	410U	410U	410U	220J	93J	260J	53J
Anthracene	410U	410U	27U	23J	21J	49J	410U
Fluoranthene	410U	410U	24U	150J	230J	560	130J
Pyrene	410U	410U	410U	140J	200J	490	120J
Chrysene	410U	410U	410U	130J	130J	280J	80J
Benzo(a)anthracene	410U	410U	410U	80J	97J	210J	60J
Benzo(b)fluoranthene	410U	410U	410U	87J	110J	220J	67J
Benzo(k)fluoranthene	410U	410U	410U	74J	120J	260J	73J
Benzo(a)pyrene	**410U**	**410U**	**410U**	**80J**	**120J**	**260J**	**72J**
Indeno(1,2,3-cd)pyrene	410U	410U	410U	56J	83J	180J	51J
Dibenz(a,h)anthracene	**410U**	**410U**	**410U**	**400U**	**410U**	**420U**	**410U**
Benzo(g,h,I)perylene	410U	410U	410U	72J	95J	190J	58J

Qualifiers

U Indicates compound was analyzed for, but not detected. The associated sample quanitation limit will be CRQL, corrected for dilution and for percent moisture.

J Indicates an estimated value, used when: 1) estimating a concentration for tentatively identified compounds assuming a 1:1 response; 2) the qualitative data indicated the presence of a compound that meets the semi-volatile identification criteria, and the result is less than the CRQL but greater than zero.

E Identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

Table 5: BaP Results

	Result in ug/kg		
Location 1	380J	56J	410U
Location 2	140J	90J	7700
Location 3	410U	410U	80J
Location 4	120J	260J	72J

J: estimated
U: Not detected at the associated detection limit

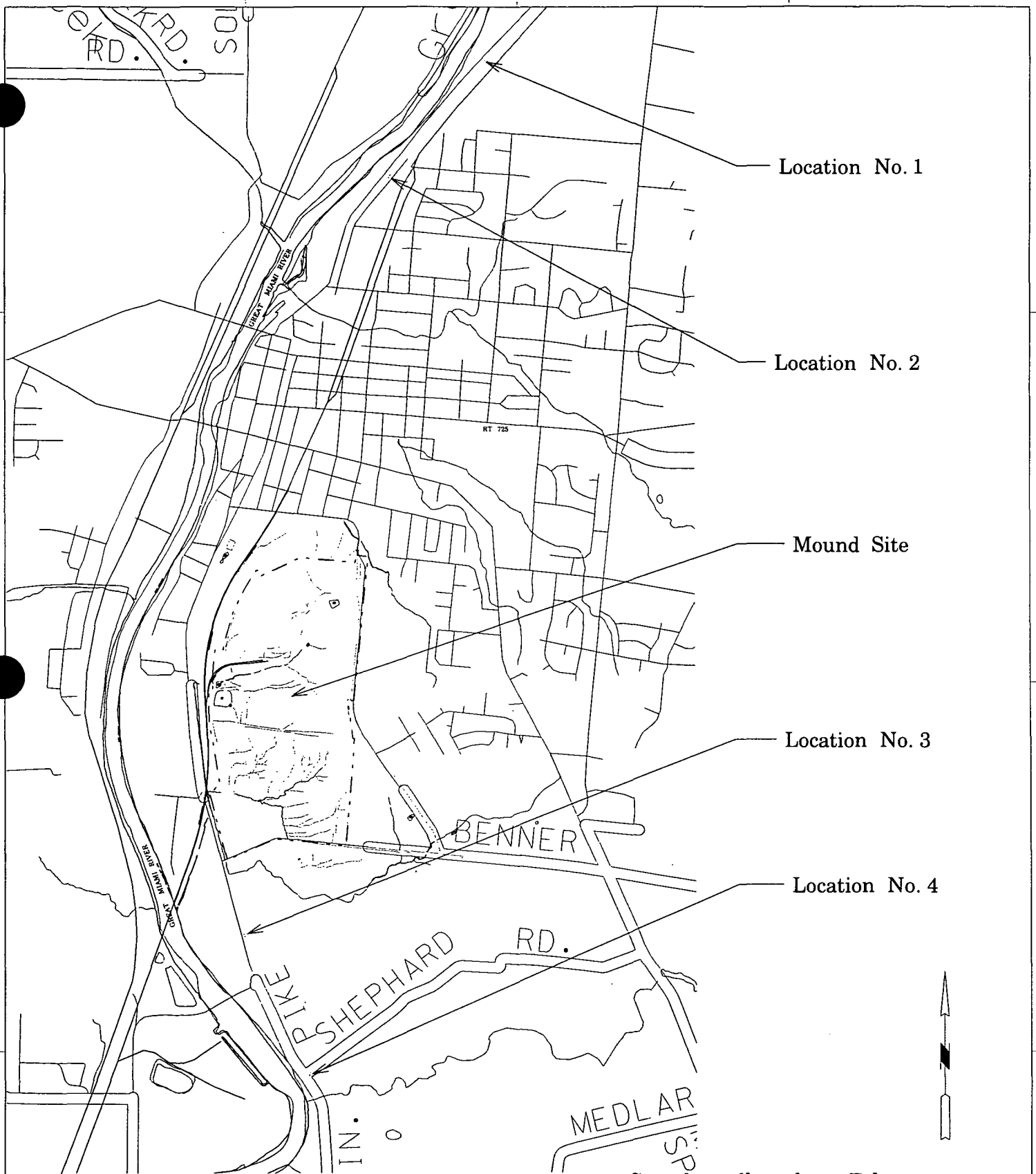
Table 6: DbA Results

	Result in ug/kg		
Location 1	27J	430U	410U
Location 2	410U	390U	400J
Location 3	410U	410U	400U
Location 4	410U	420U	410U

J: estimated
U: Not detected at the associated detection limit

APPENDIX B

Figures



Samples collected on Febuary 14, 2002

GRAPHIC SCALE

1000 500 0 1000 2000 FEET 3000 4000 FEET

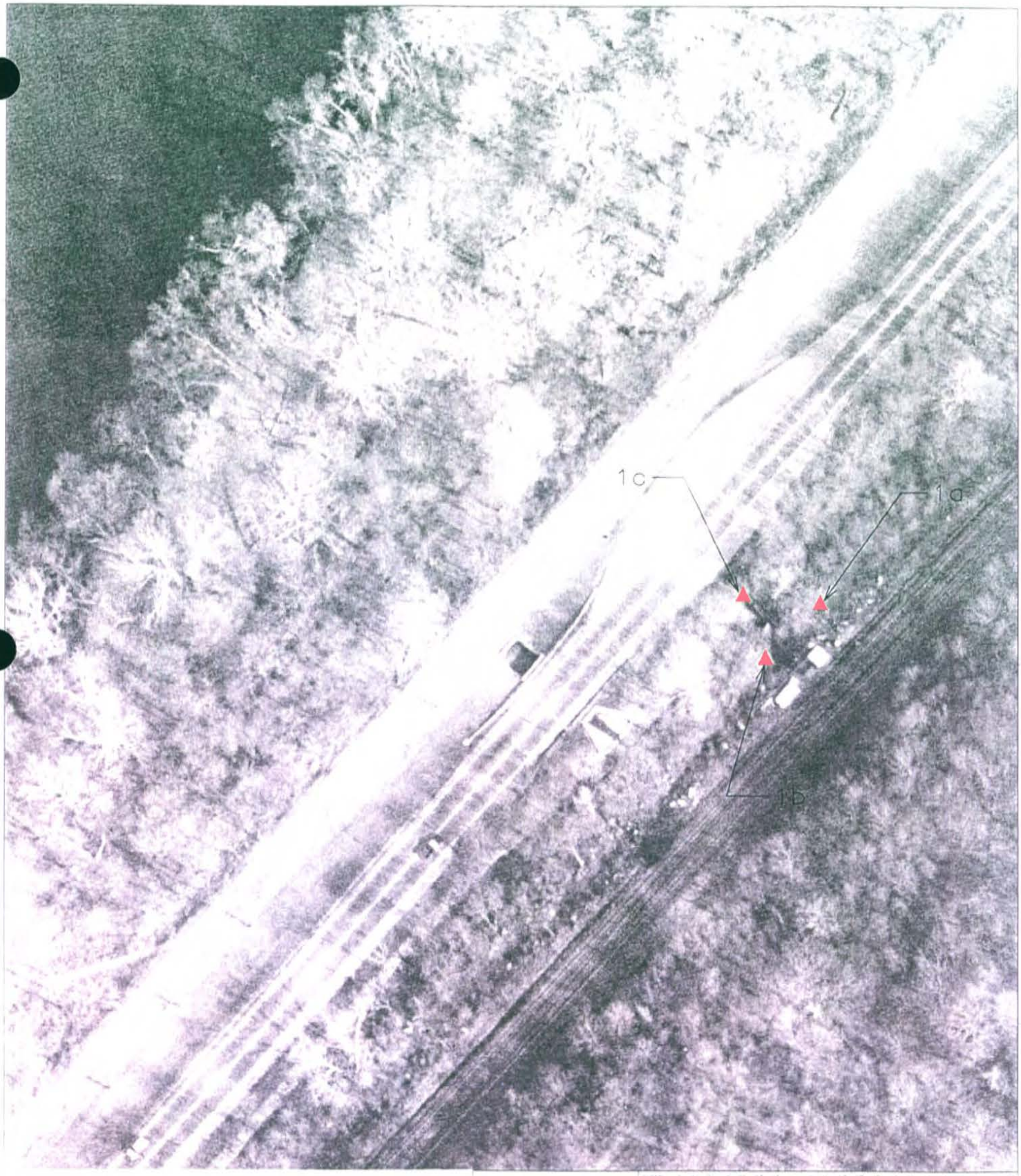
ISS	DATE	REVISION	BY
	10/09/02	ISSUE FOR DATA REPORT	SSP

MOUND

Environmental Restoration Geographic Information System

FIGURE 1
OFF-SITE
PAH SAMPLE LOCATIONS

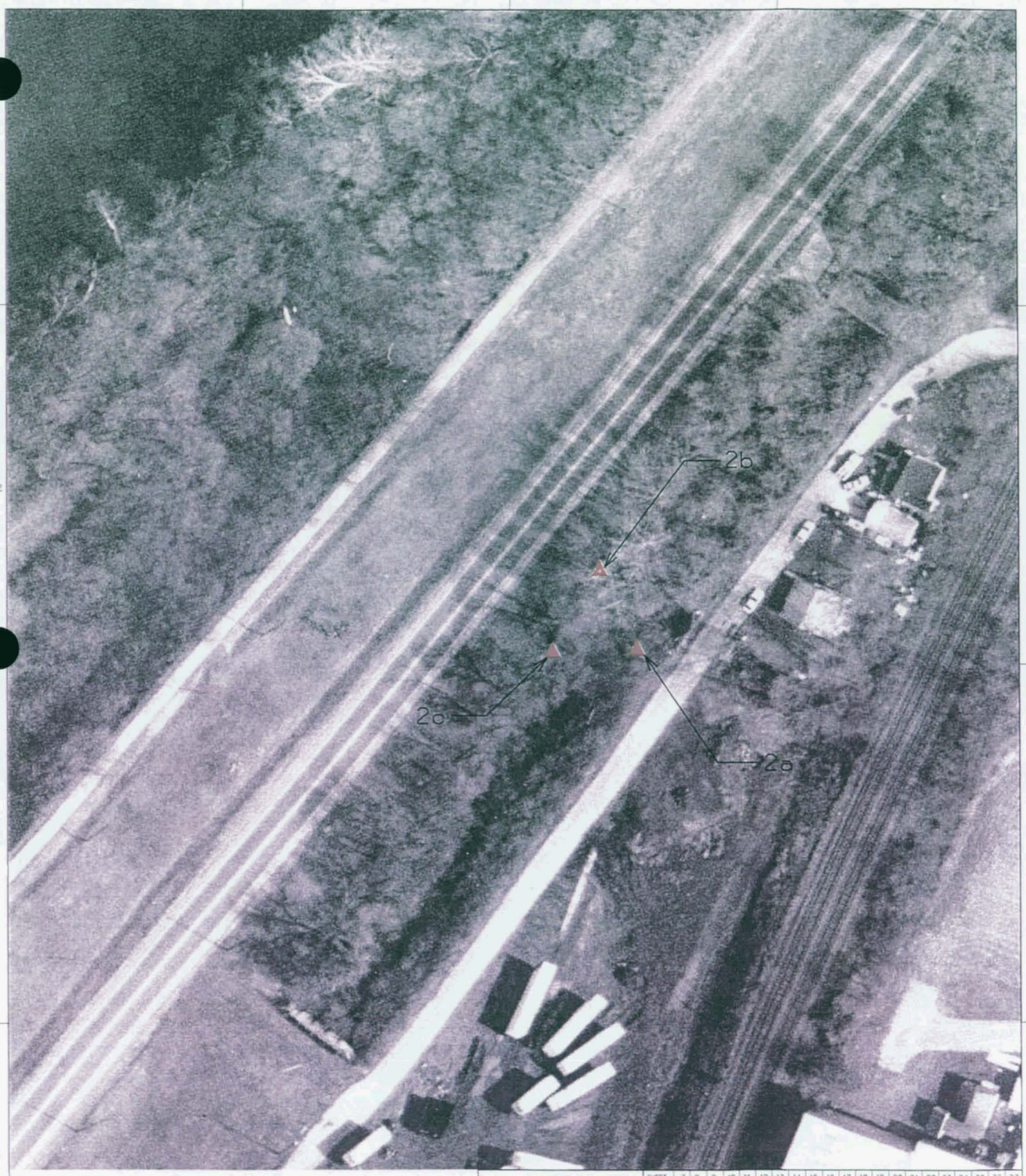
DRAWING CLASSIFICATION: UNCLASSIFIED
DRAWING NUMBER: offsite_samples.dgn
SCALE: GRAPHIC



MOUND

Environmental Restoration Geographic Information System

FIGURE 2
LOCATION NO 1
OFF SITE
PAH SAMPLE LOCATIONS



0 40
Scale in Ft.

ISS	DATE	REVISION	BY	CHKR	ENG	LP&EC	APVD	M
	10/09/02	ISSUE FOR DATA REPORT	SSP					

MOUND

Environmental Restoration Geographic Information System

SHEET	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ISSUE																					

SHEET	1	2	3	4	5	6
ISSUE						

PART CLASSIFICATION

FIGURE 3
LOCATION NO.2
OFF-SITE
PAH SAMPLE LOCATIONS

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE
DRAWING NUMBER: location_2.dgn
JOB NUMBER: *

DWG TYPE: STE | PRMG: ER-GIS | CAGEC | SCALE: GRAPHIC | SHEET 1 OF *

STATUS: MD-REL-03/06/02 | ORIGIN: MSTATION / J

0 40
Scale in Ft.

ISS	DATE	REVISION	BY	CHKR	ENG	UPNEC	APVD	M
	10/09/02	ISSUE FOR DATA REPORT	SSP					

MOUND
Environmental Restoration Geographic Information System

SHEET	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ISSUE																					
SHEET	1	2	3	4	5	6															
ISSUE																					

PART CLASSIFICATION

FIGURE 4
LOCATION 3
OFF-SITE
PAH SAMPLE LOCATIONS

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE
DRAWING NUMBER: ocation_3.dgn
JOB NUMBER: *

DWG TYPE: STE | PRMG: ER-GIS | CADEC | SCALE: GRAPHIC | SHEET 1 OF *

STATUS: MD-REL-03/06/02 | ORIGIN: MSTATION / J

0 40
Scale in Ft.

MOUND

Environmental
Restoration
Geographic
Information
System

SHEET	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ISSUE																					

SHEET	1	2	3	4	5	6
ISSUE						

PART CLASSIFICATION

FIGURE 5
LOCATION 4
OFF-SITE
PAH SAMPLE LOCATIONS

DRAWING CLASSIFICATION: UNCLASSIFIED
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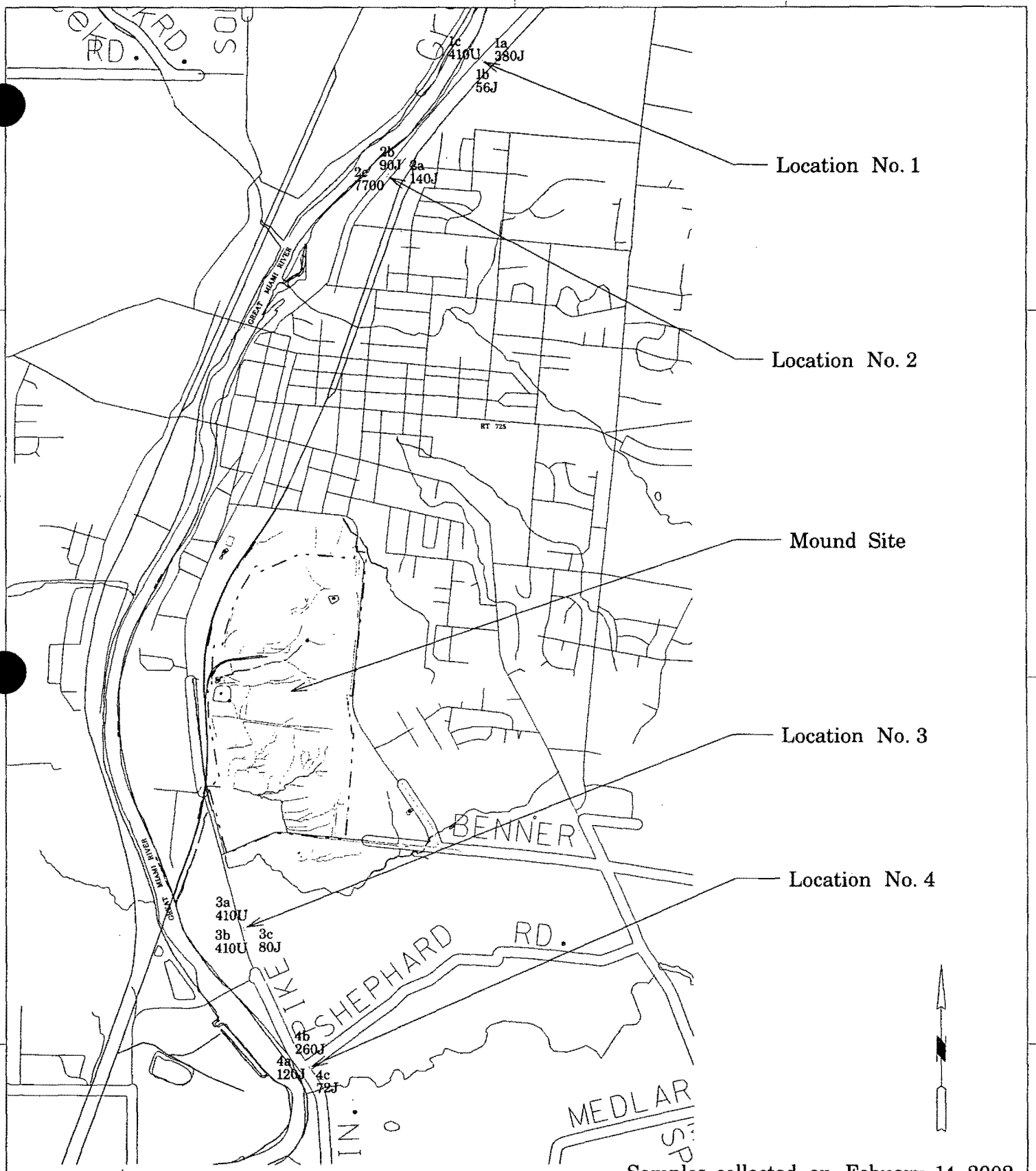
STATUS: MD-REL-03/06/02 | ORIGIN: MSTATION / J

ISS	DATE	REVISION	BY	CHKR	ENG	UPNEC	APVD	W
	10/09/02	ISSUE FOR DATA REPORT	SSP					



Samples collected on Febuary 14, 2002

GRAPHIC SCALE

10/09/02	ISSUE FOR DATA REPORT		
SS	DATE	REVISION	BY

MOUND

Environmental Restoration Geographic Information System

FIGURE 6
OFF-SITE
PAH SAMPLE LOCATIONS
AND BAP RESULTS

UNCLASSIFIED

offsite_samples.dgn

STATUS MD-PEL-03/06/02

ORIGIN MSTATION

Figure 7: BaP Results and Locations (Verification Sampling)

APPENDIX C

SAMPLE FIELD TRACKING SHEET

FIELD ENTRY FORM

BAP Background Determination

Sample Location Code	Sample ID	Area Description	Matrix	QC Type	Sample Date	Collection Time	Analysis
BAP-0-1A	000001	Loc.1	Soil	Regular	2/14/2002	8:35	PAH
BAP-0-1B	000002	Loc.1	Soil	Regular	2/14/2002	8:45	PAH
BAP-0-1C	000003	Loc.1	Soil	Regular	2/14/2002	9:00	PAH
BAP-1-1C	000004	Loc.1	Soil	Duplicate	2/14/2002	9:00	PAH
BAP-0-2A	000005	Loc.2	Soil	MS/MSD	2/14/2002	9:20	PAH
BAP-0-2B	000006	Loc.2	Soil	Regular	2/14/2002	9:35	PAH
BAP-0-2C	000007	Loc.2	Soil	Regular	2/14/2002	9:45	PAH
BAP-0-3A	000008	Loc.3	Soil	Regular	2/14/2002	10:10	PAH
BAP-0-3B	000009	Loc.3	Soil	Regular	2/14/2002	10:20	PAH
BAP-1-3B	000010	Loc.3	Soil	Duplicate	2/14/2002	10:20	PAH
BAP-0-3C	000011	Loc.3	Soil	Regular	2/14/2002	10:30	PAH
BAP-0-4A	000012	Loc.4	Soil	Regular	2/14/2002	11:00	PAH
BAP-0-4B	000013	Loc.4	Soil	Regular	2/14/2002	11:10	PAH
BAP-0-4C	000014	Loc.4	Soil	Regular	2/14/2002	11:15	PAH

Samples shipped FedEx Priority Overnight on 2/14/02
Tracking Number-821145248741

APPENDIX D

FIELD LOGBOOK

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

Name Monica Stofanoff
Roy F. Weston
Address 25466 Kohnle Dr.
Miamisburg, OH 45342
Phone 937/384-4200

Project BAP-Background
determination
BWXTO-Mound

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE

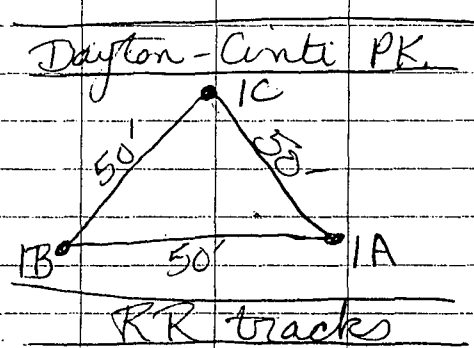
2/14/02 BWXTO M. Stefanoff

0700 arrived at OSW, met with K. Weaver and M. Spivey. M. Spivey suggested using a Geoprobe for soil samples. He has it stored in Bldg. 34

730 Went to Bldg 34 to get Geoprobe rod and sleeves

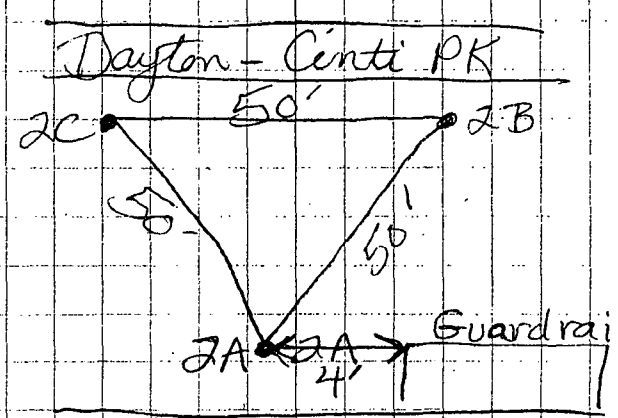
820 arrived at Location 1. Will collect 3 samples at each location. Sample points will be 50' apart, forming a triangle

Loc. 1

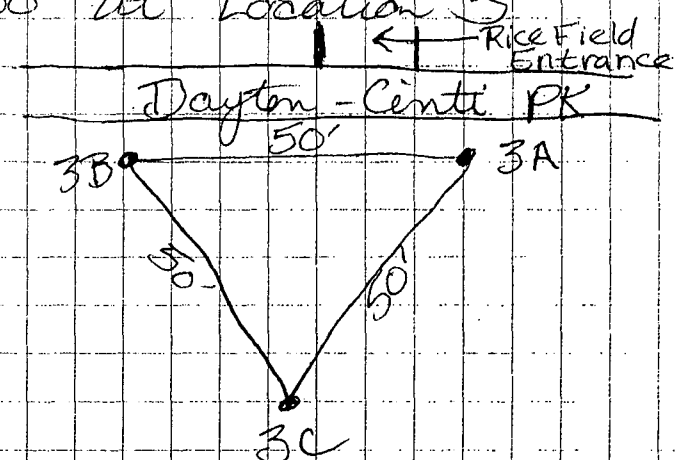


2/14/02 BWXTO M. Stefanoff

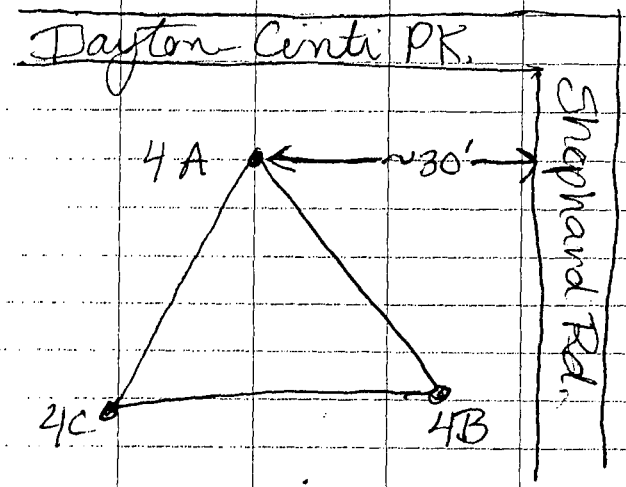
905 at location 2



1000 at Location 3



2/14/02 BWXTO M. Stefanoff
1050 at Location 4



1125 Left Location 4 to return to Bldg 94, to ~~Ship~~ MS 2/14/02 label bottles, fill out COC, and Ship Samples
M. Stefanoff

M. Stefanoff 2/14/02

APPENDIX E

COMPENDIUM METHOD A-003

MS-80045
Method: A-003

CLP Semi-Volatile Analysis/ CLP SOW OLM01.8

Issue 1

Miamisburg Environmental Management Project
Miamisburg, OH

Source Document: QAPP (April 1995)

1. INTRODUCTION

1.1 Description

Soil/sediment and water samples will be analyzed for semi-volatile organic compounds by the EPA CLP SOW Document Number OLOM01.8 (EPA, 1990a), using Gas Chromatography/Mass Spectrometry (GC/MS). A modification to the CLP SOW (Attachment A and B) has been prepared to specify criteria for three additional analytes: benzoic acid, 2-benzyl-4-chlorophenol, and benzyl alcohol.

1.2 References

U.S. EPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multimedia, Multi-Concentration. Document No. OLM01.8.

DOE 1995. "Remedial Investigation/Feasibility Study Operable Unit 9, Site-Wide Quality Assurance Project Plan," Final Revision 4, U.S. Department of Energy, April 1995.

2. PRESERVATION

Table 2.1 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Sample Containers, Volumes, Preservation, and Holding Times

Matrix	Parameters	Analytical Method	Container	Minimum Volume	Preservation	Holding Time
Water	Semi-Volatile Organic Compounds	CLP SOW	Amber glass bottle with Teflon-lined lid	Two 1000 mL bottles	Cool 4°C	7 days extraction/ 40 days analysis
Soil	Semi-Volatile Organic Compounds	CLP SOW	Amber glass bottle with Teflon-lined lid	100 grams	Cool 4°C	14 days extraction/ 40 days analysis

3. CALIBRATION

GC/MS will be used for analysis of semi-volatile organic compounds. Mass spectral abundance criteria must be met prior to sample analysis. Decafluorotriphenylphosphine (DFTPP) is used to verify instrument performance of the GC/MS system and must meet specific ion abundance criteria established in the CLP SOW. Meeting these criteria is demonstrated daily or once during every 12-hour time period, whichever is more frequent. The instrument performance is also verified whenever a corrective action to the GC/MS system is taken that affects the tuning (e.g., ion source cleaning or repair).

Initial calibration of the GC/MS system is accomplished with a minimum of five concentrations of target compounds. Only a four point calibration is required by the CLP SOW for eight of the target semi-volatile compounds that have higher CRQLs. Relative response factors (RRFs) must

be greater than or equal to 0.05. Relative standard deviations for the RRFs must be less than or equal to 30%. Initial calibration is not valid if this criterion is not met. The relative retention times of each compound in each standard run must agree within 0.06 units.

The initial calibration is verified every 12-hour period with a continuing calibration standard containing all target semi-volatile surrogate compounds. RRFs are compared to the average RRF from the initial calibration. The minimum RRF for the target compounds must be met. The percent difference between the initial RRFs and the continuing RRF must be less than or equal to 25 percent for the initial calibration to be valid. Prior to sample analysis, the GC/MS system is evaluated and corrective action taken if these criteria are not met.

4. QC CRITERIA

Table 4.1 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Field QC Sample Frequency

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
SVOC, CLP SOW	Equipment (rinsate) blank	1 every 10 or fewer field samples (water)	≤ 10 × level in associated samples	Evaluate variability
	Field Duplicate	1 every 10 or fewer field samples (water)	≤ 55% RPD	Evaluate data for usability
		1 every 10 or fewer field samples (soil)	Not applicable	Evaluate variability

Table 4.2 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Laboratory QC Sample Frequency

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
VOA, CLP SOW	Method Blank	1 per 20 samples of a given matrix or whenever a batch of samples is prepared in a day, whichever is more frequent; see CLP SOW	≤ 5 × CRQL phthalate esters ≤ CRQL	Investigate source; re-extract and reanalyze associated samples
	Matrix spike	1 per 20 samples of a given matrix or fewer; see CLP SOW	See Table 4.3	Evaluate data for usability
	Matrix spike duplicate	1 per 20 samples of a given matrix or fewer; see CLP SOW	See Table 4.3	Evaluate data for usability
	Laboratory Control Sample	1 per 20 samples or a given matrix or 1 whenever a batch of samples is prepared in a day, whichever is more frequent	See Table 4.3	Evaluate data for usability
	Surrogate spike	All lab and field samples	See Table 4.3	See CLP SOW
	Instrument performance check	Daily or each 12-hour period, whichever is more frequent	CLP SOW	Retune; reanalyze associated samples
	Calibration	CLP SOW	CLP SOW	Recalibrate before sample analyses
	Calibration check	With every calibration	CLP SOW	Recalibrate
	internal standard	Every standard and sample	CLP SOW	See CLP SOW
	Continuing calibration check	Once each 12-hour period	CLP SOW	Identify source and correct. Recalibrate if source not found and corrected
	Retention time window	CLP SOW	± 0.06 relative retention time units (sample and standard)	See CLP SOW

Table 4.3 - Volatile Organic Analysis CLP SOW OLM01.8 Laboratory Surrogate and Matrix Spike Limits

Analytical Method	Spiking Compounds	Spike Concentration		Advisory Limits			
				Percent Recovery		Relative Percent Difference (%)	
		Water (µg/L)	*Soil (µg/kg)*	*Water*	*Soil*	*Water*	*Soil*
	Matrix Spike/LCS						
SVOC, CLP SOW	Phenol	per CLP SOW	per CLP SOW	12-110	26-90	≤42	≤35
	2-Chlorophenol	per CLP SOW	per CLP SOW	27-123	25-102	≤40	≤50
	1,4-Dichlorobenzene	per CLP SOW	per CLP SOW	36-97	28-104	≤28	≤27
	N-nitroso-di-n-propylamine	per CLP SOW	per CLP SOW	41-116	41-126	≤38	≤38
	1,2,4-Trichlorobenzene	per CLP SOW	per CLP SOW	39-98	38-107	≤28	≤23
	4-Chloro-3-methylphenol	per CLP SOW	per CLP SOW	23-97	26-103	≤42	≤33
	Acenaphthene	per CLP SOW	per CLP SOW	46-118	31-137	≤31	≤19
	4-Nitrophenol	per CLP SOW	per CLP SOW	10-80	11-114	≤50	≤50
	2,4-Dinitrotoluene	per CLP SOW	per CLP SOW	24-96	28-89	≤38	≤47
	Pentachlorophenol	per CLP SOW	per CLP SOW	9-103	17-109	≤50	≤47
	Pyrene	per CLP SOW	per CLP SOW	26-127	35-142	≤31	≤36
	Surrogates						
	Nitrobenzene-d5	per CLP SOW	per CLP SOW	35-114	23-120	NA	NA
	2-Fluorobiphenyl	per CLP SOW	per CLP SOW	43-116	30-115	NA	NA
	p-Terphenyl-d14	per CLP SOW	per CLP SOW	33-141	18-137	NA	NA
	Phenol-d5	per CLP SOW	per CLP SOW	10-110	24-113	NA	NA
	2-Fluorophenol	per CLP SOW	per CLP SOW	21-110	25-121	NA	NA
	2,4,6-Tribromophenol	per CLP SOW	per CLP SOW	10-123	19-122	NA	NA
	2-Chlorophenol-d4	per CLP SOW	per CLP SOW	33-110	20-130	NA	NA
	1,2-Dichlorobenzene-d4	per CLP SOW	per CLP SOW	16-110	20-130	NA	NA

5. ANALYTE LIST AND REPORTING LIMITS

These are expected quantitation limits based on reagent grade water or a purified solid matrix. Actual quantitation limits may be higher depending upon the nature of the sample matrix. The limit reported on final laboratory reports will take into account the actual sample volume or weight, percent moisture (where applicable), and the dilution factor, if any.

Table 5.1 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Target Analyte List

Analyte	Water (µg/L)	Soil (µg/kg)
Phenol	10	330
bis(2-Chloroethyl)ether	10	330
2-Chlorophenol	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
1,2-Dichlorobenzene	10	330
2-Methylphenol	10	330
2,2'-oxybis(1-Chloropropane)[1]	10	330
4-Methylphenol	10	330
N-nitroso-di-n-dipropylamine	10	330
Hexachloroethane	10	330

Table 5.1 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Target Analyte List

Analyte	Water (µg/L)	Soil (µg/kg)
Nitrobenzene	10	330
Isophorone	10	330
2-Nitrophenol	10	330
2,4-Dimethylphenol	10	330
bis(2-Chloroethoxy)methane	10	330
2,4-Dichlorophenol	10	330
1,2,4-Trichlorobenzene	10	330
Naphthalene	10	330
4-Chloroaniline	10	330
Hexachlorobutadiene	10	330
4-Chloro-3-methylphenol	10	330
(para-chloro-meta-cresol)	10	330
2-Methylnaphthalene	10	330
Hexachlorocyclopentadiene[2]	NA	330
2,4,6-Trichlorophenol	10	330
2,4,5-Trichlorophenol	25	800
2-Chloronaphthalene	10	330
2-Nitroaniline	25	800
Dimethylphthalate	10	330
Acenaphthylene	10	330
2,6-Dinitrotoluene	10	330
3-Nitroaniline	25	800
Acenaphthene	10	330
2,4-Dinitrophenol	25	800
4-Nitrophenol	25	800
Dibenzofuran	10	330
2,4-Dinitrotoluene	10	330
Diethylphthalate	10	330
4-Chlorophenyl-phenyl ether	10	330
Fluorene	10	330
4-Nitroaniline	25	800
4,6-Dinitro-2-methylphenol	25	800
N-nitrosodiphenylamine	10	300
4-Bromophenyl-phenylether	10	330
Hexachlorobenzene	10	330
Pentachlorophenol	25	800
Phenanthrene	10	330
Anthracene	10	330
Carbazole	10	330
Di-n-butylphthalate	10	330
Fluoranthene	10	330
Pyrene	10	330
Butylbenzylphthalate	10	330
3,3'-Dichlorobenzidine	10	330
Benzo(a)anthracene	10	330
Chrysene	10	330
bis(2-Ethylhexyl)phthalate	10	330
Di-n-octylphthalate	10	330

Table 5.1 - Semi-Volatile Organic Analysis - CLP SOW OLM01.8 Target Analyte List

Analyte	Water (µg/L)	Soil (µg/kg)
Benzo(b)fluoranthene	10	330
Benzo(k)fluoranthene	10	330
Benzo(a)pyrene	10	330
Indeno(1,2,3-cd)pyrene	10	330
Dibenz(a,h)anthracene	10	330
Benzo(g,h,i)perylene	10	330
Additional Compounds		
2-Benzyl-4-chlorophenol	10	330
Benzyl alcohol	10	330
Benzoic acid	50	1600

[1] Previously known by the name bis (2-chloroisopropyl) ether

[2] Spike recoveries in water for hexachlorocyclopentadiene from method validation studies have demonstrated that the compound can't be adequately detected by this method

ATTACHMENT A FOR

METHOD A-003

Attachment A for Method A-003

Modification to CLP Organic SOW OLM01.8
"Statement of Work for Organic Analysis,
Multi-media, Multi-concentration"

The purpose of this addendum is to outline modifications to the Contract Laboratory Program (CLP) "Statement of Work for Organic Analysis, Multi-media, Multi-concentration" which are project specific to the QAPP prepared by Roy F. Weston, Inc. for investigative activities at the Department of Energy/LANL Mound Plant, Miamisburg, Ohio.

This addendum extends the analysis to include 4-chloro-2-(phenylmethyl)phenol, benzoic acid, and benzyl alcohol for semi-volatiles.

Exhibit A - Summary of Requirements

No modifications to this section.

Exhibit B - Reporting and Deliverables Requirements

Section I: Contract Reports/Deliverables Distribution

No modifications to this section.

Section II: Report Descriptions and Order of Data Deliverables

No modifications to this section.

Section III: Form Instructions

No modifications to this section.

Section IV: Data Reporting Forms:

The following compounds must be added on Form I (Data Sheets).

CAS No.	Semi-Volatiles
120-32-1	4-Chloro-2-(phenylmethyl)phenol
100-51-6	Benzyl Alcohol
65-85-0	Benzoic Acid

Form VI SV-2 (Initial Calibration) and Form VII SV-2 (Continuing Calibration) must be modified to include these additional compounds: 4-Chloro-2-(phenylmethyl)phenol, benzyl alcohol, and benzoic acid.

Exhibit C - Target Compound List (TCL) and Contract Required Quantitation Limits(CRQL)

The following should be added to the Target Compound List (TCL) and Contract required Quantitation Limits(CRQL, Page C-2 and Page C-4):

Analyte	CAS No.	CRQL			On Col. (ng)
		Low Water ug/L	Low Soil ug/kg	Med. Soil ug/kg	
4-Chloro-2-(phenylmethyl)phenol	120-32-1	10	330	10000	20
Benzyl Alcohol	100-51-6	10	330	10000	20
Benzoic Acid	65-85-0	50	1600	50000	100

Exhibit D - Analytical Methods for Semi-Volatiles (SV)

Section I: Introduction

No modifications to this section.

Section II: Sample Preparation and Storage

No modifications to this section.

Section III: Screening of SV organic Extracts

No modifications to this section.

Section IV: GC/MS Analysis of SV

1. Summary of Method: No modifications to this section.

2. Apparatus and Materials: No modifications to this section.

3. Reagents:

3.1 Internal standards - No modifications to this section.

3.2 Calibration standards - 4-Chloro-2-(phenylmethyl)phenol and benzyl alcohol must be added to the calibration standards prepared at 20, 50, 80, 120 and 160 total ng per 2 µL. Benzoic acid must be added to the calibration standard prepared at 50, 80, 120, 160 total ng per 2 µL.

3.3 DFTPP solution - No modifications to this section.

4. Instrument operating Conditions: No modifications to this section.

5. Calibration:

5.1 No modifications to this section.

5.2 and Table 2 Add: 4-Chloro-2-(phenylmethyl)phenol, benzoic acid, and benzyl alcohol must be calibrated using the closest eluting internal standard.

5.3 - 5.5 No modifications to this section.

Table 4 Add:

Parameter	Primary Ion	Secondary Ion (s)
4-Chloro-2-(phenylmethyl) phenol	218	183,165,140
Benzyl Alcohol	108	79,77
Benzoic Acid	122	105,77

5.6.1 No modifications to this section.

5.6.2 Add: 4-Chloro-2-(phenylmethyl)phenol, benzoic acid, and benzyl alcohol to the list of compounds. The maximum %RSD must be ± 25 and maximum % Difference ± 30. However, this compound must meet the minimum RRF criteria of 0.01.

These are advisory limits and final limits will be established after method validation.

5.7 - 5.13 No modifications to this section.

6. Sample Analysis: No modifications to this section.

7. Qualitative Analysis: No modifications to this section.

8. Quantitation: No modifications to this section.

9. GC/MS Confirmation of Pesticides and Aroclors: No modifications to this section.

Exhibit E - QA/QC Requirements

I. Overview:

No modifications to this section.

II. Quality Assurance Plan:

No modifications to this section.

III. Standard Operating Procedure:

No modifications to this section.

IV. QA/QC Requirements: Semi-volatile QA/QC requirements

1. GC/MS Mass Calibration and Ion Abundance Patterns:

No modifications to this section.

2. GC/MS Initial Calibration:
Reference to Exhibit D includes the modifications to Exhibit D presented in this addendum.

3. Continuing Calibration:

Reference to Exhibit D includes the modifications to Exhibit D presented in this addendum.

4. Internal Standards Responses and Retention Times:

No modifications to this section.

5. Method Blank Analysis:

No modifications to this section.

6. System Monitoring Compound Recoveries:

No modifications to this section.

7. Matrix Spike and Matrix Spike Duplicate Analysis:

   Reference to Exhibit D includes the modifications to Exhibit D presented in this addendum.

8. Dilution of Samples, MS and MSD

   No modifications to this section.

VII Regional Data Review

No modifications to this section.

VIII Laboratory Evaluation Samples

No modifications to this section.

IX GC/MS Tape Audits

No modifications to this section.

X Data Package Audits

No modifications to this section.

XI On Site Laboratory Evaluations

No modifications to this section.

XII Quality Assurance and Data Management

No modifications to this section.

XIII Data Management

No modifications to this section.

Exhibit F - Chain-of-Custody, Document Control, and Standard Operating Procedures

No modifications to this section.

Exhibit G - Glossary of Terms

No modifications to this section.

Exhibit H - Data Dictionary and Format for Data Deliverables in Computer-Readable Format

No modifications to this section.

ATTACHMENT B FOR METHOD A-003

Attachment B for Method A-003

Statement of Work for Soil Preparation for Common Organic, Inorganic, and Selected Radiological Analyses

1.0 Scope and Application

This procedure describes how to aliquot Mound soil and soil-like samples for laboratory preparation and analysis. This procedure applies to soil analysis for metals, semi-volatiles, pesticide/PCBs, cyanide, anions, explosives, and radiological analyses which do not have a prescribed soil preparation procedure. This procedure should not be used for volatile organic analysis. Soils for volatile organic analysis will be prepared and homogenized as described in the method of analysis.

2.0 Summary

A representative aliquot of a sample is taken in the laboratory by either visually examining and taking a representative portion from each layer in a sample, or taking a core of the sample.

3.0 Interferences

Soil samples are heterogeneous by nature. Because of this nature, target analytes are often channeled and concentrated in the soil in specific layers or locations. This heterogeneity may affect both how representative the sample is of the field location and how representative the laboratory aliquot is of the sample.

The heterogeneous nature of soils can sometimes be eliminated in laboratory aliquoting by visually inspecting the sample for layering and selecting a representative aliquot or by taking a core of the sample.

4.0 Equipment

4.1 Spatula or Scoop

4.2 Glass tray, plastic tray, or other material for containing spilled soil

4.3 Large container, i.e. 1000 mL Pyrex beaker

5.0 Reagents/Supplies

5.1 Disposable gloves

6.0 Sample Collection/Holding Time/Preservation

6.1 See Section 2.0 of Method A-003.

7.0 Procedure

7.1 Place a glass tray, plastic tray, or disposable paper beneath the sample container. The tray or paper will be used to contain any soil which accidentally falls off the bottle lip when the cap is opened or falls out while the sample is taken.

7.2 Visually examine the contents of the sample container. If obvious layering is present, then representative portions of each layer must be taken for the aliquot.

If the sample is obviously a core sample (cylindrical soil mass), then use the spatula to core from the top of the sample to the bottom of the sample. This procedure should be representative of the entire core.

If the sample cannot be easily cored, it may be necessary to transfer the sample to a large container and thoroughly and carefully mix the sample with a spatula or scoop. Mixing will not be performed on soil samples for volatile and semi-volatile analyses.

If the sample is neither layered nor a core sample, then use a spatula to core through the middle of the sample. The core should be representative of the entire sample.

7.3 Process the sample as specified in the applicable method.

8.0 Quality Control

8.1 Each analytical method has specific types of quality control samples introduced to evaluate laboratory precision and reproducibility of sample results. Typically, these quality control samples are laboratory duplicates or matrix spike duplicates. These quality control samples permit the laboratory to calculate the relative percent difference and evaluate the soil aliquoting procedure and the precision of the method.

9.0 References and Associated Standard Operating Procedures

None

APPENDIX F

CHAIN OF CUSTODY

Lionville Laboratory Use Only

Custody Transfer Record/Lab Work Request

LVLI — LIONVILLE LABORATORY INC.

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Client: Tinton/Morris - FAP Background
Est. Final Proj. Sampling Date: 2/14/02
Project #: 01.0C.07.0740.0300
Project Contact/Phone #: C. Stell/973-334-4900
Lionville Laboratory Project Manager: J. Slone
QC: ____ Del: ____ TAT: Agreement

Date Rec'd: ____ Date Due: ____

Refrigerator #

#/Type Container: Liquid / Solid — AG

Volume: Liquid / Solid — 90z

Preservatives

ANALYSES REQUESTED → ORGANIC: VOA, BNA, Pest/PCB, Herb, PAH; INORG: Metal, CN

Lionville Laboratory Use Only

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	PAH
	FAP-0-1A-000001			S	2/14/02	8:35	1
	FAP-0-1B-000002					8:45	1
	FAP-0-1C-000003					9:00	1
	FAP-1-1C-000004					9:00	1
	FAP-0-2A-000005	✓	✓			9:30	2
	FAP-0-2B-000006					9:35	1
	FAP-0-2C-000007					9:45	1
	FAP-0-3A-000008					10:10	1
	FAP-0-3B-000009					10:20	1
	FAP-1-3B-000010			S	2/14/02	10:20	1

Special Instructions:

Sample received @ 4°C

DATE/REVISIONS:
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

Relinquished by	Received by	Date	Time

Relinquished by	Received by	Date	Time

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

Lionville Laboratory Use Only

Samples were:
1) Shipped ____ or Hand Delivered ____
Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Samples Properly Preserved Y or N
5) Received Within Holding Times Y or N

Tamper Resistant Seal was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Cooler Temp. ____ °C

Lionville Laboratory Use Only

Custody Transfer Record/Lab Work Request

LIONVILLE LABORATORY INC.

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Client: BIXTC/Mound BAP Background
Est. Final Proj. Sampling Date: 7/14/02
Project #: 0601 0 07 0716380
Project Contact/Phone #: [illegible] 937-384-4260
Lionville Laboratory Project Manager: [illegible]
QC: ____ Del: ____ TAT: Acceptance

Date Rec'd: ____ Date Due: ____

Refrigerator #																	
#/Type Container	Liquid																
	Solid					AG											
Volume	Liquid																
	Solid					90g											
Preservatives																	
ANALYSES REQUESTED →		ORGANIC							INORG								
		VOA	BNA	Pest/ PCB	Herb	RAD			Metal	CN							
		Lionville Laboratory Use Only															

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected													
	BAP-0-3C-060011			S	7/14/02	10:30					1								
	BAP-0-4A-060012			S	7/14/02	11:00					1								
	BAP-0-4B-060013			S	7/14/02	11:10					1								
	BAP-0-4C-060014			S	7/14/02	11:15					1								

Special Instructions:

[illegible] at 4°C

DATE/REVISIONS:

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

Relinquished by	Received by	Date	Time

Relinquished by	Received by	Date	Time

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

Lionville Laboratory Use Only

Samples were:
1) Shipped ____ or Hand Delivered ____
Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Samples Properly Preserved Y or N
5) Received Within Holding Times Y or N

Tamper Resistant Seal was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Cooler Temp. ____ °C

Miami/Erie Canal Verification Project

Sample Locations with Benzo(a)pyrene results in ug/kg

North Canal

South Canal

- Sample Location
- Building Label
  - Text Bldg ID
- Building Outline
  - Building Outline
- Building
  - Color Fill
- Roads
  - Bridges
  - Paved Drives/Parking
  - Primary Roads
  - Residential Drives
  - Trail/Footpath
  - Unpaved Drives/Parking
- Hydrology
  - River
  - Pond
  - Creek/Stream
- Excavated Boundaries
  - Surveyed
  - Digitized
- Survey
  - Site Boundary - current
- Topography Text
  - Text Index Contour Label - 200 scale
- Topography
  - Index Contour
  - Intermediate Contour

N W E S

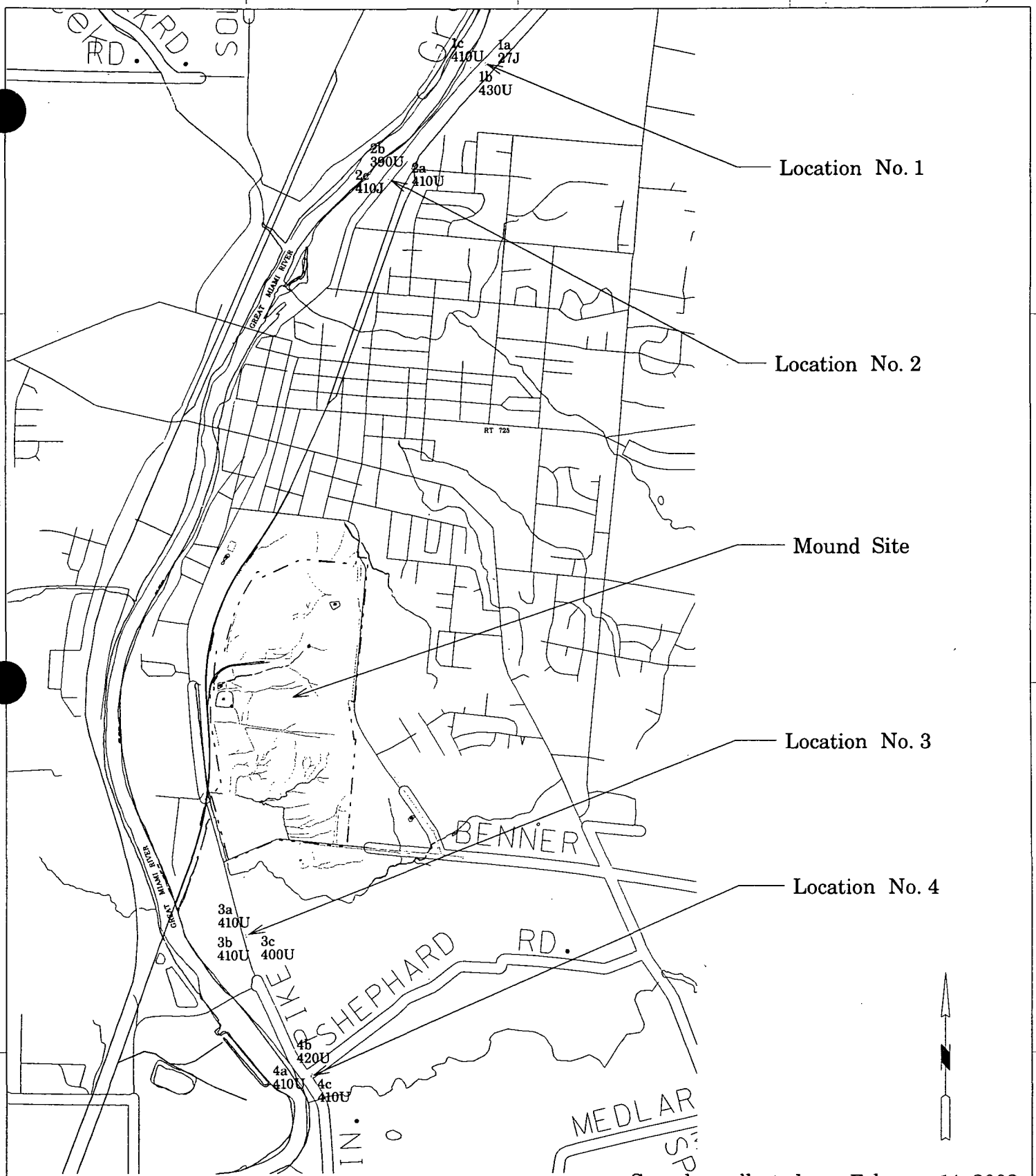
200 0 200 400 600 800 1000 Feet

MOUND

Environmental Restoration Geographic Information System

e:\cad_proj\canal\esri\canal97benzo032702.apr

03/27/02



Samples collected on Febuary 14, 2002

GRAPHIC SCALE

1000 500 0 1000 2000FT 3000 4000FT

ISS	DATE	REVISION	BY	CHKD	ENG	APPRD	APVD
	10/09/02	ISSUE FOR DATA REPORT	SSP				

MOUND

Environmental Restoration Geographic Information System

FIGURE 8
OFF-SITE
PAH SAMPLE LOCATIONS
AND DbA RESULTS

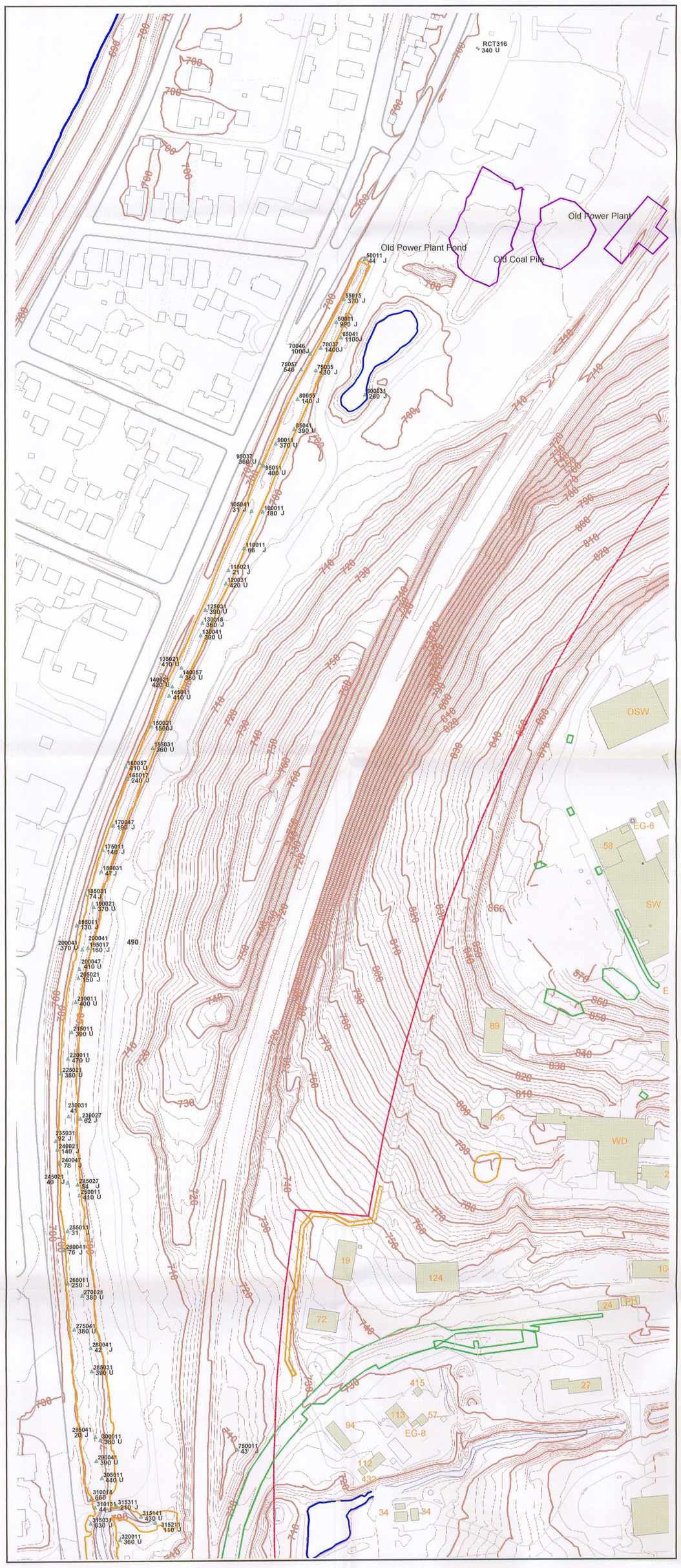
DRAWING CLASSIFICATION	UNCLASSIFIED
SIZE	
DRAWING NUMBER	offsite_samples.dgn
JOB NUMBER	-
DWG TYPE	STE
DWG	EF-GIS
CAGE	
SCALE	GRAPHIC
SHEET	1 OF 1
STATUS	MD-REL-03/06/02
ORIGIN	MSTATION / J

Figure 9: DbA Results and Locations (Verification Sampling)

Miami/Erie Canal Verification Project

Sample Locations with Dibenz(a,h)anthracene (DbA) results in ug/kg

North Canal



South Canal

DbA Sample Location
Building Label
Text Bldg ID
Building Outline
Building Outline
Building
Color Fill
Roads
Bridges
Paved Drives/Parking
Primary Roads
Residential Drives
Trail/Footpath
Unpaved Drives/Parking
Hydrology
River
Pond
Creek/Stream
Excavated Boundaries
Surveyed
Digitized
Survey
Site Boundary - current
Topography Text
Text Index Contour Label - 200 scale
Topography
Index Contour
Intermediate Contour

N
W E
S

200 0 200 400 600 800 1000 Feet

MOUND
Environmental Restoration Geographic Information System

10/10/02

e:\cad_proj\canal\esri\canal97dba101002.apr