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Site Inspection Report

United States Postal Service
Aurora Main Post Office Facility
525 North Broadway, Aurora, Illinois
Illinois ID Number: 0890050033
USEPA ID Number: ILD981795453

US EPA RECORDS CENTER REGION 5
406302

Prepared for:
United States Postal Service
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DEI Project Number: 01031-03

September 19, 2006

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1.0 EXECUTIVE SUMMARY AND INTRODUCTION

The United States Postal Service ("USPS") owns and operates the Aurora Main Post Office ("site") located at 525 North Broadway Avenue, Aurora, Illinois. The site is listed on the Federal Agency Hazardous Waste Compliance Docket under Section 120(c) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and as amended by Superfund Amendments and Reauthorization Act ("SARA").

The United States Environmental Protection Agency ("USEPA") Region V has requested that the USPS conduct site assessment activities under the authority of CERCLA in order to determine the potential threat to human health and the environment posed by the site and to determine the appropriate corrective actions to be implemented. In correspondence between the USEPA and the USPS, it was determined that an Expanded Site Inspection ("SI") would need to be conducted in order to meet the project objectives. This SI was therefore conducted to determine the potential impact of the previously identified contamination on potentially effected populations. This report has been prepared in accordance with USEPA Document No. EPA540-R-92-021, *"Guidance for Performing Site Inspections Under CERCLA"*, Directive 9345.1-05, September 1992.

The SI field work was conducted on July 14, 2006 and July 17, 2006 and included the following:

- Advancement of 13 soil borings using direct push technology (Geoprobe® Systems Model 6610DT);
- Collection of one soil sample from each boring location for laboratory analysis;
- Conversion of 3 of the soil boring locations to permanent 2-inch monitoring wells by over-drilling the soil boring location using the hollow stem auger ("HSA") auger attachment for the 6610DT; and
- Collection of 3 sediment and 3 surface water samples from Indian Creek, which is located adjacent to the site along the northern property boundary.

The soil, sediment, surface water and ground water samples were transported to First Environmental Laboratories, Inc. (Naperville, Illinois, Accreditation #100292) under strict chain-of-custody protocols. The samples were analyzed for the following:

Soil/Sediment:

- VOC's: Method 5035/8260B;
- PAH's and SVOC's: Method 5035/8270C;
- Total Metals (18): Method 3050B/6010B;
- Mercury: Method 7470A;
- Cyanide: Method 9010B/9014; and
- pH: 9045C.

Ground/Surface Water:

- VOC's: Method 5030B/8260B;
- PAH's and SVOC's: Method 3510C/8270C;
- Total Metals: Method 3010A/6010B;
- Mercury: Method 7470A;
- Cyanide: Method 9010B/9014; and
- pH: 9045C.

The following organic contaminants were identified in the soil exceeding the method detection limit ("MDL") for the analysis procedure performed (none of the sediment samples exhibited exceedences of the MDL for any of the organic contaminants analyzed). Since metals are naturally occurring in soil and sediment, they are omitted from this MDL exceedence evaluation:

- 2-Butanone;
- Ethylbenzene;
- Acenaphthene;
- Anthracene;
- Benzo(a)anthracene;
- Benzo(k)fluoranthene;
- Benzo(g,h,i)perylene;
- Benzo(a)pyrene;
- Chrysene;
- Dibenzofuran;
- Fluoranthene;
- Fluorene;
- 2-methylnaphthalene;
- Naphthalene;
- Phenanthrene; and
- Pyrene.

The following constituents were identified in the soil exceeding at least one of the State of Illinois Remediation Objectives ("RO's") as outlined in 35 IAC 742:

- Benzo(a)anthracene;
- Benzo(a)pyrene;
- Naphthalene;
- Arsenic; and
- Lead.

The following constituents were identified in the ground and surface water exceeding the MDL

for the analysis procedure performed:

- Benzo(a)anthracene;
- Fluorene;
- Phenanthrene;
- Pyrene;
- Arsenic;
- Beryllium;
- Cadmium;
- Chromium, total;
- Copper;
- Lead;
- Nickel; and
- Zinc.

The following constituents were identified in the ground water exceeding at least one of the State of Illinois 35 IAC 742 RO's:

- Benzo(a)anthracene; and
- Lead.

A water well survey was conducted in a 5,000 foot radius of the site. The results of this survey indicate that there is one community water supply well and 14 private and/or industrial use wells within the search radius. The site is not located within the setback zones for these wells nor is it located within a designated wellhead protection area. The potentially affected populations associated with the site are the workers and visitors to the postal facility, the users of nearby potable private water wells, people who consume water from nearby municipal wells and construction workers conducting future excavation in areas of soil contamination.

The data collected as part of this investigation indicate that the soil and ground water at the site have been impacted by VOC's, SVOC's and metals as a result of operations conducted by the previous property owner, Burlington Northern - Santa Fe Railroad. Sediment and surface water samples were obtained from Indian Creek (located directly adjacent to the site) with no discernable impact from the site identified. The areas soil and ground water impact appear to be limited to the site and are covered by asphalt and concrete. The sediment and surface water of Indian Creek (located adjacent to the site) show elevated levels for metals in the downgradient sampling locations (as compared to the two upgradient sampling locations. These downgradient samples however are not impacted above levels at which standards would likely be applied to the site. Therefore, the area of exceedence of State of Illinois RO's does not appear to present a health risk to the potentially effected population (visitors and employees of the postal facility and nearby residences and businesses).

2.0 SITE DESCRIPTION AND REGULATORY HISTORY

The site is approximately 11.5 acres in size and is located at 525 North Broadway Avenue, south of the intersection of North Broadway Avenue and Illinois Street and approximately 530 feet east of the Fox River. The site is located in the SE ¼ NW ¼ NE ¼, Section 22, T 38 N, R 8 E of the Third Principal Meridian, Kane County, Illinois. The approximate coordinates of the site are 41° 45′ 54″ north latitude and 88° 18′ 25″ west longitude. Please refer to **Figures 1 and 2, Appendix A** for the site location map and site base map.

2.1 *Site Description*

The site is currently used as the Main Post Office ("MPO") for the City of Aurora. The site topography is generally flat, with a gently sloping grade to the west toward the Fox River. A retaining wall runs along the western property boundary along North Broadway Avenue and the land to the west of the wall drops along a consistent grade approximately 10 feet to a sidewalk. The site is occupied by a large post office building (approximately 50,000 square feet) near the center portion of the property near its western boundary. A vehicle maintenance facility ("VMF", approximately 8,500 square feet) is located in the northeastern portion of the property where postal vehicles are serviced. The VMF building includes four service bays, office and storage space.

A large, fenced surface water retention area (approximately 1.5 acres) is located in the northern portion of the site. This retention area is approximately 5 to 10 feet deep at its deepest point and is vegetated. An access road for Burlington Northern Santa Fe ("BNSF") railroad vehicles exists to the north of the retention area and parallels Indian Creek. The northern property boundary abuts with Indian Creek which is a first order tributary to the Fox River.

The remainder of the site includes asphalt and concrete parking areas for the public, USPS employees and USPS vehicles and vegetated, landscaped areas.

2.2 *Surrounding Land Use*

The land use in the vicinity of the site is exclusively commercial and/or industrial along the North Broadway Avenue corridor. The western side of the property is bounded by North Broadway Avenue, with commercial and industrial properties along the western side of North Broadway, from Pierce Street on the north to Clark Street on the south. Further west of these properties is the Fox River, approximately 530 feet west of the site.

The eastern side of the property is bounded by BNSF property that includes an office and maintenance facility toward the north, a major rail switch yard directly to the east, and a rail line toward the south. The northern side of the property is bounded by Indian Creek, more industrial properties north of Indian Creek, to Pierce Street. North of Pierce Street is a residential area. The southern side of the property is bounded by a large asphalt parking area

associated with the bus and train stations and commercial properties including a restaurant and hotel along the east side of North Broadway Avenue. Further south along North Broadway are a series of mixed commercial and light industrial properties.

Residential properties exist to the north and to the east, but are not located directly adjacent to the site. The nearest residential properties are located across the BNSF railroad tracks, directly adjacent to Lincoln Avenue approximately 1400 feet east of the site. The next nearest residential properties are located across Indian Creek, directly across from commercial and industrial properties along the north side of Pierce Street approximately 1800 feet north of the site.

Please refer to **Figure 7, Appendix A** for an aerial photograph of the site and surrounding properties.

2.3 *Site Development and Regulatory History*

The site was purchased by the USPS in the mid-1980's for redevelopment as a postal facility. Upon purchasing the site, the USPS conducted several stages of investigations to characterize the type, magnitude and extent of contamination and for geophysical soil testing for construction purposes. These investigations began in 1985 and continued until the facility was constructed in 1988. The site has been used continuously since construction was completed as the MPO for the City of Aurora.

The site was previously owned by BNSF (then known as Burlington Northern Railroad). The entire BNSF facility encompassed an estimated 45 to 50 acres of land from Indian Creek in the north to New York Street on the south and encompassing the existing BNSF tracks to the north and east to Wood Street. Please refer to the aerial photograph included as **Figure 7, Appendix A** of this report.

The BNSF facility, when in operation, housed many operations including a large switching yard and round house and railcar and engine manufacturing, maintenance and repair operations. The southern portion of the site has been redeveloped as well and includes a transportation center (bus and train stations), a large parking area, a restaurant (in the restored roundhouse location) and hotels.

The BNSF facility was in operation for approximately 80 years until the property was sold in the mid-1980's. The USPS purchased the northern portion of the facility and the former operations in this portion of the site included the following:

- Brass finishing shop;
- Blacksmith and machine shop;
- Wood machine shop;
- Lumber shed;

- Boiler building;
- Welding shop;
- Wheel shop;
- Coke/coal storage building; and
- Oil tank of unknown size or content.

The BNSF facility was involved in an assessment under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and corrective action activities at the time the site was purchased by the USPS. The USPS and its contractors, Wight and Company, Inc. ("Wight", project architect) and Warzyn Environmental, Inc. ("Warzyn", environmental consultant) became involved with the United States Environmental Protection Agency ("USEPA") and Illinois Environmental Protection Agency ("Illinois EPA") regarding the assessment and corrective action of the site during the construction of the facility.

2.3.1 Summary of CERCLA Assessment and Corrective Actions

Site assessment activities were conducted prior to the development of the site by the USPS from 1985 to 1987 in four separate phases of work. A total of 57 soil borings, 30 temporary ground water sumps, 8 ground water monitoring wells and 28 test pits were conducted at the site as part of these assessments. The purpose of the site assessment was to determine the physical properties of soil at the site for future construction activities, to determine the nature of the geology of the site and to evaluate any potential contamination present.

From these locations, a total of 14 soil samples and 9 ground water samples were obtained for laboratory analysis. The samples were analyzed for volatile organic compounds ("VOC's"), semi-volatile organic compounds ("SVOC's"), metals, petroleum hydrocarbons and polychlorinated biphenols ("PCB's"). The results of these analyses indicate that VOC contamination exists at low concentrations, including trichloroethane ("TCE") and total petroleum hydrocarbons. In addition to the above analysis, free phase petroleum-like product was observed in several of the test pits excavated as part of the site assessment.

The borings encountered bedrock at approximately 10 to 12 feet below ground surface. The materials above the bedrock were comprised of fill materials, sand, silty clay and clay. Ground water occurred above the interface of the bedrock and the sediments above.

According to the Illinois EPA (referenced in the PA Report dated November 17, 1988), 6,135 cubic yards of contaminated soil were disposed at the Settler's Hill Landfill in Batavia, Illinois in July 1987 and 405 cubic yards of contaminated soil was disposed in the same landfill in October 1987. The soil was disposed of as special waste and no records of any laboratory tests have been identified. A review of the Illinois EPA Non-Hazardous Waste Quarterly Report Forms indicates that a total of 10,318 cubic yards of soil waste was disposed in the Third Quarter of 1987 under the same Illinois EPA Site Number. It is inferred from these documents and from the various site reports that the referenced soil disposal originated from the

construction of the MPO, the VMF and the retention pond. Please refer to **Figure 3, Appendix A** of this report for a depiction of these three major areas of soil excavation.

The Illinois EPA, acting under the authority of the USEPA Region V, conducted a CERCLA Preliminary Assessment ("PA") in 1988. The Executive Summary in the PA stated that the site was given a high priority status and recommended immediate site inspection. According to the PA, visual inspections of the site were conducted by the Illinois EPA on July 16, 1986 and on November 17, 1988. Upon completion of the PA Report, the Illinois EPA applied the Hazard Ranking System ("HRS") to the site. In a report dated November 18, 1988, the preliminary HRS score was 26.17 and the projected HRS score was 40.19.

The documents listed below were reviewed in order to develop the site history outlined above. The documents were obtained via various Freedom of Information Act ("FOIA") requests issued to the Illinois EPA and the USEPA and are listed in chronological order:

TABLE 2-1: References Cited for Previous CERCLA Work

REF. NO.	DOCUMENT	DATE	AUTHOR	RECEIVER	COMMENT
1	Report of Site Exploration	12/12/85	Testing Service Corporation ("TSC")	Wight and Co	Geotechnical testing
2	Letter Report, Soil Contamination Investigation ("SCI")	6/17/86	Warzyn, Inc	Wight	22 soil borings in the area of the Brass Finishing Shop
3	Meeting between USPS and IEPA	7/16/86	Wight and Co	Meeting attendees	IEPA concern possible GW contamination
4	SCI, Phase II	7/30/86	Warzyn	Wight	Free product observed
5	Correspondence	8/26/86	Illinois Environmental Protection Agency ("IEPA")	Wight	IEPA response to 6/86 report, requests full delineation
6	Report of ground water ("GW") results from BNSF MW#3	9/9/86	BNSF	IEPA	
7	Correspondence	9/22/86	Wight	IEPA	Additional investigation proposal
8	SCI, Phase III	April, 1987	Warzyn	Wight	5 soil borings and 8 MW's
9	SCI, Phase IV	May, 1987	Warzyn	Wight	28 test pits
10	Memo	6/1/87	Harza Env Inc	IEPA	IEPA contractor for Phase III report rev.
11	Letter Report	6/10/87	TSC	Wight	Geotech for retention pond
12	Correspondence	6/29/87	Warzyn	IEPA	Tables and figures
13	Correspondence	7/10/87	IEPA	USPS	IEPA reiterates its stance of complete site delineation and

					remediation
14	Waste Disposal Manifests	9/87 and 10/87	USPS	IEPA	10, 316 yd^3 of soil disposed
REF. NO.	**DOCUMENT**	**DATE**	**AUTHOR**	**RECEIVER**	**COMMENT**
15	CERCLA PA Report	11/17/88	IEPA	USEPA	Issues high priority status
16	USEPA/IEPA HRS System Prelim/Proj Score Form	11/18/88	IEPA	USEPA	Prelim. Score = 26.17 Proj score = 40.19
17	Federal Sites Docket	12/29/00	USEPA	NA	Copy of docket w/ Aurora MPO
18	E-mail	4/20/01	USEPA	USPS	USEPA request for information under CERCLA
19	Conversation record	7/26/01	DEI	NA	Phone call with Laura Ripley of USEPA which requires SI

These documents are included as reference for USEPA file review and retrieval and copies can be provided upon request.

2.3.2 Leaking Underground Storage Tank Incident

In 1999, a release was identified from the underground storage tank ("UST") system present at the site. On January 27, 1999 one 12,000-gallon gasoline UST, one 1,000-gallon new oil UST and one 2,000-gallon used oil UST and all dispensers and ancillary piping were removed from the VMF portion of the site by R. Carlson & Sons, Inc. of Mokena, Illinois. Evidence of a petroleum release was identified during the removal activities and a release incident was reported to the Illinois Emergency Management Agency ("IEMA"). The release was reported to the Illinois EPA Leaking Underground Storage Tank ("LUST") program and incident number 990183 was assigned to the site.

The following documents associated with this LUST incident were reviewed:

TABLE 2-2: References Cited for LUST Work

DOCUMENT	DATE	AUTHOR	RECEIVER	COMMENT
20-day Report	1/29/99	USPS	IEPA	Notification of release
45-day Report	3/11/99	Roy F Weston, Inc	IEPA	Details of UST removal, release and immediate corrective actions
Letter	3/31/99	IEPA	USPS	45-day receipt letter, full review
Site Characterization Work Plan	3/1/00	Weston	IEPA	Method 2, one physical soil class Well to be installed
Site Characterization Completion Report (SCCR)	9/18/00	Weston	IEPA	Requesting NFR status be assigned to site due to lack of exceedence of Remediation Objectives, lack of groundwater and clay soil

DOCUMENT	DATE	AUTHOR	RECEIVER	COMMENT
Memo	10/20/00	IEPA	Internal	Internal review memo; denial of SCCR request pending submittal of property declaration form and soil analytical results
Letter	11/1/00	IEPA	USPS	SCCR denial based on above
Letter	11/9/00	Weston	IEPA	Denial response with declaration form; soil analytical submitted as part of 45-day report
Memo	11/28/00	IEPA	Internal	Internal review memo, recommends approval of NFR
Letter	12/6/00	IEPA	USPS	NFR approval letter
Letter	3/26/01	IEPA	USPS	Request for copy of NFR letter certified by County Recorder
Letter	4/6/01	USPS	IEPA	Copy of NFR letter certified by Kane County Recorder of Deeds

The documents listed are incorporated by reference only; copies of these documents can be provided to the USEPA upon request

As outlined in the documents above, the LUST incident in question has an NFR letter from the Illinois EPA LUST program recorded to the deed of the property. Some soil contamination was identified during the tank removal including polynuclear aromatic hydrocarbons ("PAH's") and metals. There were no exceedences of the Remediation Objectives ("RO's") as outlined in Title 35, Illinois Administrative Code ("IAC"), Part 742, *Tiered Approach to Corrective Action Objectives* ("TACO"). Additionally, the soil analyses indicated that no VOC's or PCB's are present above the method detection limit ("MDL") for the analyses conducted.

Ground water was sampled and indicated that no contamination exists at the site above the TACO RO's for any chemical tested. The following SW-846 test methods were conducted on the soil (7 samples) and ground water (1 sample). Extraction methods listed were for soil samples only:

- Metals: Methods 3051/6010 for totals, 3015/6010 for SPLP, 7471A for mercury and 9045A for pH;
- PCB: Method 8081;
- PAH: Method 8270C; and
- VOC: Method 8260B.

2.3.3 NPDES Permit

A permit was issued under the National Pollutant Discharge Elimination System ("NPDES") beginning in 1994 and continuing to the present. This permit is for the surface water runoff from the site. The permit number is ILR003478 and is incorporated by reference. A copy can be provided to the USEPA upon request.

2.3.4 RCRA Small Quantity Generator Permit

The FOIA requests submitted for the site indicate that it is a conditionally exempt small quantity generator ("CESQG") under the Resource Conservation and Recovery Act ("RCRA"). The generator status was renewed in 1998 according to the FOIA materials received. The Generator ID number is 0894075888 and the USEPA ID number indicated on the 1998 permit renewal form is ILR000030692. A correspondence dated November 5, 1996 from the USPS to the Illinois EPA, including a Notification of Regulated Waste Activity Form, states that the "facility is currently managing its waste at quantities below the Conditionally Exempt Small Quantity Generator Status" but that the facility would like to manifest all waste shipments. According to the USPS, EPA Form 8700-12, "RCRA Subtitle C Site Identification Form" was submitted to the Illinois EPA providing notice that the facilities hazardous waste generator status is CESQG.

3.0 SITE CONTAMINANTS-OF-CONCERN

Since extensive assessment was previously conducted at the site, the contaminants-of-concern ("COC's") had been previously identified in the soil and ground water. Based upon the previous assessment, the following table lists the COC's for the site.

TABLE 3-1: COC Identified in Previous CERCLA Work

CHEMICAL	LOCATION ID	MATRIX	DATE	LEVEL[1]	REF. NO.
2-butanone	OW-8	GW[2]	Dec-86	6	8
2-methylnaphthalene	B-5	S[3]	Dec-86	3700	8
4,6 trinitro-2-methylphenol	OW-5	GW	Dec-86	3	8
Acenaphthylene	B-5	S	Dec-86	6300	8
Anthracene	B-5	S	Dec-86	16000	8
Benzene	OW-5	GW	Dec-86	0 4	8
	B-10	S	May-86	0 16	2
Benzo(a)anthracene	B-5	S	Dec-86	37,000	8
	OW-1	S	Dec-86	140.0	8
Benzo(b)-fluroanthene	B-5	S	Dec-86	23,000	8
	OW-1	S	Dec-86	120 0	8
	B-5	S	Dec-86	23,000	8
	OW-1	S	Dec-86	120.0	8
Benzo[g,h,i]perylene	B-5	S	Dec-86	13,000	8
Bezno(a)pyrene	B-5	S	Dec-86	26,000	8
Bis(2-ethylhexyl)phthalate	OW-5	GW	Dec-86	5 0	8
	OW-7	GW	Dec-86	12 0	8
Chrysene	B-5	S	Dec-86	24,000	8
	OW-1	S	Dec-86	120 0	8
Dibenzo(a,h)-anthracene	B-5	S	Dec-86	5,000	8
Dibenzofuran	B-5	S	Dec-86	4,200	8
diethylphthalate	OW-5	GW	Dec-86	1 0	8
Di-n-butyl phthalate	OW-5	GW	Dec-86	1 0	8
	B-2	S	Dec-86	1,400	8
	B-21	S	May-86	2,600	2
	B-5	S	Dec-86	1,900	8
	OW-1	S	Dec-86	2,300	8
	OW-1	S	Dec-86	1,300	8
Di-n-octyl phthalate	B-10	S	May-86	2,600	2
Ethylbenzene	OW-5	GW	Dec-86	1 0	8
Fluoranthene	B-2	S	Dec-86	33 0	8
	B-5	S	Dec-86	8,400	8
	OW-1	S	Dec-86	22.0	8
	OW-1	S	Dec-86	290 0	8
Fluorene	B-5	S	Dec-86	7,200	8

CHEMICAL	LOCATION ID	MATRIX	DATE	LEVEL[1]	REF. NO.
Indeno(1,2,3-cd)-pyrene	B-5	S	Dec-86	15,000	8
Naphthalene	B-5	S	Dec-86	3,800	8
Phenanthrene	B-15	S	May-86	850 0	2
	B-2	S	Dec-86	73 0	8
	B-5	S	Dec-86	61,000	8
	OW-1	S	Dec-86	200 0	8
Pyrene	B-15	S	May-86	1,100	2
	B-2	S	Dec-86	25 0	8
	B-21	S	May-86	880.0	2
	B-5	S	Dec-86	46,000	8
	OW-1	S	Dec-86	16 0	8
	OW-1	S	Dec-86	230 0	8
Trans-1,2dichloroethene	OW-7	GW	Dec-86	51 0	8
	OW-8	GW	Dec-86	2.0	8
Trichloroethene	OW-3	GW	Dec-86	2.0	8
	OW-7	GW	Dec-86	33.0	8
	OW-8	GW	Dec-86	16 0	8

Notes

1 – Units in mg/kg for soil and mg/l for water
2 – GW = Ground water
3 – S = Soil

The RCRA priority pollutant metals were also tested in the soil and ground water. Some metals occurred at levels above applicable standards. It is uncertain whether or not the levels present are above the statistical background levels present in the area.

Based upon the previously collected analytical data, the chemical groups represented by the COC's listed above are VOC's, SVOC's and metals. This was used as the basis for the analysis procedures outlined in the approved Site Inspection Work Plan ("SIWP").

4.0 SUMMARY OF INVESTIGATION

Field work was conducted at the site on July 14, 2006 and on July 17, 2006 to complete the tasks outlined in the approved work plan dated May 26, 2006. Approval of this work plan was granted by USEPA Region V Project Manager Michael Chrystof in an e-mail dated July 14, 2006. All borings were advanced using a Geoprobe® 6610DT machine. This is a self-propelled, tracked unit which advances probes via a pneumatic hammer. All borings were advanced in this manner. When the monitoring well locations were determined, the 6610DT was fitted with a hollow stem auger attachment and the boring location was over-drilled to construct 2-inch diameter monitoring wells.

4.1 Project QA/QC Methods and Protocols

All work conducted at the site conformed with the protocols and methodologies outlined in the approved SIWP. Copies of Deuchler Environmental, Inc. ("DEI") Standard Operating Procedures for soil and ground water investigations are included in **Appendix F** of this report.

All soil/sediment and ground/surface water samples obtained from the investigation were analyzed by First Environmental Laboratories, Inc. ("First") located at 1600 Shore Road, Naperville, Illinois. This laboratory is accredited (Accreditation #100292) through both the Illinois Environmental Laboratory Accreditation Program ("IL ELAC") and the USEPA National Environmental Laboratory Accreditation Conference ("NELAC"). Their certificate number is 001532: April 26, 2006 through February 28, 2007. A copy of the laboratory QA/QC protocols is included in **Appendix G** of this report for reference.

4.2 Summary of Work Performed

The following work was conducted at the site:

- Advancement of 13 soil borings (designated SB-1 through SB-13) at various locations across the site. Each of the borings were advanced until bedrock was encountered;

- Conversion of three of the borings to permanent, 2-inch diameter PVC monitoring wells. The designations and soil boring locations of the monitoring wells are MW-1/SB-5, MW-2/SB-2 and MW-3/SB-9;

- Collection of three sediment samples directly from Indian Creek, which is located directly adjacent to the northern property boundary of the site; and

- Collection of three surface water samples from Indian Creek.

Additionally, all borings and monitoring wells were surveyed to calculate their vertical and

horizontal position. The survey was conducted using GPS technology with accuracies of 3-inches in the horizontal plane and 0.01-inch in the vertical plane. The ground surface horizontal coordinates and elevation were obtained from each boring location. At the three monitoring well locations, the top of the PVC casing elevation was recorded, in addition to the horizontal coordinates and ground surface elevation.

4.3 *Work Plan Deviations*

Due to conditions present at the site, certain deviations from the work plan were made. These deviations did not impact the validity of the investigation nor prevent the investigation from meeting its stated objectives. There were no deviations from the QA/QC protocols or investigation methodologies. The work plan deviations are described in detail below.

4.3.1 Relocation of MW-2/SB-2

The monitoring well/boring location MW-2/SB-2 was moved from the area indicated on **Figure 4** in the SIWP to the location depicted on **Figure 3** of this report. The reason for this modification was due to the steep slope that exists in the originally proposed area. The slope of the ground from the grassy area to the sidewalk was too great for the 6610DT to properly operate. Therefore, due to the proximity of underground utilities near the sidewalk area, the location of MW-2/SB-2 was moved to a midpoint in the asphalt parking lot area for the USPS facility.

The purpose of MW-2/SB-2 is to be a downgradient monitoring/sampling control point for the site. Its relocation still serves this purpose and is considered to be a valid and proper location for the monitoring well/soil boring.

4.3.2 Monitoring Well Construction at the SB-3 and SB-4 Locations

The SIWP originally proposed monitoring wells to be constructed at the SB-3 and SB-4 boring locations. In conducting both of these borings, ground water was not encountered. Therefore monitoring wells could not be constructed in those locations. Consideration was given to constructing a monitoring well east of the retaining wall that exists at the site, within the asphalt parking area on the north side of the USPS building. However, existence of underground utilities (electric, gas, sewer and water lines) precluded drilling in this area.

4.3.3 Relocation of MW-1

The SIWP originally called for a monitoring well (MW-1) to be constructed at the SB-1 boring location. However, ground water was not encountered at this location, so a monitoring well could not be constructed. When advancing soil boring SB-5, which is located directly to the south of SB-1, ground water was encountered in sufficient quantities to justify the construction of a monitoring well. The purpose of MW-1 was to serve as an upgradient

monitoring/sampling control point at the site, and construction of a monitoring well at the SB-5 location adequately meets this purpose.

4.3.4 Addition of MW-3 at the SB-9 Location

In order to minimally characterize the hydrogeology of the site, a third monitoring well needed to be constructed since the monitoring wells proposed for the SB-3 and SB-4 locations could not be constructed. During advancement of SB-9, obvious signs (visual staining and hydrocarbon odor) of contamination were identified. Considering this fact, a monitoring well was constructed at this location. The rationale behind this decision was to quantify potential ground water contamination at this location and to provide monitoring/sampling control at a location that would either be laterally gradient and/or downgradient of the suspected sources of contamination at the site.

4.3.5 Addition of SB-13

Operating under the assumption that the soil and ground water at the MW-3/SB-9 location would be contaminated to some degree, a control point between this location and Indian Creek was thought to be necessary. Since monitoring wells were not constructed at the SB-3 and SB-4 locations, construction of an additional boring and monitoring well at this point is within the scope of the SIWP.

Considering the configuration of the former welding shop, and also considering the proximity of surface water retention area and the BNSF access road, the location chosen to construct the boring/monitoring well was within the fenced area of the retention pond, on the north side, within the former welding shop location. Three attempts were made to advance the boring to bedrock in an area yielding ground water. Each boring was advanced to bedrock, with none of them yielding any ground water. A decision was made to collect a soil sample from the last boring location for laboratory analysis. A fourth attempt was made to advance a boring that would encounter ground water outside of the fenced area of the retention pond, adjacent to the BNSF access road approximately 20 feet from Indian Creek to no avail.

4.3.6 Indian Creek Sediment Samples

The approved SIWP indicated that Indian Creek sediment samples from the SED-2 and SED-3 locations would be obtained through vertical borings conducted directly adjacent to the creek, with the samples obtained from the depth interval equivalent to the elevation of the creek bed. This proposal was made because at the time that the SIWP was drafted, Indian Creek was at very high flow and due to the characteristics of the large cobbles in the creek bed. At the time the field work for this investigation was conducted however, the flow of Indian Creek was greatly reduced which allowed field personnel to move the large cobbles in order to obtain representative sediment samples directly from the creek bed. Therefore, the creek sediment samples were obtained directly from the creek channel.

5.0 CONTAMINANT ANALYSIS RESULTS

As part of the site investigation, soil and ground water samples were obtained from various locations and sediment and surface water samples were obtained from Indian Creek. Soil and ground water contamination was identified during previous investigations conducted at the site. The purpose of this investigation was to confirm the status of this contamination and to determine if site contamination poses a risk to human health and the environment.

There are two factors that will be evaluated in this report. First, it will be determined whether or not previous site activities have caused contamination above the method detection limits ("MDL's") for the laboratory analysis procedures conducted. Second, those samples which exhibit exceedence of the MDL will be compared to existing State of Illinois remediation objectives ("RO's") to determine the potential risk posed by that contamination to potentially effected populations.

5.1 Laboratory Analysis Methods

The laboratory analysis methods applied to the samples collected at the site were chosen to encompass the COC's outlined in the approved SIWP. All samples were forwarded to First Environmental Laboratories, Inc. (Naperville, Illinois) for analysis under strict chain-of-custody protocols. A copy of the laboratory QA/QC procedures is included in **Appendix G** of this report.

5.1.1 Soil and Sediment Analysis Methods

The following analysis methods were conducted on the soil and creek bed sediment samples collected at the site:

- VOC's: Method 5035/8260B;
- PAH's and SVOC's: Method 5035/8270C;
- Total Metals (18): Method 3050B/6010B;
- Mercury: Method 7470A;
- Cyanide: Method 9010B/9014; and
- pH: 9045C.

5.1.2 Ground and Surface Water Analysis Methods

The following analysis methods were conducted on the ground and surface water samples collected at the site:

- VOC's: Method 5030B/8260B;
- PAH's and SVOC's: Method 3510C/8270C;

- Total Metals: Method 3010A/6010B;
- Mercury: Method 7470A;
- Cyanide: Method 9010B/9014; and
- pH: 9045C.

5.2 *Soil and Sediment Analysis Results*

Contamination of the soil was identified in some of the samples obtained from the borings at the site including VOC's, SVOC's and metals. None of the sediment samples obtained from Indian Creek exhibited contamination in excess of the MDL's for VOC's and SVOC's. Metals were identified in all soil and sediment samples obtained at the site. Since metals are naturally occurring in soil and sediment, their detection above the MDL's is not unusual.

5.2.1 Soil and Sediment Constituents Identified Above Laboratory MDL's

The following table outlines the chemical constituents were identified in the soil and sediment samples obtained at the site:

Table 5-1: Soil and Sediment MDL Exceedences

CHEMICAL	CLASS	BORING ID	DEPTH (ft. bgs)	MDL (mg/kg)	LEVEL IDENTIFIED (mg/kg)
2-Butanone	VOC	SB-9	8-10	0.010	0.0136
		SB-11	4-8	0.010	0.0113
Ethylbenzene	VOC	SB-11	4-8	0.005	0.0083
Acenaphthene	SVOC	SB-9	8-10	0.330	0.744
		SB-11	4-8	0.330	6.250
Anthracene	SVOC	SB-9	8-10	0.330	1.040
		SB-11	4-8	0.330	21 400
Benzo(a)anthracene	SVOC	SB-11	4-8	0 330	13.900
Benzo(k)fluoranthene	SVOC	SB-11	4-8	0 330	2.280
Benzo(g,h,i)perylene	SVOC	SB-11	4-8	0.330	4.520
Benzo(a)pyrene	SVOC	SB-6	2-4	0 090	0.209
	SVOC	SB-8	4-8	0.090	0.119
	SVOC	SB-11	4-8	0 090	8 53
	SVOC	SB-13	0-4	0.090	0.162
Chrysene	SVOC	SB-6	2-4	0.330	0 679
	SVOC	SB-9	8-10	0.330	0.427
	SVOC	SB-11	4-8	0.330	30.800

CHEMICAL	CLASS	BORING ID	DEPTH (ft. bgs)	MDL (mg/kg)	LEVEL IDENTIFIED (mg/kg)
Chrysene (continued)	SVOC	SB-12	4-8	0.330	0.587
	SVOC	SB-13	0-4	0.330	0.525
Dibenzofuran	SVOC	SB-11	4-8	0.330	3.830
Fluoranthene	SVOC	SB-6	2-4	0 330	0.529
		SB-8	4-8	0.330	0.419
		SB-11	4-8	0.330	5.890
Fluorene	SVOC	SB-9	8-10	0 330	0.722
		SB-11	4-8	0.330	11.900
2-methylnaphthalene	SVOC	SB-11	4-8	0.330	62.300
Naphthalene	SVOC	SB-11	4-8	0.330	5 860
Phenanthrene	SVOC	SB-6	2-4	0.330	0.692
	SVOC	SB-8	4-8	0.330	0.434
	SVOC	SB-9	8-10	0.330	3.730
	SVOC	SB-11	4-8	0.330	108.00
	SVOC	SB-13	0-4	0.330	0.617
Pyrene	SVOC	SB-6	2-4	0.330	0.448
	SVOC	SB-9	8-10	0 330	0.988
	SVOC	SB-11	4-8	0 330	59.30
	SVOC	SB-12	4-8	0.330	0.420

5.2.2 Soil and Sediment Contamination Above RO's

A certain number of the soil samples exhibited exceedences of State of Illinois RO's. The RO's used for comparison are found in Title 35 of the Illinois Administrative Code ("IAC"), Subtitle G, Part 742, *"Tiered Approach to Corrective Action Objectives"* ("TACO"). The RO's established in TACO are part of a risk-based approach to site assessment and remediation. They are health based and use the toxicity and exposure values outlined by the federal risk-based corrective action guidelines. Other RO's can be applied to the site at a later date should the USEPA wish.

Of the constituents outlined in Table 5.1 above, a certain number exceed at least one TACO RO. Those contaminants are listed in the following table:

Table 5-2: Soil and Sediment RO Exceedences

CHEMICAL	CLASS	BORING ID	DEPTH (ft. bgs)	LOWEST RO (mg/kg)	LEVEL IDENTIFIED (mg/kg)
Benzo(a)anthracene	SVOC	SB-11	4-8	0.090	13 90
Benzo(a)pyrene	SVOC	SB-6	2-4	0.090	0 209
	SVOC	SB-8	4-8	0 090	0 119
	SVOC	SB-11	4-8	0.090	8.53
	SVOC	SB-13	0-4	0 090	0 162
Naphthalene	SVOC	SB-11	4-8	1.80	5.860
Arsenic	Metal	SB-6	2-4	13.0	43.10
	Metal	SB-8	4-8	13.0	44.40
	Metal	SB-9	8-10	13 0	39.30
	Metal	SB-13	0-4	13.0	31 80
Lead	Metal	SB-9	8-10	400.0	411.0
	Metal	SB-12	4-8	400.0	2,630.0

The were no RO exceedences for VOC's, SVOC's or metals in any of the Indian Creek sediment samples obtained. There were no RO exceedences for VOC's in any of the soil samples obtained.

The area of soil contamination is depicted on **Figure 6, Appendix A**. This area corresponds with the areas of the site that were not excavated as part of the site remediation and facility construction conducted in 1987 and 1988. Additionally, this area corresponds directly with the following former BNSF buildings that are suspected sources of site contamination:

POTENTIAL SOURCE	BORINGS	DEPTH (ft. bgs)	COC > MDL ONLY	COC > RO
Former Boiler Building	SB-12	4-8	pyrene	lead
Lumber Shop	SB-8	4-8	fluoranthene, phenanthrene	benzo(a)pyrene, arsenic
Welding Shop	SB-9	8-10	2-butanone, anthracene, chrysene, fluorene, phenanthrene, pyrene	arsenic, lead
	SB-13	0-4	chrysene, phenanthrene	lead
Coke/coal Storage Building	SB-6	2-4	chrysene, fluoranthene, phenanthrene, pyrene	arsenic
Former Oil Tank	SB-11	4-8	2-butanone, ethylbenzene, acenaphthalene, anthracene, benzo(a)anthracene, Benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzofuran, fluoranthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, pyrene	benzo(a)anthracene, benzo(a)pyrene, naphthalene

Due to the fact that the total lead result from SB-12 was an order of magnitude higher than the lead results in the other soil borings, the laboratory was contacted and instructed to conduct a Toxicity Characteristic Leaching Procedure ("TCLP", USEPA Method 1311) on the sample. The result of this test was 0.003 mg/l (MDL was 0.002 mg/l). This level is below the State of Illinois limit for hazardous waste lead (5.0 mg/l).

5.3 Ground and Surface Water Analysis Results

The following subsections discuss the MDL and RO exceedences identified in the water samples obtained at the site.

5.3.1 Ground and Surface Water Constituents Identified Above Laboratory MDL's

The following table outlines the chemical constituents were identified in the soil and sediment samples obtained at the site:

Table 5-3: Ground and Surface Water MDL Exceedences

CHEMICAL	CLASS	MW ID	MDL (mg/l)	LEVEL IDENTIFIED (mg/l)
Benzo(a)anthracene	SVOC	MW-3	0.00013	0.00068
Fluorene	SVOC	MW-3	0.002	0.004
Phenanthrene	SVOC	MW-3	0.005	0.012
Pyrene	SVOC	MW-3	0.002	0.004
Arsenic	Metal	MW-3	0.002	0.030
		SW-3	0.002	0.048
Beryllium	Metal	MW-1	0.001	0.002
		SW-3	0.001	0.003
Cadmium	Metal	MW-1	0.001	0.002
		SW-3	0.001	0.002
Chromium, total	Metal	MW-1	0.001	0.002
		MW-2	0.001	0.004
		SW-3	0.001	0.059
Copper	Metal	MW-1	0.650	0.062
		MW-2	0 650	0.016
		MW-3	0.650	0.008
		SW-1	0.650	0 003
		SW-3	0 650	0 105
Lead	Metal	MW-1	0.002	0.004

CHEMICAL	CLASS	MW ID	MDL (mg/l)	LEVEL IDENTIFIED (mg/l)
Lead (continued)		MW-2	0 002	0.016
		MW-3	0 002	0.010
		SW-1	0.002	0 003
		SW-3	0 002	0.122
Nickel	Metal	MW-1	0 001	0.091
		MW-2	0.001	0 014
		MW-3	0 001	0.006
		SW-1	0.001	0.002
		SW-2	0.001	0.002
		SW-3	0 001	0.099
Zinc	Metal	MW-1	0 005	0.046
		MW-2	0.005	0 025
		MW-3	0.005	0 010
		SW-1	0 005	0.022
		SW-2	0.005	0 009
		SW-3	0 005	0 758

None of the ground or surface water samples collected at the site exceeded the MDL for any of the VOC's tested. Additionally, no SVOC's exceeded the MDL's for any of the surface water samples collected.

5.3.2 Ground and Surface Water Contamination Above RO's

A certain number of the ground water samples exhibited exceedences of State of Illinois RO's. The RO's used for comparison are found in 35 IAC 620, *"Ground Water Quality"*. The RO's established in 620 are health and risk based standards applied to different classifications of ground water in the state. There are two primary use classifications for ground water in the State of Illinois and are designated Class 1 and Class 2 ground water. Classes 3 and 4 are special use classifications which would not be applicable to the ground water at this site. Generally speaking, Class 1 ground water is high yield, good quality ground water that either is used, or could be used for potable municipal, industrial or private purposes. Class 1 ground water has more stringent protection and more stringent RO's than Class 2 ground water. Class 2 is ground water that does not meet the regulatory definition of Class 1, 3, or 4 ground water.

Of the constituents outlined in Table 5.3 above, a certain number exceed at least one TACO RO. Those contaminants are listed in the following table:

Table 5-4: Ground and Surface Water RO Exceedences

CHEMICAL	CLASS	MW ID	CLASS 1 RO (mg/l)	CLASS 2 RO (mg/l)	LEVEL IDENTIFIED (mg/l)
Benzo(a)anthracene	SVOC	MW-3	0.00013	0.00065	0.00068
Lead	Metal	MW-2	0.0075	0.100	0.016
		MW-3	0 0075	0.100	0 010

The ground water at the site does not meet the regulatory definition of Class 1, 3 or 4 ground water. Therefore, the ground water would be Class 2. Given this, the only RO exceedence of the Class 2 RO is for Benzo(a)anthracene in MW-3. All other water samples (ground and surface) are below all applicable State of Illinois RO's.

It should be noted that surface water standards are established on a case-by-case basis in the State of Illinois. In all cases, the surface water standards are higher than the ground water standards. All surface water samples obtained at the site are below the ground water RO's and therefore, would likely be below any standard established for the surface water in Indian Creek associated with this site.

5.4 Summary of Investigation Results

The soil and ground water contamination appears to be limited to the site. There is no impact to the sediment or surface water within Indian Creek. Some metals in the downgradient surface water sample (SW-3) are elevated, but do not exceed the Class 1 ground water standards, which would be more stringent than any surface water and/or surface water/ground water interface standards that would be established for the site. Comparison of the surface water samples to ground water standards is done only for initial review purposes, and should not be construed to be a regulatory criterion to be met.

6.0 SITE AND AREA GEOLOGY AND HYDROGEOLOGY

Information was collected from published literature, local water well logs and historical boring logs to assess the geology in the vicinity of the site. The nature of the site geology (e.g., consistency, continuity, depth of units, thickness, conductivity, etc.) is a key factor in establishing contaminant fate and transport characteristics and therefore risk associated with contamination in the subsurface.

6.1 Area Geology

The Illinois State Geological Survey ("ISGS") Circular 460, titled *"Surficial Geology of the Chicago Region"* (H. B. Hillman and J. A. Lineback, 1970) was reviewed for information pertaining to the general surficial geology of the area. According to the ISGS Circular 460, the property is situated in the Cahokia Alluvium System. This system generally consists of deposits in floodplains and channels of modern rivers and streams. These deposits consist of mostly poorly sorted silt and sand containing local deposits of sandy gravel, and in many places overlies relatively well sorted glacial outwash of the Henry Formation.

Below the Cahokia Alluvium System in the area, bedrock is typically encountered within 10 to 20 feet of the ground surface. According to the ISGS *Handbook of Illinois Stratigraphy* (H.B. Willman et. al., 1975), the surface of the bedrock under the site is comprised of the Silurian System starting with portions of the Alexandrian Series. The Silurian System in this area tends to be comprised of undifferentiated Joliet-Kankakee, Elwood and Wilhelmi Formations. These formations are all comprised of fine-grained sedimentary rocks including shale, dolomite and chert. The Wilhelmi Formation is often absent in the transition to the Ordovician Maquoketa Group. These formations are fine-grained dolomite and dolomitic shale and may have relatively large nodules of chert present.

Underlying the Silurian System in the area of the site is the Ordovician System starting with the Maquoketa Group. According to ISGS Circular 547, titled *"Facies Analysis of the Ordovician Maquoketa Group and Adjacent Strata in Kane County, Northeastern Illinois"* (Anne M. Graese, 1991) the Maquoketa Group consists of olive-gray and greenish gray shale with interbedded dolomite and limestone.

The remaining portions of the Ordovician System generally present in this area are the Galena and Platteville Groups (fine to medium grained dolomite, with some limestone and chert with interbedded shale at its base) followed by the Glenwood Formation (interbedded shale and dolomite) and the Ancell Group primarily comprised of the St. Peter Formation (sandstone). The Ordovician System is underlain by the Cambrian and Precambrian Systems. The stratigraphy of the area is summarized in the table below:

TABLE 6-1: Area Geology

SYSTEM	GROUP	FORMATION	SEDIMENT/ROCK TYPE	AVERAGE THICKNESS (feet)	COMMENT
Quarternary		Cahokia Alluvium	Fine grained sand and silts, some Gravel	5 - 10	Depositional materials from the modern Fox River and Indian Creek
Silurian – Niagran Series		Joliet Kankakee Elwood Wilhelmi	Fine grained dolomite transitioning to dolomitic shale with some chert	100 to 120	Tends to be undifferentiated in this area with the Wilhelmi thin or absent
Ordovician	Maquoketa		Shale, interbedded with dolomite and limestone	150	
	Galena		Dolomite	330 - 375	Tends to be undifferentiated, active subterranean mine 3 mi north of site
	Platteville		Dolomite		
	Ancell	Glenwood	Poorly sorted sandstone, shaley dolomite and shale	50	
		St. Peter	Sandstone	250	Class I aquifer
Cambrian		Eminence	Dolomite, Dolomitic Sandstone	< 50	
		Potosi	Dolomite	< 100	
		Franconia	Dolomite, Dolomitic Sandstone	100	
		Ironton-Galesville	Sandstone	100 to 150	Class I aquifer
		Eau Claire	Dolomite, Dol Sandstone, Shale	400 +	
		Mt Simon	Sandstone	2500	Class I aquifer
Precambrian					

Most of the potable wells in the area produce water from either the St. Peter Formation or the Mt. Simon Formation.

6.2 *Site Geology and Hydrogeology*

Please refer to **Appendix C** of this report for all soil boring logs and monitoring well construction details.

The soil borings and monitoring wells that were constructed as part of this investigation indicate that the Silurian dolomite bedrock was encountered at depths ranging from 4.5 to 15 feet bgs. The bedrock was typical of the Niagran Series dolomites in the area and was fine-grained, brown dolomite. The bedrock was cherty in the area of SB-1, SB-5 and SB-13.

The materials encountered above the bedrock across the site can be characterized in three different categories as described below.

6.2.1 Fill Material

Fill material was placed at the site to varying depths by human activities and cannot be characterized as native materials. The fill material to a depth of approximately 2 to 3 feet bgs in areas of asphalt cover is characterized as medium sand base material. In other areas of the site the fill material to this depth is a loamy soil in nature. Other areas of fill materials were identified ranging from 2 to 7.5 feet bgs of varying composition. These fill materials included a loose sandy to silty clay matrix with various debris including brick fragments, glass, wood, combusted materials and plant materials. This type of fill was identified in borings SB-2, SB-3, SB-6, SB-9 and SB-10.

At boring SB-11 the entire section to bedrock (7.5 feet bgs) was an oily, black sand fill material with a petroleum odor. It is suspected that the fill material in this boring represents the sand backfill around the former tank. Additionally, a very thin (less than 1-inch) seam of black combusted material was identified in SB-13.

6.2.2 Silty Clay

A layer of brown to gray silty clay was identified in all borings conducted at the site except for SB-3, SB-7 and SB-11. This clay layer ranged in depth from 2 to 12 feet bgs and varied from dry (stiff) to moist (plastic). The bottom portion of this stratum is characterized by being brown in color, more moist than above and a higher content of sand.

6.2.3 Sandy Clay

In all boring locations except for SB-1, SB-3, SB-4, SB-8 and SB-13 a brown, plastic sandy clay layer was present. This stratum is characterized by a relatively high content of fine, brown sand that was wet in every boring location encountered. This stratum lies directly over bedrock, with the bedrock acting as a confining layer causing it to become saturated.

6.2.4 Ground Water Occurrence

Ground water was present in boring locations SB-2, SB-5, SB-6 through SB-9 and in SB-12. This corresponded directly with the presence of the sandy clay layer described above. Monitoring wells were installed in SB-5 (MW-1), SB-2 (MW-2) and SB-9 (MW-3). The depth to ground

water in the borings ranged from 7 feet bgs in SB-2 to 10.5 feet bgs in SB-9. The depth to water and corresponding ground water elevations were as follows:

- MW-1/SB-5: 6.82 feet bgs and 638.02 feet above mean sea level;
- MW-2/SB-2: 13.00 feet bgs and 632.60 feet; and
- MW-3/SB-9: 7.72 feet bgs and 636.62 feet.

The data indicate that the ground water flow direction at the site is to the west-southwest toward the Fox River and the average hydraulic gradient at the site is **0.0074 ft/ft**. Please refer to **Figure 4, Appendix A** for the ground water elevations and flow map.

7.0 POTENTIAL RECEPTOR AND EXPOSURE PATHWAY SUMMARY

The exposure to contaminants is the result of potential dermal contact, ingestion or inhalation of the contaminated media of concern via various exposure pathways. In order to identify the potential risk, these exposure pathways should be evaluated. At this site, the media of concern are the soil and ground water present, as well as the sediment and surface water of Indian Creek adjacent to the site. This section discusses the pathways of potential public exposure to any contamination that may be present in the media of concern at the site.

7.1 Soil Ingestion/Inhalation Pathway

The physical conditions present at the site demonstrate that direct contact to contaminated soil is not occurring at the site. The site is covered by clean landscaped areas, asphalt, concrete and buildings. Additionally, three large areas of contaminated soil were excavated in the mid-1980's as part of the remediation of the site and construction of the USPS facilities. The area of soil contamination depicted on **Figure 6, Appendix A** is covered by asphalt and concrete and partially encompassed by the surface water retention area.

The potentially effected population at the site includes the public using the postal facility and a total of 250 employees who work at the facility. Any contaminated soil which previously existed beneath the occupied MPO and VMF buildings was excavated prior to their construction.

By comparing the soil contamination levels to the State of Illinois TACO RO's, the potential risk to the potentially effected population can be evaluated. The following provides a summary of the RO exceedences of the soil samples collected at the site:

- Benzo(a)anthracene: The residential ingestion RO of 0.900 mg/kg and the commercial/industrial ingestion RO of 8.0 mg/kg were exceeded in SB-11 (level detected 13.90 mg/kg);

- Benzo(a)pyrene: The residential ingestion RO of 0.090 mg/kg was exceeded in SB-6 (level detected 0.209 mg/kg), SB-8 (level detected 0.119 mg/kg) and in SB-11 (level detected 8.53 mg/kg) and the commercial/industrial ingestion RO of 0.80 mg/kg was exceeded in SB-11 (level detected 8.53 mg/kg);

- Naphthalene: The construction worker inhalation RO of 1.80 mg/kg was exceeded in SB-11 (level detected 5.86 mg/kg);

- Arsenic: The residential and commercial/industrial ingestion RO of 13.0 mg/kg was exceeded in SB-6 (level detected 43.1 mg/kg), SB-8 (level detected 44.4 mg/kg), SB-9 (level detected 39.3 mg/kg) and SB-13 (level detected 31.8 mg/kg); and

- Lead: The residential, commercial/industrial and construction worker ingestion RO of 400.0 mg/kg was exceeded in SB-9 (level detected 411.0 mg/kg) and SB-12 (level detected 2,630.0 mg/kg)

7.2 *Ground Water Pathway*

The site is not located within any type of public or private well setback zone or recharge area. The City of Aurora obtains drinking water from the Fox River and, in times of high demand, a network of deep municipal wells. The municipal wells all draw water from the Mt. Simon Formation, greater than 2,000 feet bgs.

A well survey was conducted to identify wells within a 5000 foot radius of the site. The well survey report is provided in **Appendix H** of this report. Additionally, a map depicting the site, radius rings and wells is included as **Figure 8 in Appendix A** and a table summarizing the wells identified within the search radius is included as **Table 8 in Appendix B**.

This survey was conducted by reviewing data from the public well database from Illinois Environmental Protection Agency, the Illinois State Geological Survey, the Illinois State Water Survey, the Illinois Department of Public Health and the Kane County Health Department. The results of this survey indicate that there is one community water supply well within the search radius. It is a City of Aurora municipal well and is located hydrologically upgradient of the site, approximately 3700 feet to the east. The site is not located within the setback zone for this well nor is it located within a designated wellhead protection area. This well was constructed in 1924 and is listed to be 2260 feet deep and draws water from the Cambrian Mt. Simon Formation.

The well survey also indicates that approximately 14 private and/or industrial use wells exist within the search radius. The closest well is located hydrologically upgradient of the site, approximately 1,000 feet to the northeast.

By comparing the ground water contamination levels to the State of Illinois 35 IAC 620 standards, the potential risk to the potentially effected population can be evaluated. The following provides a summary of the standard exceedences of the ground water samples collected at the site:

- Benzo(a)anthracene: The Class 1 standard of 0.00013 mg/l and the Class 2 standard of 0.00065 were exceeded in MW-3 (level detected 0.00068 mg/l); and

- Lead: The Class 2 standard of 0.0075 mg/l was exceeded in MW-2 (level detected 0.016 mg/l) and in MW-3 (level detected 0.010 mg/l).

7.3 Surface Water Pathway

The Fox River is located topographically and hydraulically downgradient from the site, approximately 530 feet to the west. Portions of this river are used for potable water supplies, fishing and boating recreation. Indian Creek, which is a first order tributary to the Fox River, is located directly adjacent to the northern boundary of the site. This river is not used as a water supply or for recreational purposes. A review of the Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Map ("FIRM") indicates that a small portion of the site running along North Broadway Avenue lies within the 500-year flood plain of the Fox River/Indian Creek system. Please refer to **Figure 9, Appendix A** for a depiction of the flood plain designation for the site.

The City of Aurora obtains most of its potable water from the Fox River. The river intakes are located approximately 2 miles north of the site in the upgradient direction. The closest downgradient municipal water intakes are located greater than 5 miles away from the site.

The results of the sediment and surface water sampling conducted in Indian Creek indicate that the site is not significantly impacting this waterway. Based upon this, the site will have no impact on potentially effected populations for this pathway.

8.0 CONCLUSIONS

The data collected as part of this investigation indicate that the soil and ground water at the site have been impacted by VOC's, SVOC's and metals as a result of operations conducted by the previous property owner, Burlington Northern - Santa Fe Railroad. Sediment and surface water samples were obtained from Indian Creek (located directly adjacent to the site) with no discernable impact from the site identified. The results of the laboratory analysis from the soil and ground water samples were compared to State of Illinois remediation objectives. The result of this comparison is discussed in detail in **Section 5.0** of this report and summarized as follows below:

Soil Comparison to State of Illinois RO's:

CHEMICAL	CLASS	BORING ID	DEPTH (ft. bgs)	LOWEST RO (mg/kg)	LEVEL IDENTIFIED (mg/kg)
Benzo(a)anthracene	SVOC	SB-11	4-8	0.090	13.90
Benzo(a)pyrene	SVOC	SB-6	2-4	0 090	0 209
	SVOC	SB-8	4-8	0.090	0.119
	SVOC	SB-11	4-8	0.090	8.53
	SVOC	SB-13	0-4	0 090	0 162
Naphthalene	SVOC	SB-11	4-8	1 80	5.860
Arsenic	Metal	SB-6	2-4	13.0	43 10
	Metal	SB-8	4-8	13 0	44.40
	Metal	SB-9	8-10	13 0	39.30
	Metal	SB-13	0-4	13.0	31.80
Lead	Metal	SB-9	8-10	400 0	411.0
	Metal	SB-12	4-8	400 0	2,630 0

Ground Water Comparison to State of Illinois RO's:

CHEMICAL	CLASS	MW ID	CLASS 1 RO (mg/l)	CLASS 2 RO (mg/l)	LEVEL IDENTIFIED (mg/l)
Benzo(a)anthracene	SVOC	MW-3	0 00013	0 00065	0 00068
Lead	Metal	MW-2	0 0075	0 100	0.016
		MW-3	0 0075	0 100	0.010

The areas soil and ground water impact appear to be limited to the site and are covered by asphalt and concrete. The sediment and surface water of Indian Creek (located adjacent to the site) show elevated levels for metals in the downgradient sampling locations (as compared to the two upgradient sampling locations. These downgradient samples however are not impacted above levels at which standards would likely be applied to the site. Therefore, the area of exceedence of State of Illinois RO's does not appear to present a health risk to the potentially effected population (visitors and employees of the postal facility and nearby residences and businesses).

APPENDIX A - MAPS AND FIGURES

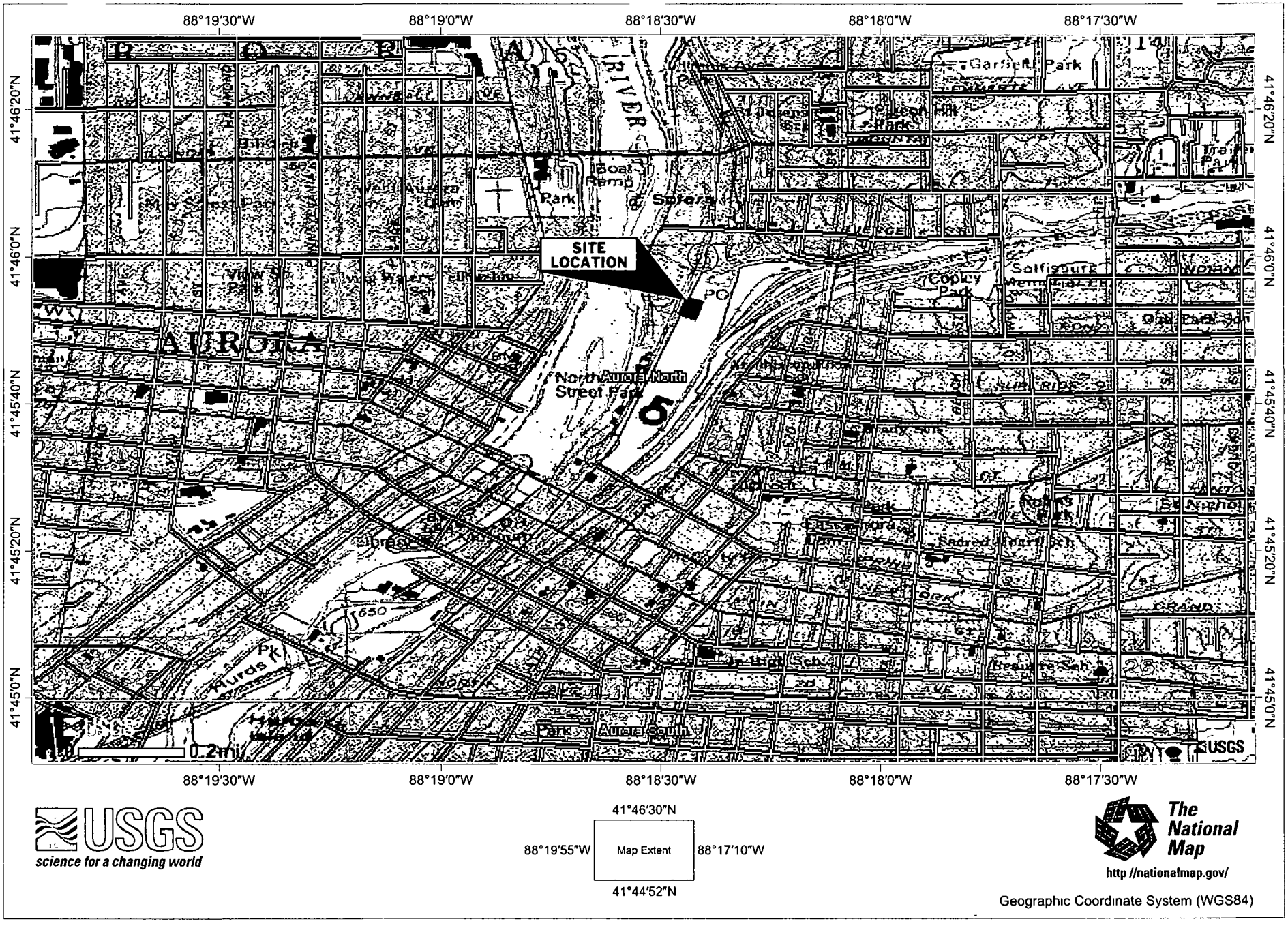


FIGURE 1: SITE LOCATION MAP

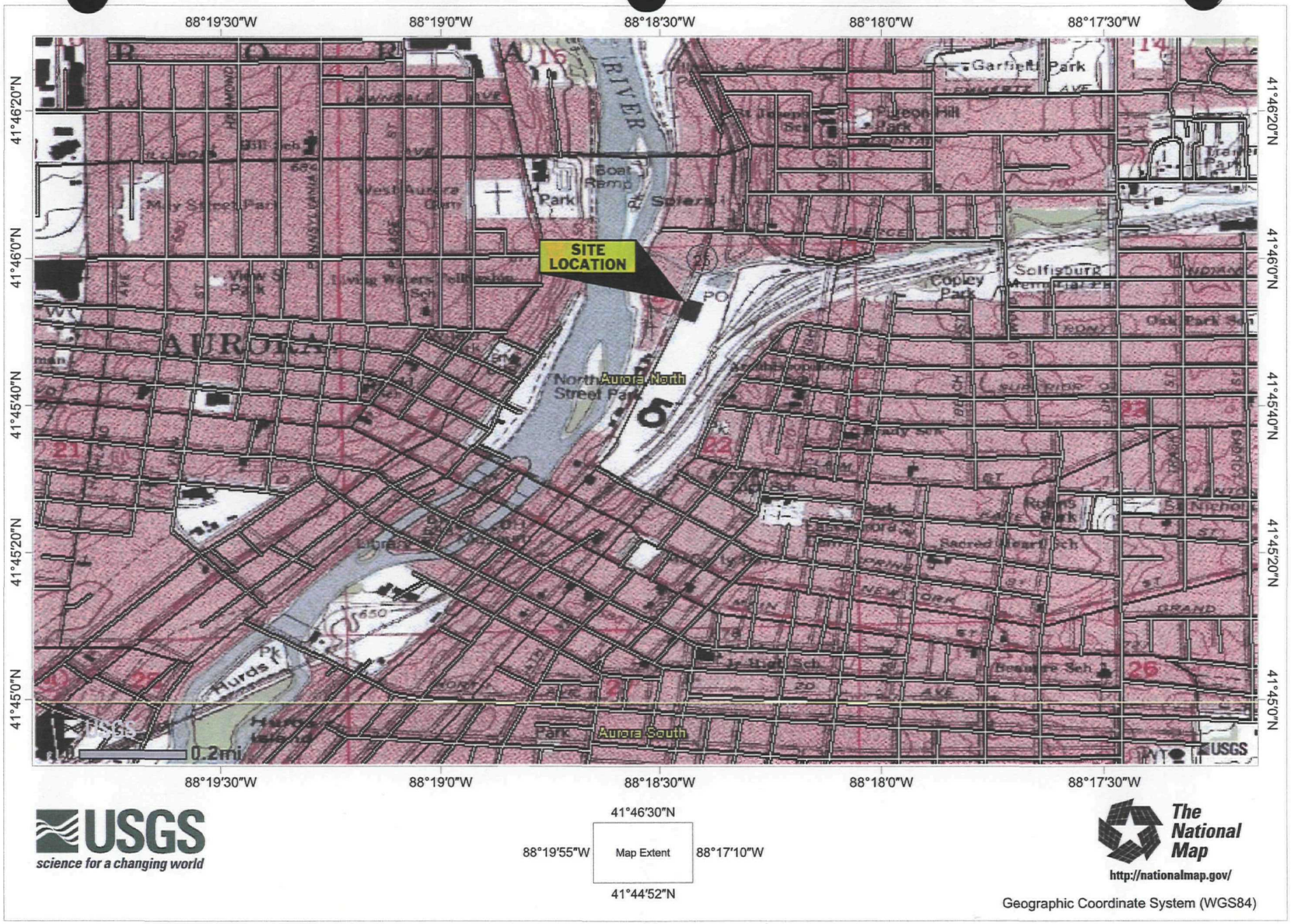
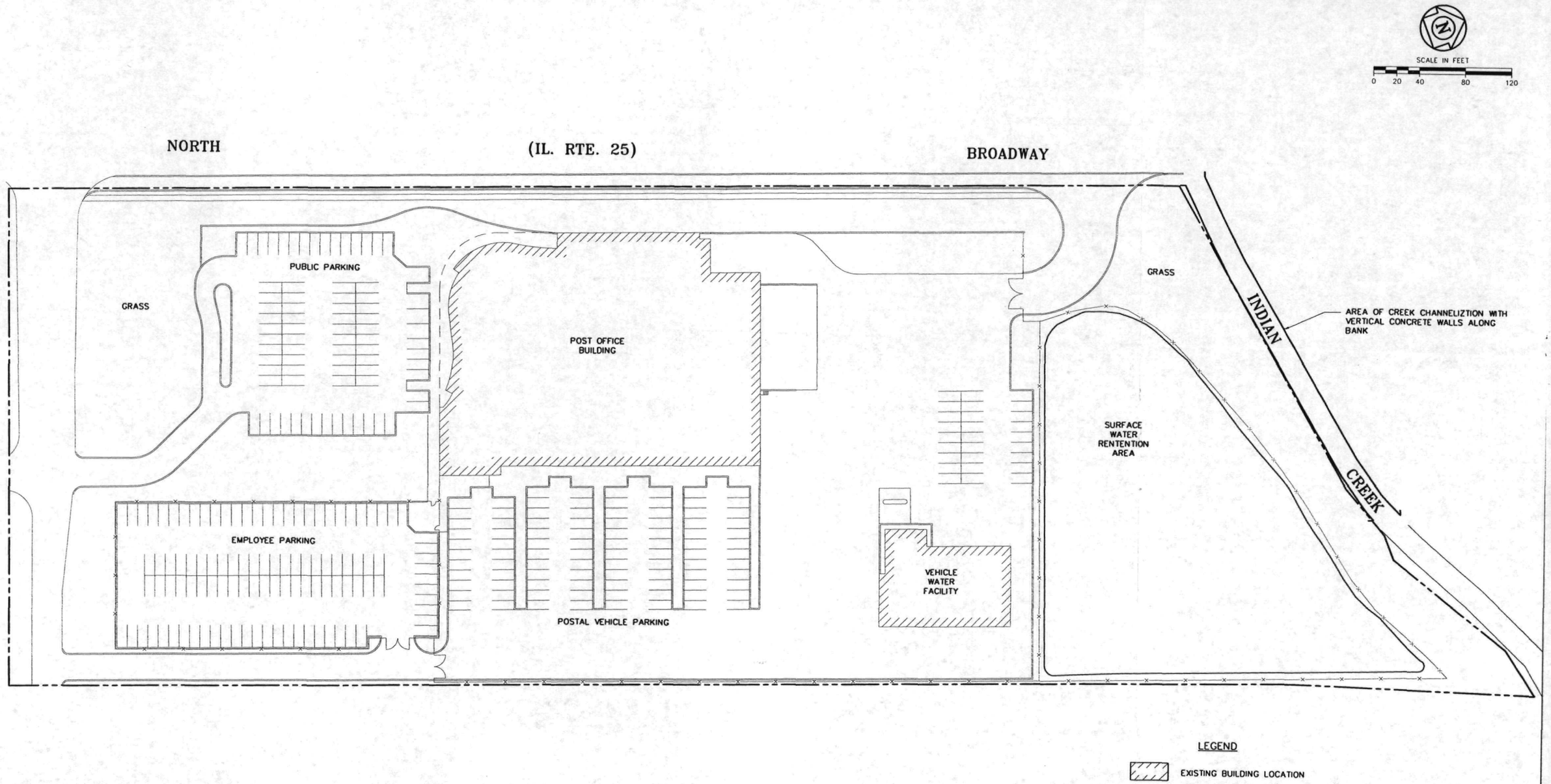


FIGURE 1: SITE LOCATION MAP



DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

REVISIONS REVISED FROM SIWP DATED 3/29/06

DEI #01031-03

DATE 7/21/06 | DESIGNED MF | DRAWN SAL | APPROVED PFM | BOOK | SCALE | CAD DWG. F:\DEI\05068\SIREP-FIG2 | JOB NO. 160/05068/00

FIGURE 2

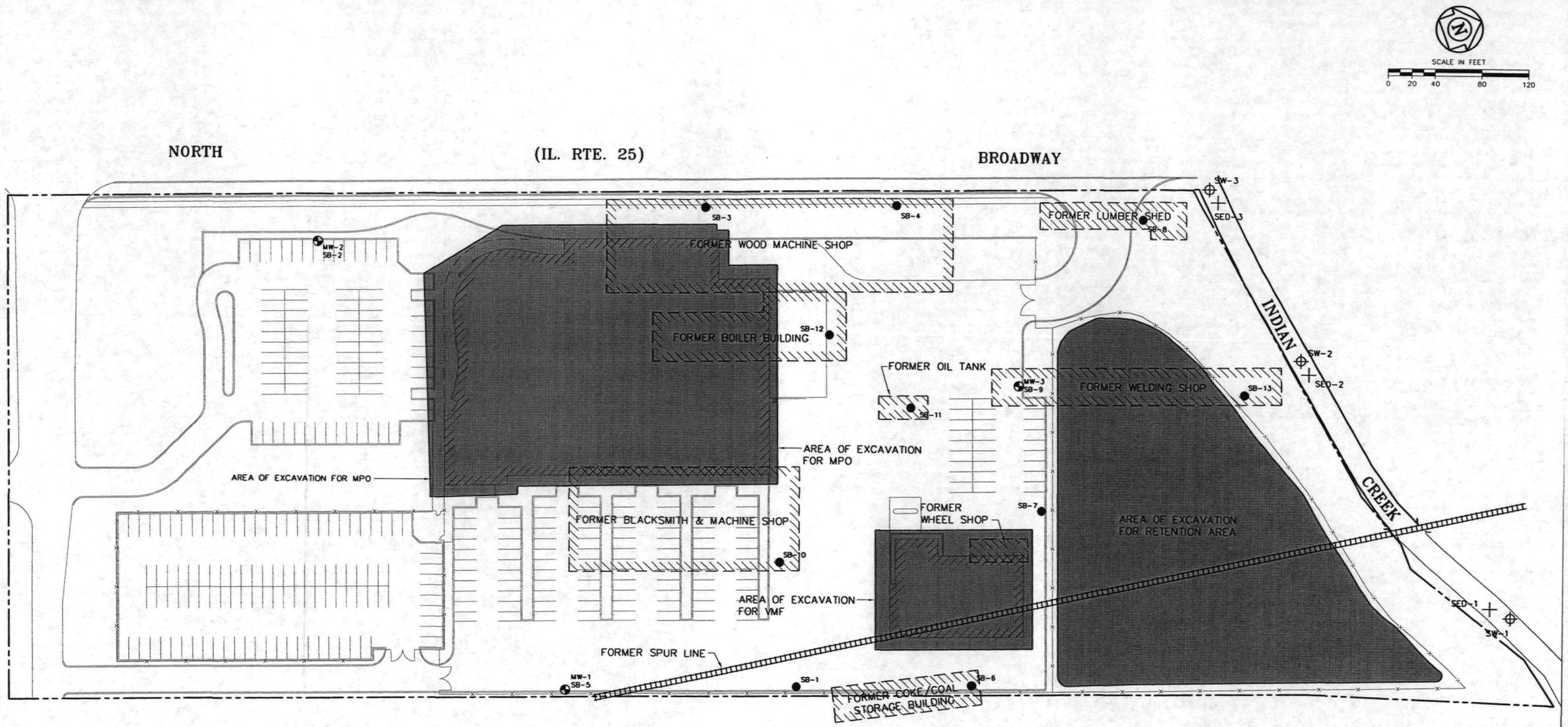
SITE BASE MAP

AURORA - MPO / VMF, 525 N. BROADWAY AVENUE

SHEET

OF

F:\DEI\05068\SIRE' wg, 8/9/2006 12:21:39 PM



LEGEND

- AREA OF PREVIOUS SOIL EXCAVATION
- EXISTING BUILDING LOCATION
- FORMER BUILDING LOCATION
- SB-8 SOIL BORING LOCATION
- MW-1 MONITORING WELL LOCATION
- SW-1 SURFACE WATER SAMPLING LOCATION
- SED-1 SEDIMENT WATER SAMPLING LOCATION

FIGURE 3

DEUCHLER ENVIRONMENTAL, INC.
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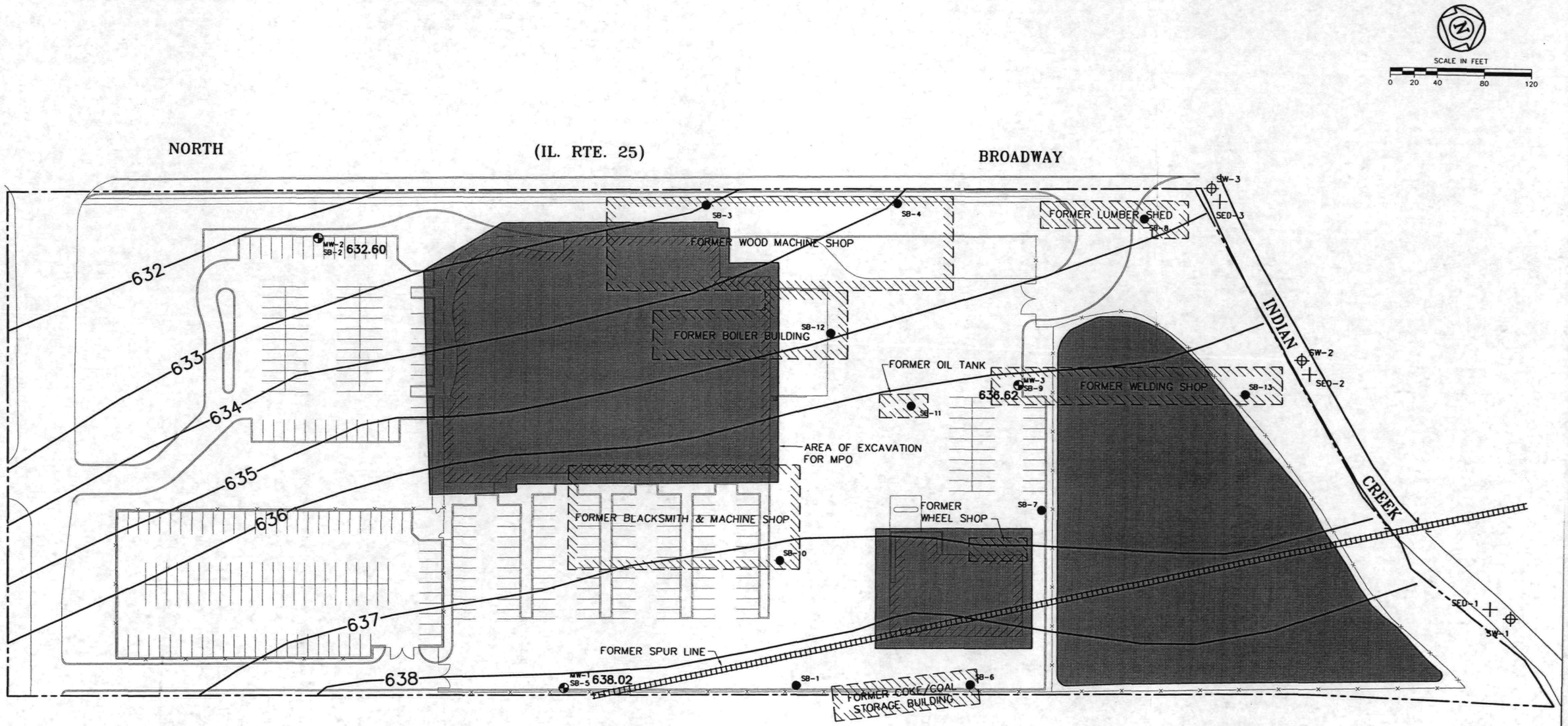
SITE MAP WITH BORING / MW LOCATIONS
AURORA - MPO / VMF, 525 N. BROADWAY AVENUE

SHEET
OF

F:\DEI\05068\SIREF 'wg, 8/9/2006 12:23:57 PM



LEGEND

- AREA OF PREVIOUS SOIL EXCAVATION
- EXISTING BUILDING LOCATION
- FORMER BUILDING LOCATION
- SB-8 SOIL BORING LOCATION
- MW-1 MONITORING WELL LOCATION
- SW-1 SURFACE WATER SAMPLING LOCATION
- SED-1 SEDIMENT WATER SAMPLING LOCATION

FIGURE 4

DEUCHLER ENVIRONMENTAL, INC.
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REVISIONS REVISED FROM SIWP DATED 3/29/06

DATE 7/21/06	DESIGNED MF	DRAWN SAL	APPROVED PFM	BOOK	SCALE	CAD DWG. F:\DEI\05068\SIREP-FIG4	JOB NO. 160/05068/00

DEI #01031-03

GW ELEVATION MAP

AURORA - MPO / VMF, 525 N. BROADWAY AVENUE

SHEET
OF

F:\DEI\05068\SIREF vg, 8/9/2006 12:26:57 PM

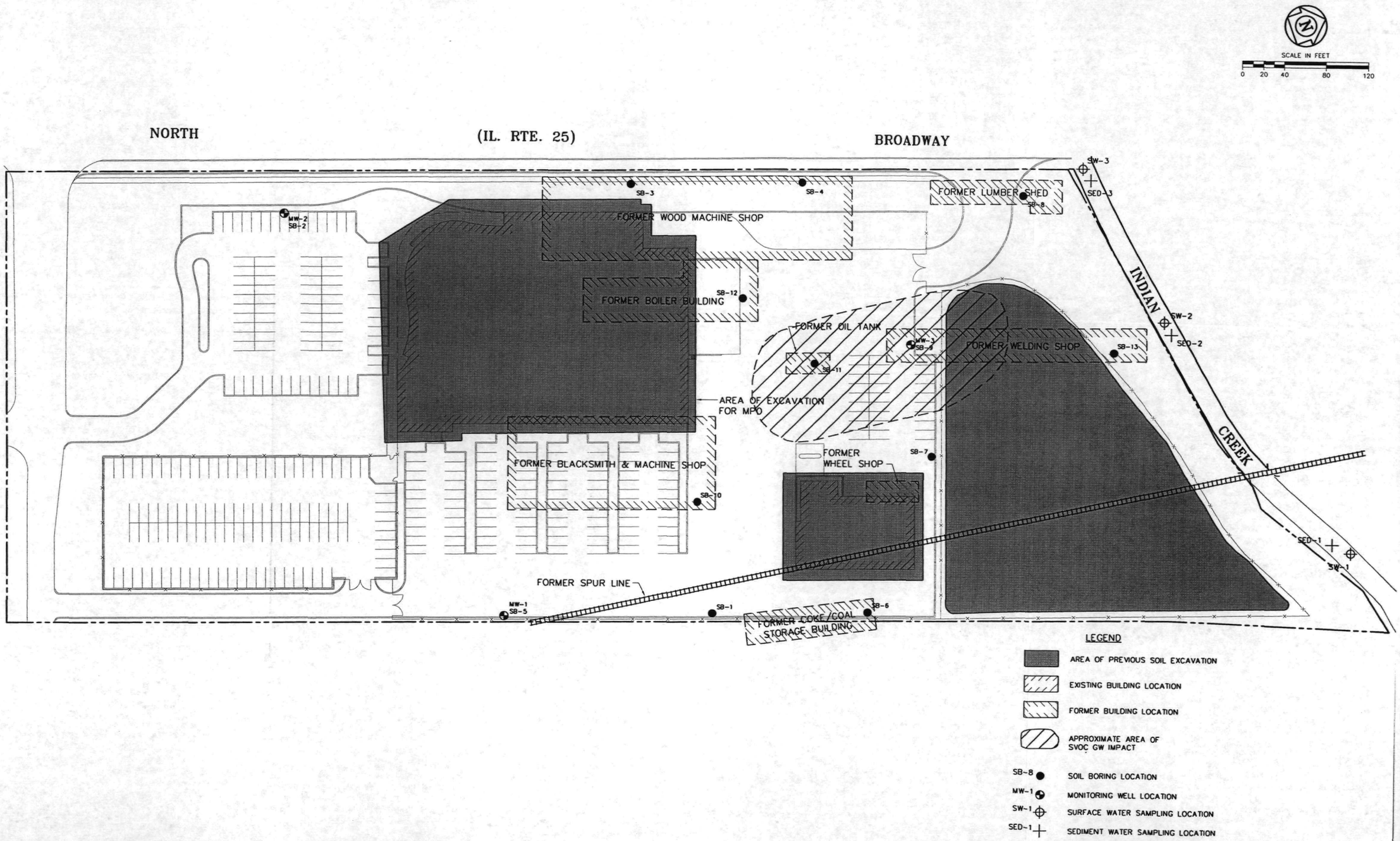


FIGURE 5

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

REVISIONS: REVISED FROM SIWP DATED 3/29/06

DEI #01031-03

DATE 7/21/06	DESIGNED MF	DRAWN SAL	APPROVED PFM	BOOK	SCALE	CAD DWG. F:\DEI\05068\SIREP-FIG5	JOB NO. 160/05068/00

GW CONTAMINATION MAP

AURORA - MPO / VMF, 525 N. BROADWAY AVENUE

SHEET
OF

F:\DEI\05068\SIRE' wg, 8/9/2006 12:27:38 PM

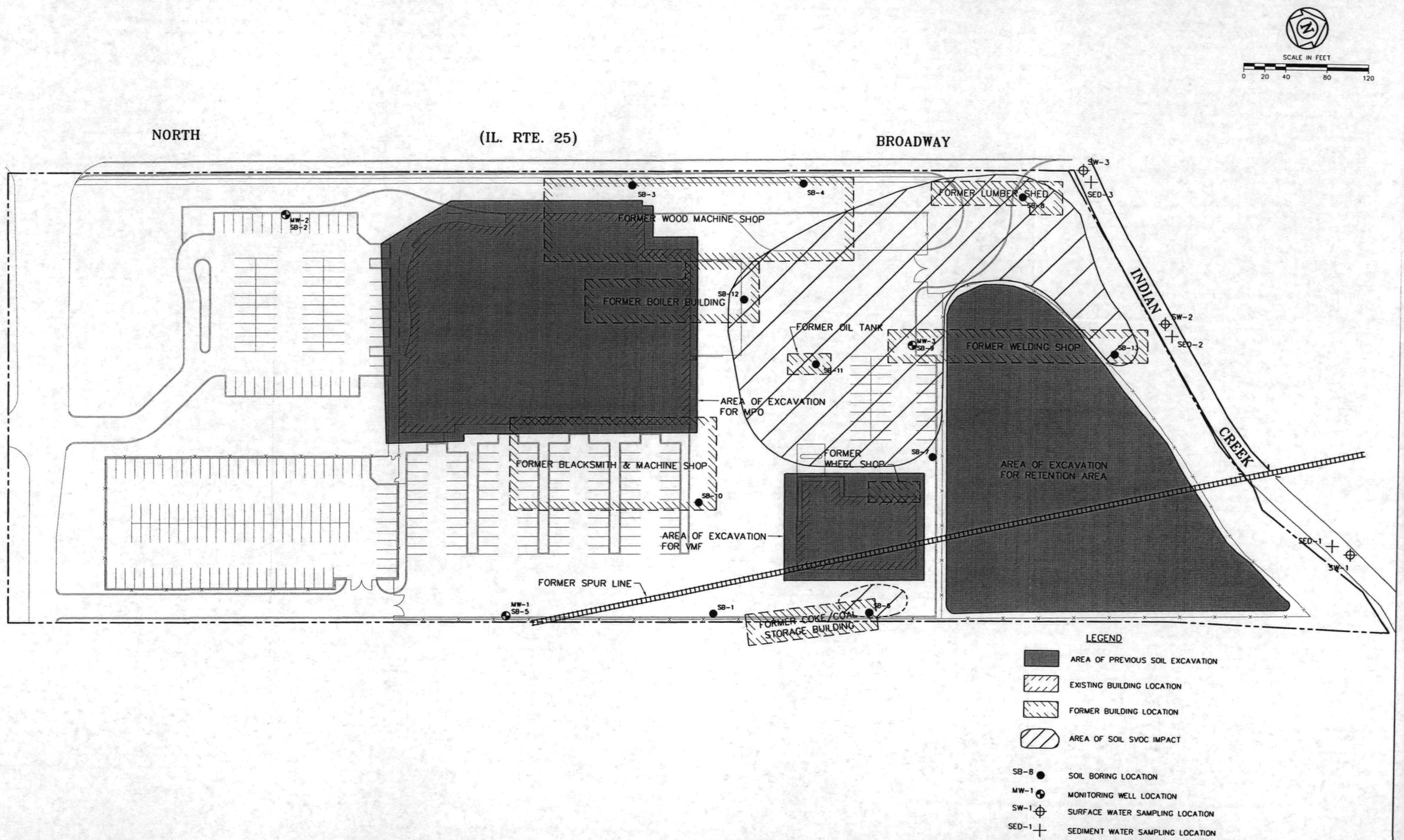


FIGURE 6

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

REVISIONS REVISED FROM SIWP DATED 3/29/06

© DATE 7/21/06 | DESIGNED MF | DRAWN SAL | APPROVED PFM | BOOK | SCALE | CAD DWG. F:\DEI\05068\SIREP-FIG6A | JOB NO. 160/05068/00 | DEI #01031-03

SOIL CONTAMINATION MAP

AURORA - MPO / VMF, 525 N. BROADWAY AVENUE

SHEET
OF

F:\DEI\05068\SIREP wg, 8/11/2006 11:46:21 AM

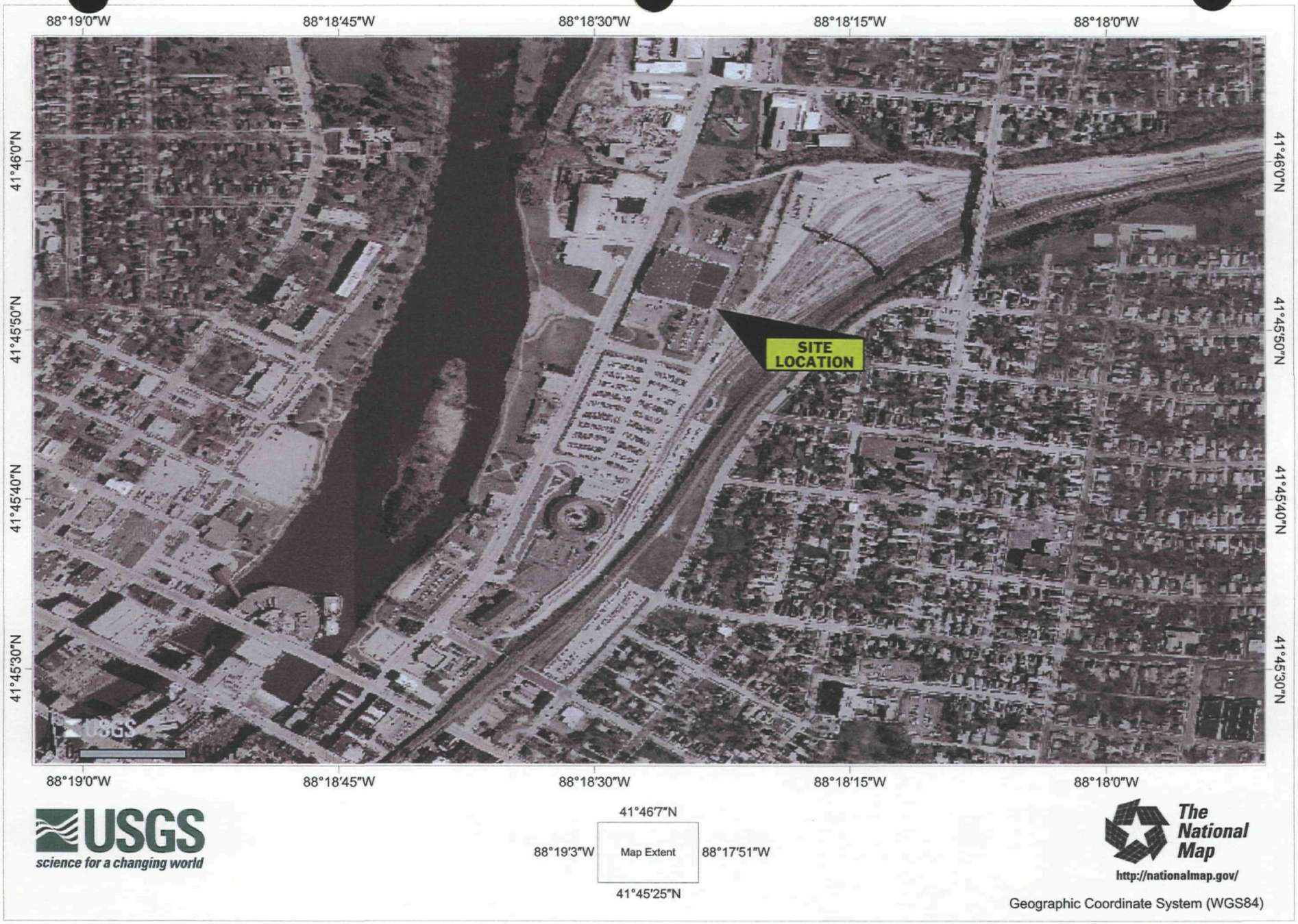
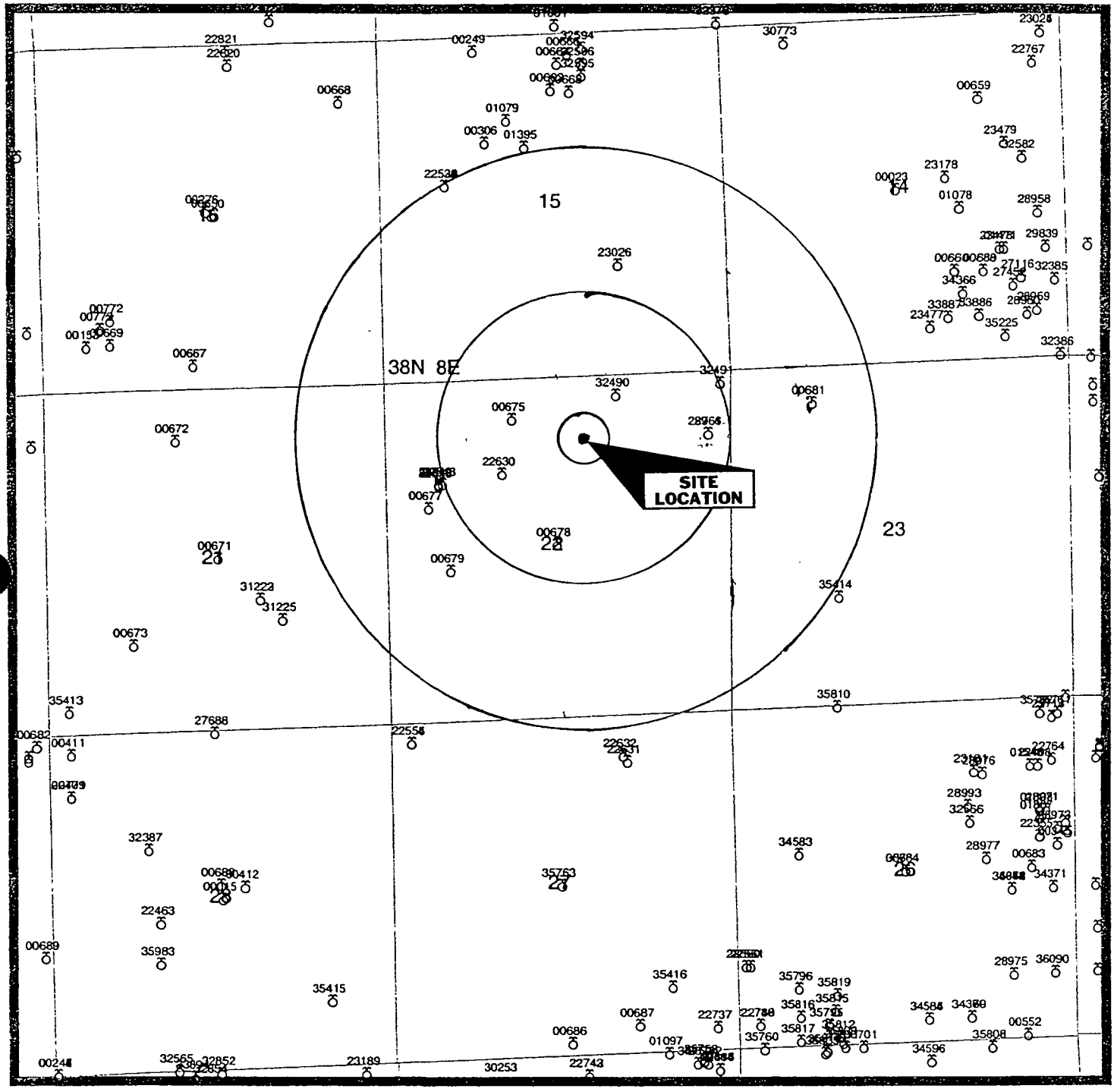


FIGURE 7: AERIAL PHOTOGRAPH OF SITE

FIGURE 8: WELL SURVEY MAP

Map Area: 38N-8E-29 m3 to 38N-8E-13 m3



Explanation

Oil	Gas Injection	Junked
Oil & Gas	Gas Storage	Temporarily Abandoned
Gas	Salt Water Disposal	Observation
D&A - Oil Show	Water Injection	Other Injection
D&A - Gas Show	Water Supply	Confidential
D&A - Oil & Gas Show	Permit	Other Well Type
D&A	Water	Status Unknown

/ through any symbol indicates well is currently plugged

N

0 2245 4490 ft

Illinois State Geological Survey

QuEStoR: Custom Map

Date: 14-AUG-06 Scale: 1:26940

Displayed data is based upon information supplied to the Illinois State Geological Survey (ISGS) and are not field verified. The ISGS does not guarantee the validity, accuracy or completeness of these data.

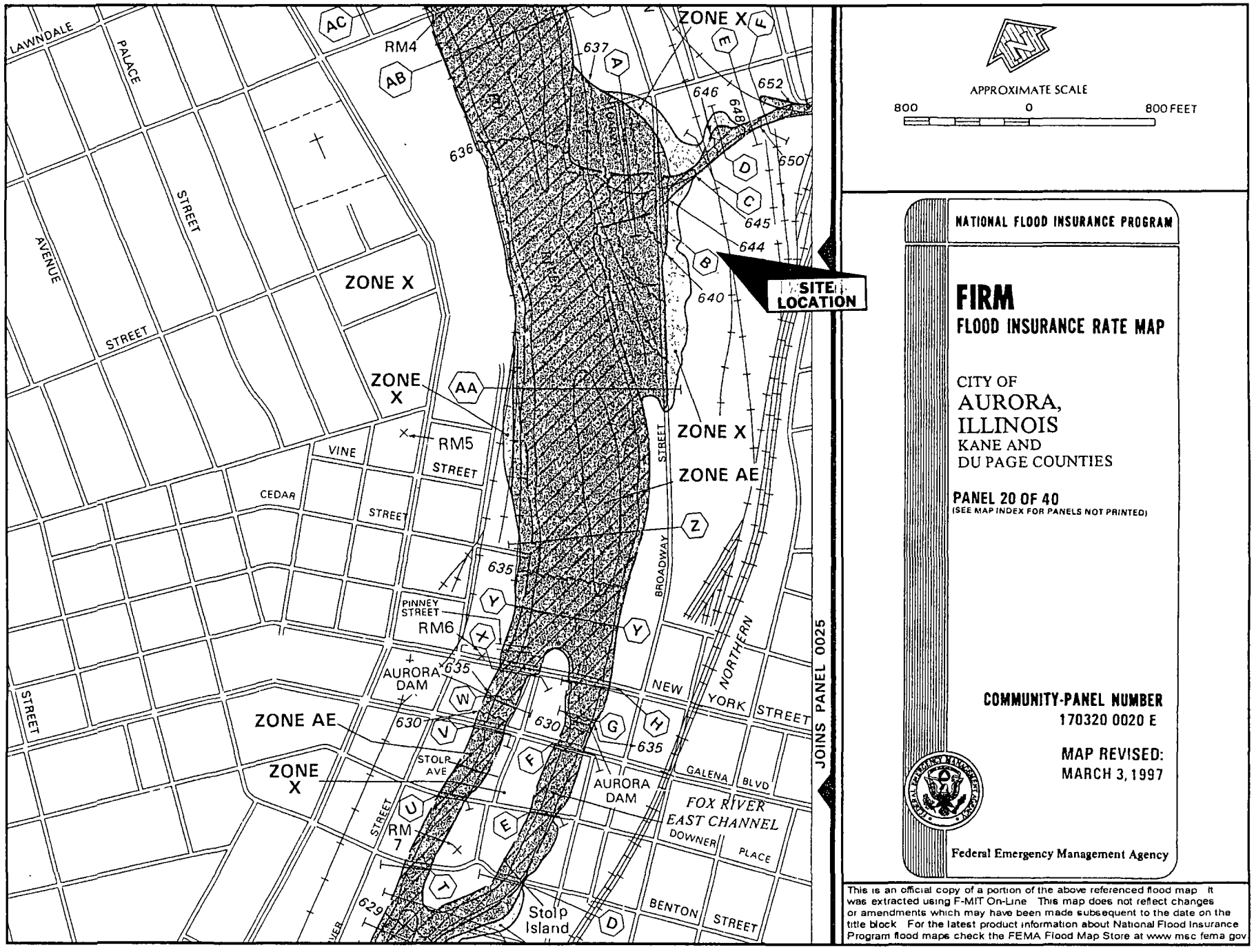


FIGURE 9: FLOOD PLAIN MAP

APPENDIX B – TABLES

SITE NAME:	USPS - Aurora MPO
ADDRESS:	525 N. Broadway, Aurora, Illinois
DEI PROJECT NUMBER:	DEI #01031-03
REGULATORY ID NUMBER:	LPC#0890050033, ILD981795453
REMEDIATION OBJECTIVE INPUT DATE:	July 24, 2006 by Marc Fisher

TABLE 1

SOIL VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N. Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH (ft bgs)	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone (MEK)	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-dichloroethene	trans-1,2-dichloroethene
SB-1	7/14/2006	2-4	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-2	7/14/2006	12-15	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-4	7/17/2006	4-7 5	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-5	7/14/2006	6-8	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-6	7/14/2006	2-4	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-7	7/14/2006	8-10	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-8	7/14/2006	4-8	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-9	7/14/2006	8-10	<0 010	<0 005	<0 005	<0 005	<0 010	0.0136	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-10	7/14/2006	4-8	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-11	7/14/2006	4-8	<0 010	<0 005	<0 005	<0 005	<0 010	0.0113	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-12	7/14/2006	4-8	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SB-13	7/17/2006	0-4	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SED-1	7/17/2006	Upgradient	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SED-2	7/17/2006	Midgradient	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SED-3	7/17/2006	Downgradient	<0 010	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 010	<0 005	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
TACO TIER 1 REMEDIATION OBJECTIVES	RESIDENTIAL	INGESTION	7,800	12	10	81	110	47,000	7,800	5	1,600	1,600	—	100	—	7,800	7	700	780	1,600
		INHALATION	100,000	0 80	3,000	53	10	14,000	720	0 30	130	1,300	—	0.30	—	1,300	0.40	1,500	1,200	3,100
	COMMERCIAL INDUSTRIAL	INGESTION	200,000	100	92	720	—	1,000,000	200,000	44	41,000	41,000	—	940	—	200,000	63	18,000	20,000	41,000
		INHALATION	100,000	1.60	3,000	100	—	22,000	720	0.64	210	1,300	—	0.54	—	1,700	0.70	1,500	1,200	3,100
	CONSTRUCTION WORKER	INGESTION	200,000	2,300	2,000	16,000	—	410,000	20,000	410	4,100	41,000	—	2,000	—	200,000	1,400	1,800	20,000	41,000
		INHALATION	100,000	2.20	3,000	140	—	140	9	0.90	1.30	1,300	—	0.76	—	130	0.99	300	1,200	3,100
	SOIL COMP. OF GW INGESTION[2]	CLASS 1	16	0 03	0.60	0.80	0.20	17	32	0.07	1.00	0.40	—	0.60	—	23	0.02	0.06	0.40	0.70
		CLASS 2	16	0 17	0.60	0.80	1.20	17	160	0.33	6.50	0.40	—	2.90	—	110	0.10	0.30	1.10	3.40

NOTES
1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620

Bold Indicates Residential Remediation Objective exceeded
Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
M = Migration to Ground Water Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per kilogram (mg/kg)
Analyzed using USEPA Method 5035A/8260B

TABLE 1 (continued)

SOIL VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH	1,2-dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene	2-Hexanone	4-methyl-2-pentanone	MTBE	Methylene chloride	Styrene	1,1,2,2- Tetrachloroethane	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	1,1,2-trichloroethane	Trichloroethene	Vinyl Acetate	Vinyl Chloride	Xylenes (Total)
SB-1	7/14/2006	2-4	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-2	7/14/2006	12-15	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-4	7/17/2006	4-7 5	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-5	7/14/2006	6-8	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-6	7/14/2006	2-4	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-7	7/14/2006	8-10	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-8	7/14/2006	4-8	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-9	7/14/2006	8-10	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-10	7/14/2006	4-8	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-11	7/14/2006	4-8	<0 005	<0 005	<0 005	0.0083	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-12	7/14/2006	4-8	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SB-13	7/17/2006	0-4	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SED-1	7/17/2006	Upgradient	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SED-2	7/17/2006	Midgradient	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
SED-3	7/17/2006	Downgradient	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 010	<0 005
TACO TIER 1 REMEDIATION OBJECTIVES	**RESIDENTIAL**	**INGESTION**	**9**	**6 40**	**6 40**	**7,800**	**—**	**—**	**780**	**85**	**16,000**	**—**	**12**	**16,000**	**—**	**310**	**58**	**78,000**	**0.46**	**160,000**
		INHALATION	**15**	**1.10**	**1.10**	**400**	**—**	**—**	**8,800**	**13**	**1,500**	**—**	**11**	**650**	**1,200**	**1,800**	**5**	**1,000**	**0.28**	**410**
	COMMERCIAL INDUSTRIAL	**INGESTION**	**84**	**57**	**57**	**200,000**	**—**	**—**	**20,000**	**760**	**410,000**	**—**	**110**	**410,000**	**—**	**8,200**	**520**	**1,000,000**	**7.90**	**1,000,000**
		INHALATION	**23**	**2.10**	**2.10**	**400**	**—**	**—**	**8,800**	**24**	**1,500**	**—**	**20**	**650**	**1,200**	**1,800**	**8.9**	**1,600**	**1.10**	**320**
	CONSTRUCTION WORKER	**INGESTION**	**1,800**	**1,200**	**1,200**	**20,000**	**—**	**—**	**2,000**	**12,000**	**41,000**	**—**	**2,400**	**410,000**	**—**	**8,200**	**1,200**	**200,000**	**170**	**410,000**
		INHALATION	**0 50**	**0 39**	**0.39**	**58**	**—**	**—**	**140**	**34**	**430**	**—**	**28**	**42**	**1,200**	**1,800**	**12**	**10**	**1.10**	**320**
	SOIL COMP. OF GW INGESTION[2]	**CLASS 1**	**0 03**	**0.00**	**0.00**	**13**	**—**	**—**	**0.32**	**0.02**	**4**	**—**	**0.06**	**12**	**2.00**	**0.02**	**0.06**	**170**	**0.01**	**190**
		CLASS 2	**0.15**	**0.02**	**0.02**	**19**	**—**	**—**	**0.32**	**0.20**	**18**	**—**	**0.30**	**29**	**9.60**	**0.30**	**0.30**	**170**	**0.07**	**190**

NOTES
1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620

Bold Indicates Residential Remediation Objective exceeded
Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
M = Migration to Ground Water Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per kilogram (mg/kg)
Analyzed using USEPA Method 5035A/8260B

TABLE 2

SOIL SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH	Acenaphthene	Acenaphthylene	Anthracene	Benzidine	Benzo(a)-anthracene	Benzo(b)-fluroanthene	Benzo(k)-fluoranthene	Benzo[g,h,i]perylene	Benzo(a)-pyrene	Benzoic Acid	Benzyl Alcohol	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether	bis(2-ethylhexyl)phthalate	4-Bromophenyl-phenyl ether	Butyl benzyl phthalate	Carbozol	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl-phenyl ether
SB-1	7/14/2006	2-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0.330
SB-2	7/14/2006	12-15	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-4	7/17/2006	4-7 5	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-5	7/14/2006	6-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0.330	<0 330	<0 330	<0 330
SB-6	7/14/2006	2-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	**0.209**	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0.330	<0 330	<0 330
SB-7	7/14/2006	8-10	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-8	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	**0.119**	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-9	7/14/2006	8-10	**0 744**	<0 330	**1.040**	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-10	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-11	7/14/2006	4-8	**6 250**	<1 980	**21 400**	<1 980	***13.9*** [M]	<1 980	**2 280**	**4 520**	***8.53*** [M]	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980
SB-12	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-13	7/17/2006	0-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0.330	<0 330	<0 330	**0.162**	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-1	7/17/2006	Upgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-2	7/17/2006	Midgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-3	7/17/2006	Downgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
TACO TIER 1 REMEDIATION OBJECTIVES	**RESIDENTIAL**	**INGESTION**	**4,700**	**4,700**	**23,000**	**0.003**	**0 9**	**0.9**	**9**	**—**	**0 09**	**310,000**	**23,000**	**—**	**0 6**	**3,100**	**46**	**—**	**16,000**	**32**	**310**	**—**	**—**	**390**	**—**
		INHALATION	**—**	**—**	**—**	**0.009**	**—**	**—**	**—**	**—**	**—**	**—**	**6,900**	**—**	**0 2**	**1,300**	**31,000**	**—**	**930**	**—**	**—**	**—**	**—**	**53,000**	**—**
	COMMERCIAL INDUSTRIAL	**INGESTION**	**120,000**	**120,000**	**610,000**	**0.02**	**8**	**8**	**78**	**—**	**0 8**	**1,000,000**	**610,000**	**—**	**5**	**82,000**	**410**	**—**	**410,000**	**290**	**8,200**	**—**	**—**	**10,000**	**—**
		INHALATION	**—**	**—**	**—**	**0.02**	**—**	**—**	**—**	**—**	**—**	**—**	**6,900**	**—**	**0 47**	**1,300**	**31,000**	**—**	**930**	**—**	**—**	**—**	**—**	**53,000**	**—**
	CONSTRUCTION WORKER	**INGESTION**	**120,000**	**120,000**	**610,000**	**0.54**	**170**	**170**	**1,700**	**—**	**17**	**820,000**	**200,000**	**—**	**75**	**8,200**	**4,100**	**—**	**410,000**	**6,200**	**820**	**—**	**—**	**10,000**	**—**
		INHALATION	**—**	**—**	**—**	**0 54**	**—**	**—**	**—**	**—**	**—**	**—**	**6,900**	**—**	**0 66**	**1,300**	**31,000**	**—**	**930**	**—**	**—**	**—**	**—**	**53,000**	**—**
	SOIL COMP. OF GW INGESTION[2]	**CLASS 1**	**570**	**570**	**12,000**	**4.30E-06**	**2**	**5**	**49**	**—**	**8**	**400**	**9 4**	**—**	**0.0004**	**2.4**	**3,600**	**—**	**930**	**0 6**	**0 7**	**—**	**—**	**4**	**—**
		CLASS 2	**2,900**	**2,900**	**59,000**	**4 30E-06**	**8**	**25**	**250**	**—**	**82**	**400**	**9 4**	**—**	**0.0004**	**2 4**	**31,000**	**—**	**930**	**2 8**	**0.7**	**—**	**—**	**4**	**—**

NOTES
1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620

Bold Indicates Residential Remediation Objective exceeded
Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
M = Migration to Ground Water Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per kilogram (mg/kg)
Analyzed using USEPA Method 3540C/8270C

TABLE 2 (continued)

SOIL SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH	Chrysene	Dibenzo(a,h)-anthracene	Dibenzofuran	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	3,3-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octyl phthalate	4,6- Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane
SB-1	7/14/2006	2-4	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-2	7/14/2006	12-15	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-4	7/17/2006	4-7 5	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-5	7/14/2006	6-8	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-6	7/14/2006	2-4	0.679	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	0.529	<0 330	<0 330	<0 330	<0 330	<0 330
SB-7	7/14/2006	8-10	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-8	7/14/2006	4-8	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	0.419	<0 330	<0 330	<0 330	<0 330	<0 330
SB-9	7/14/2006	8-10	0.427	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	0.722	<0 330	<0 330	<0 330	<0 330
SB-10	7/14/2006	4-8	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-11	7/14/2006	4-8	30.800	<0 540	3.830	<1 980	<1 980	<1 980	<3 960	<1 980	<1 980	<1 980	<1 980	<1 980	<1 980	<9 600	<9 600	<1 500	<1 560	5.890	11.900	<1 980	<1 980	<1 980	<1 980
SB-12	7/14/2006	4-8	0.587	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-13	7/17/2006	0-4	0.525	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-1	7/17/2006	Upgradient	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-2	7/17/2006	Midgradient	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-3	7/17/2006	Downgradient	<0 330	<0 090	<0 330	<0 330	<0 330	<0 330	<0 660	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<0 250	<0 260	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
TACO TIER 1 REMEDIATION OBJECTIVES	**RESIDENTIAL**	**INGESTION**	**88**	**0 09**	—	**7,000**	—	—	**1**	**230**	**63,000**	**1,600**	—	—	**1,600**	—	**160**	**0 9**	**0 9**	**3,100**	**3,100**	**0 4**	**16**	**550**	**78**
		INHALATION	—	—	—	**560**	—	**11,000**	—	—	**2,000**	—	—	—	**10,000**	—	—	—	—	—	—	**1**	**1,000**	**10**	—
	COMMERCIAL INDUSTRIAL	**INGESTION**	**780**	**0.8**	—	**180,000**	—	—	**13**	**6,100**	**1,000,000**	**41,000**	—	—	**41,000**	—	**4,100**	**8 4**	**8 4**	**82,000**	**82,000**	**4**	**410**	**14,000**	**2,000**
		INHALATION	—	—	—	**560**	—	**17,000**	—	—	**2,000**	—	—	—	**10,000**	—	—	—	—	—	—	**1 8**	**1,000**	**16**	—
	CONSTRUCTION WORKER	**INGESTION**	**17,000**	**17**	—	**18,000**	—	—	**280**	**610**	**1,000,000**	**41,000**	—	—	**4,100**	—	**410**	**180**	**180**	**82,000**	**82,000**	**78**	**41**	**14,000**	**2,000**
		INHALATION	—	—	—	**310**	—	**340**	—	—	**2,000**	—	—	—	**10,000**	—	—	—	—	—	—	**2 6**	**180**	**1 1**	—
	SOIL COMP. OF GW INGESTION[2]	**CLASS 1**	**160**	**2**	—	**17**	—	**2**	**0 007**	**1**	**470**	**9**	—	—	**10,000**	—	**0.2**	**0.0008**	**0 0007**	**4,300**	**560**	**2**	**2 9**	**400**	**0 5**
		CLASS 2	**800**	**7 6**	—	**43**	—	**11**	**0.033**	**1**	**470**	**9**	—	—	**10,000**	—	**0 2**	**0.0008**	**0 0007**	**21,000**	**2,800**	**11**	**15**	**2,200**	**2 6**

NOTES
1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620

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Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
M = Migration to Ground Water Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per kilogram (mg/kg)
Analyzed using USEPA Method 3540C/8270C

TABLE 2 (continued)

OIL SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH	Indeno(1,2,3-cd)-pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	3&4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol	4-Nitrophenol	n-Nitrosodimethylamine	n-Nitrosodi-n-propylamine	n-Nitrosodiphenylamine	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine	1,2,4-Trichlorobenzene	2,4,5-Trichorophenol	2,4,6-Trichlorophenol
SB-1	7/14/2006	2-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-2	7/14/2006	12-15	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-4	7/17/2006	4-7 5	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-5	7/14/2006	6-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-6	7/14/2006	2-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	0.692	<0 330	0.448	<0.330	<0 330	<0 330	<0 330
SB-7	7/14/2006	8-10	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-8	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	0.434	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-9	7/14/2006	8-10	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	3.730	<0 330	0.988	<0 330	<0 330	<0 330	<0 330
SB-10	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SB-11	7/14/2006	4-8	<1 980	<1 980	62.300	<1 980	<1 980	5.860	<9 600	<9 600	<9 600	<1 560	<9 600	<9 600	<1 980	<1 980	<1 980	<1 980	108.000	<1 980	59.300	<1 980	<1 980	<1 980	<1 980
SB-12	7/14/2006	4-8	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	0.420	<0 330	<0 330	<0 330	<0 330
SB-13	7/17/2006	0-4	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	0.617	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-1	7/17/2006	Upgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-2	7/17/2006	Midgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330
SED-3	7/17/2006	Downgradient	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<1 600	<1 600	<1 600	<0 260	<1 600	<1 600	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0 330	<0.330	<0 330
TACO TIER 1 REMEDIATION OBJECTIVES	**RESIDENTIAL**	**INGESTION**	**0.9**	**15,600**	**—**	**3,900**	**390**	**1,600**	**—**	**—**	**—**	**39**	**—**	**—**	**—**	**0.09**	**130**	**3**	**—**	**47,000**	**2,300**	**78**	**780**	**7,800**	**58**
		INHALATION	**—**	**4,600**	**—**	**—**	**15,000**	**170**	**—**	**—**	**—**	**92**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**120,000**	**3,200**	**—**	**200**
	COMMERCIAL INDUSTRIAL	**INGESTION**	**8**	**410,000**	**—**	**100,000**	**10,000**	**41,000**	**—**	**—**	**—**	**1,000**	**—**	**—**	**—**	**0 8**	**1,200**	**24**	**—**	**1,000,000**	**61,000**	**2,000**	**20,000**	**200,000**	**520**
		INHALATION	**—**	**4,600**	**—**	**—**	**15,000**	**270**	**—**	**—**	**—**	**140**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**120,000**	**3,200**	**—**	**390**
	CONSTRUCTION WORKER	**INGESTION**	**170**	**410,000**	**—**	**100,000**	**1,000**	**4,100**	**—**	**—**	**—**	**1,000**	**—**	**—**	**—**	**18**	**25,000**	**520**	**—**	**120,000**	**61,000**	**2,000**	**2,000**	**200,000**	**11,000**
		INHALATION	**—**	**4,600**	**—**	**—**	**15,000**	**1 8**	**—**	**—**	**—**	**9 4**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**5,200**	**920**	**—**	**540**
	SOIL COMP. OF GW INGESTION[2]	**CLASS 1**	**14**	**8**	**—**	**15**	**0.24**	**12**	**—**	**—**	**—**	**0.1**	**—**	**—**	**—**	**0 00005**	**1**	**0 03**	**—**	**100**	**4,200**	**0 029**	**5**	**270**	**0 2**
		CLASS 2	**69**	**8**	**—**	**15**	**0 24**	**18**	**—**	**—**	**—**	**0.1**	**—**	**—**	**—**	**0.00005**	**5 6**	**0.14**	**—**	**100**	**21,000**	**0 029**	**53**	**1,400**	**0.77**

NOTES
1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620

Bold Indicates Residential Remediation Objective exceeded
Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
M = Migration to Ground Water Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per kilogram (mg/kg)
Analyzed using USEPA Method 3540C/8270C

TABLE 3

SOIL TOTAL METALS ANALYSIS RESULTS

USPS - Aurora MPO
525 N. Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID[1]	DATE SAMPLED	SAMPLE DEPTH	pH	Antimony	Arsenic[5]	Beryllium	Cadmium	Chromium[6]	Copper	Cyanide	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
SB-1	7/14/2006	2-4	8 40	<1 00	11 30	0 90	0 40	25.40	18 63	<0 10	5 00	<0 05	20 40	<0 20	<0 10	<1 00	93 80
SB-2	7/14/2006	12-15	8 75	<1 00	9 90	0 80	0 40	21 50	18 40	0 41	18 90	<0 05	32 50	<0 20	<0 10	<1 00	59.10
SB-4	7/17/2006	4-7.5	8 56	<1 00	5 90	0 80	0 80	21 70	18 50	<0 10	12 60	<0 05	24 80	<0 20	<0.10	<1 00	68 90
SB-5	7/14/2006	6-8	8.31	<1 00	6 00	0.60	0 20	12 80	13 00	<0 10	14 20	<0 05	15 40	<0 20	<0.10	<1 00	38 60
SB-6	7/14/2006	2-4	7.63	5.00	**43.10**	0.80	1.00	15 20	92.20	0 20	28 10	0.21	53.00	5.30	<0.10	<1 00	65 10
SB-7	7/14/2006	8-10	7 93	<1.00	5 20	1.10	0 80	20.60	34.90	<0 10	27 90	0.08	23.70	<0 20	<0.10	<1 00	96.50
SB-8	7/14/2006	4-8	7 44	1 30	**44.40**	1.40	1.40	31 30	228.00	<0 10	259.00	0.18	36.50	1.70	<0 10	<1.00	323.00
SB-9	7/14/2006	8-10	7 78	5.10	**39.30**	1.20	2.40	18.10	190.00	<0 10	**411.00**	<0 05	23.60	1.80	<0 10	<1 00	334.00
SB-10	7/14/2006	4-8	8 80	<1 00	9 30	0.90	0 20	24.50	18 60	<0 10	14 70	<0 05	22.50	<0.20	<0.10	<1 00	60 50
SB-11	7/14/2006	4-8	9 85	<1 00	8 50	0.90	0.40	23.90	16 80	0.21	14 20	0 06	90.80	<0 20	<0.10	<1 00	66.50
SB-12	7/14/2006	4-8	8 85	5.20	11 20	0 10	1.60	106.00	256.00	<0.10	**2,630.00**	<0 05	13 90	1.20	0.70	<1 00	626.00
SB-13	7/17/2006	0-4	7 40	4 60	**31.80**	1.60	3.00	19.20	114.00	0 17	325.00	0.17	33.70	3.00	0.70	<1 00	319.00
SED-1	7/17/2006	Upgradient	8 88	<1 00	1 80	0 10	0.20	3 00	6 50	<0 10	11 10	<0 05	3 40	<0.20	<0 10	<1.00	31.60
SED-2	7/17/2006	Midgradient	8 77	2 40	2 60	0 20	0.70	13 00	228 00	<0 10	55 40	0.07	21 10	<0.20	0 20	<1 00	125 00
SED-3	7/17/2006	Downgradient	8 92	<1 00	5 50	0 40	0.50	6 80	17.10	<0.10	26 50	<0 05	10.60	<0 20	<0.10	<1 00	173.00
TACO TIER 1 REMEDIATION OBJECTIVES	RESIDENTIAL	INGESTION	—	31.0	BACK	160.0	78.0	230.0	2,900	1,600	400	23.0	1,600	390	390	6.3	23,000
		INHALATION	—	—	750	1,300	1,800	270.0	—	—	—	10.0	13,000	—	—	—	—
	COMMERCIAL INDUSTRIAL	INGESTION	—	820.0	BACK	4,100	2,000	6,100	82,000	41,000	400	610	41,000	10,000	10,000	160	610,000
		INHALATION	—	—	1,200	2,100	2,800	420.0	—	—	—	540,000	21,000	—	—	—	—
	CONSTRUCTION WORKER	INGESTION	—	82.0	61.0	410	200	4,100	8,200	4,100	400	61.0	4,100	1,000	1,000	160	61,000
		INHALATION	—	—	25,000	44,000	59,000	690.0	—	—	—	52,000	440,000	—	—	—	—
	MIGRATION TO GROUNDWATER[2]	CLASS 1	—	0.006	0.05	0.004	0.005	0.1	0.65	0.2	0.0075	0.002	0.1	0.05	0.05	0.002	5.0
		CLASS 2	—	0.024	0.2	0.5	0.05	1.0	0.65	0.6	0.1	0.01	2.0	0.05	—	0.02	10.0
	HAZARDOUS (mg/l)[7]	TCLP SAMPLES	—	—	5.0	—	1.0	5.0	—	—	5.0	0.2	—	1.0	5.0	—	—
	TACO BACKGROUND[3, 4]	METRO	—	4.0	13.0	0.59	0.60	16.2	19.6	0.51	36.0	0.06	18.0	0.48	0.55	0.32	95.0
		NON-METRO	—	3.3	11.3	0.56	0.50	13.0	12.0	0.50	20.9	0.05	13.0	0.37	0.50	0.42	60.2

NOTES

1 - Soil sample from SB-3 not obtained due to lack of sufficient soil recovery above bedrock
2 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620
3 - *Background Levels applicable to the site are for Counties Within Metropolitan Statistical Areas as per 35 IAC 742 APPENDIX A, Table G*
4 - Background values as listed in 742 APPENDIX A, Table G, **Background levels not applicable to Indian Creek sediment samples**
5 - Arsenic residential and commercial/industrial ingestion remediation objectives are equal to the background levels listed in 742 APPENDIX A, Table G
6 - Lowest RO used among Cr-Total, Cr-3 or Cr-6
7 - Hazardous Toxicity value as listed in 35 IAC 721 124

Bold Indicates Residential Remediation Objective exceeded
Italics Indicates Commercial Industrial Remediation Objective exceeded
Underline indicates Construction Worker Remediation Objective exceeded
Shaded cells indicate background level exceeded as outlined in 35 IAC 742 APPENDIX A, Table G
M = Migration to Ground Water Remediation Objective exceeded

Concentrations in milligrams per kilogram (mg/kg), NA indicates that the parameter was not analyzed
Analyzed using USEPA Method 3050B/6010B
**USEPA Method 4500H+B used for pH, USEPA Method 7470A used for mercury and USEPA Method 4500CN,C,E used for cyanide*

TABLE 4

GROUND WATER VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID	DATE SAMPLED	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone (MEK)	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-dichloroethene	trans-1,2-dichloroethene
MW-1/SB-5	7/18/2006	<0 100	<0 005	<0 001	<0 001	<0 005	<0 010	<0 005	<0 005	<0 005	<0 001	<0 010	<0 001	<0 010	<0 005	<0 005	<0 005	<0 005	<0.005
MW-2/SB-2	7/18/2006	<0.100	<0 005	<0 001	<0 001	<0.005	<0 010	<0.005	<0 005	<0 005	<0 001	<0 010	<0.001	<0 010	<0 005	<0 005	<0 005	<0.005	<0 005
MW-3/SB-9	7/18/2006	<0.100	<0 005	<0 001	<0 001	<0 005	<0 010	<0 005	<0 005	<0 005	<0 001	<0 010	<0.001	<0 010	<0 005	<0 005	<0 005	<0.005	<0.005
SW-1[2]	7/17/2006	<0 100	<0 005	<0 001	<0 001	<0 005	<0 010	<0 005	<0 005	<0 005	<0 001	<0 010	<0 001	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005
SW-2	7/17/2006	<0 100	<0 005	<0 001	<0 001	<0 005	<0 010	<0 005	<0.005	<0.005	<0 001	<0 010	<0 001	<0 010	<0.005	<0.005	<0 005	<0 005	<0 005
SW-3	7/17/2006	<0 100	<0.005	<0 001	<0 001	<0 005	<0 010	<0 005	<0.005	<0.005	<0 001	<0 010	<0 001	<0 010	<0 005	<0 005	<0 005	<0.005	<0.005
TACO TIER 1 REMEDIATION OBJECTIVES	**CLASS I**	**0.7000**	**0.0050**	**0.00020**	**0.0010**	**—**	**4.2000**	**0.7000**	**0.0050**	**0.1000**	**0.1400**	**—**	**0.0002**	**—**	**0.7000**	**0.0050**	**0.0070**	**0.0700**	**0.1000**
	CLASS II	**0.7000**	**0.0250**	**0.00020**	**0.0010**	**—**	**4.2000**	**3.5000**	**0.0250**	**0.5000**	**0.1400**	**—**	**0.0010**	**—**	**3.5000**	**0.0250**	**0.0350**	**0.2000**	**0.5000**

NOTES
1 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620
2 - Ground water standards not applicable to surface water samples obtained Surface water standards applied on a site-by-site basis

Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Method 5030B/8260B

TABLE 4 (continued)

GROUND WATER VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N. Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID	DATE SAMPLED	1,2-dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethyl benzene	2-Hexanone	4-methyl-2-pentanone	MTBE	Methylene chloride	Styrene	1,1,2,2- Tetrachloroethane	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	1,1,2-trichloroethane	Trichloroethene	Vinyl Acetate	Vinyl Chloride	Xylenes (Total)
MW-1/SB-5	7/18/2006	<0 005	<0 001	<0 001	<0 005	<0 010	<0 010	<0 005	<0.005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 002	<0 005
MW-2/SB-2	7/18/2006	<0 005	<0 001	<0 001	<0 005	<0 010	<0 010	<0 005	<0 005	<0.005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 002	<0 005
MW-3/SB-9	7/185/06	<0 005	<0 001	<0 001	<0 005	<0.010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0.005	<0 005	<0 005	<0 010	<0.002	<0 005
SW-1	7/17/2006	<0 005	<0 001	<0 001	<0 005	<0.010	<0 010	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 002	<0 005
SW-2	7/17/2006	<0 005	<0 001	<0 001	<0 005	<0 010	<0.010	<0 005	<0 005	<0.005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 010	<0 002	<0.005
SW-3	7/17/2006	<0 005	<0 001	<0 001	<0.005	<0 010	<0 010	<0.005	<0 005	<0.005	<0 005	<0 005	<0 005	<0 005	<0 005	<0.005	<0 010	<0 002	<0.005
TACO TIER 1 REMEDIATION OBJECTIVES	**CLASS I**	**0.005**	**0.001**	**0.001**	**0.700**	**—**	**—**	**0.070**	**0.005**	**0.10**	**0.21000**	**0.005**	**1.00**	**0.20**	**0.005**	**0.005**	**7.0**	**0.002**	**10.0**
	CLASS II	**0.025**	**0.005**	**0.005**	**1.000**	**—**	**—**	**0.070**	**0.050**	**0.50**	**1.05000**	**0.025**	**2.50**	**1.00**	**0.050**	**0.025**	**7.0**	**0.010**	**10.0**

NOTES
1 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620
2 - Ground water standards not applicable to surface water samples obtained Surface water standards applied on a site-by-site basis

Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Method 5030B/8260B

TABLE 5

GROUND WATER SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
C#0890050033, ILD981795453
I #01031-03

BORING ID	DATE SAMPLED	Acenaphthene	Acenaphthylene	Anthracene	Benzidine	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluroanthene	Benzo(k)-fluroanthene	Benzo[g,h,i]perylene	Benzoic Acid	Benzyl Alcohol	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether	bis(2-ethylhexyl)phthalate	4-Bromophenyl-phenylether	Butylbenzylphthalate	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl-phenylether	Chrysene
MW-1/SB-5	7/18/2006	<0 010	<0 010	<0 005	<0 010	<0 00013	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
MW-2/SB-2	7/18/2006	<0 010	<0 010	<0 005	<0 010	<0 00013	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
MW-3/SB-9	7/18/2006	<0 010	<0 010	<0 005	<0 010	*0.00068*	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
SW-1	7/17/2006	<0 010	<0 010	<0 005	<0 010	<0 00013	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
SW-2	7/17/2006	<0 010	<0 010	<0 005	<0 010	<0 00013	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
SW-3	7/17/2006	<0 010	<0 010	<0 005	<0 010	<0 00013	<0 0002	<0 00018	<0 00017	<0 0004	<0 050	<0 020	<0 010	<0 010	<0 010	<0 005	<0 010	<0 010	<0 010	<0 010	<0 020	<0 010	<0 010	<0 010	<0 0015
REMEDIATION OBJECTIVES	CLASS I	0.420	—	2.1	—	0.00013	0.0002	0 00018	0.00017	—	28	—	—	0.01	—	0.006	—	1 4		0.028	—	—	0.035	—	0.0015
	CLASS II	2.100	—	10 5	—	0.00065	0.002	0.0009	0.00085	—	28	—	—	0.01	—	0 06	—	7.0		0.028	—	—	0.175	—	0.0075

NOTES
1 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620 and is described in the Site Characterization Report for the site
2 - Ground water standards not applicable to surface water samples obtained Surface water standards applied on a site-by-site basis

Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Method 3510C/8270C

TABLE 5 (continued)

GROUND WATER SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
ID#0890050033, ILD981795453
Job #01031-03

BORING ID	DATE SAMPLED	Dibenzo(a,h)-anthracene	Dibenzofuran	Di-n-butyl phthalate	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dichlorophenol	3,3-Dichlorobenzidine	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	4,6- Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane
MW-1/SB-5	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	<0 002	<0 010	<0 010	<0 010	<0 005
MW-2/SB-2	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	<0 002	<0 010	<0 010	<0 010	<0 005
MW-3/SB-9	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	0.004	<0 010	<0 010	<0 010	<0 005
SW-1	7/17/2006	<0.0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	<0 002	<0 010	<0 010	<0 010	<0 005
SW-2	7/17/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	<0 002	<0 010	<0 010	<0 010	<0 005
SW-3	7/17/2006	<0.0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 010	NA	<0 010	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 002	<0 002	<0 010	<0 010	<0 010	<0 005
REMEDIATION	**CLASS I**	**0.0003**	**—**	**0.700**	**0.60**	**—**	**0.075**	**0.021**	**0.020**	**5.60**	**0.140**	**—**	**—**	**0.140**	**0.00002**	**0.00031**	**0.140**	**0.280**	**0.280**	**0.00006**	**—**	**0.05**	**0 007**
OBJECTIVES	**CLASS II**	**0.0015**	**—**	**3.50**	**1.50**	**—**	**0.375**	**0.021**	**0.100**	**5.60**	**0.140**	**—**	**—**	**0 140**	**0.00002**	**0.00031**	**0 700**	**1.40**	**1.40**	**0.0003**	**—**	**0.50**	**0 035**

NOTES
1 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620 and is described in the Site Characterization Report for the site
2 - Ground water standards not applicable to surface water samples obtained Surface water standards applied on a site-by-site basis

Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Method 3510C/8270C

TABLE 5 (continued)

GROUND WATER SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
#0890050033, ILD981795453
#01031-03

BORING ID	DATE SAMPLED	Indeno(1,2,3-cd)-pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	3&4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol	4-Nitrophenol	n-Nitrosodimethylamine	n-Nitrosodiphenylamine	n-Nitrosodi-n-propylamine	Pentachlorophenol	Phenol	Phenanthrene	Pyrene	1,2,4-Trichlorobenzene	2,4,5-Trichorophenol	2,4,6-Trichlorophenol
MW-1/SB-5	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	<0 005	<0 002	<0 010	<0 010	<0 010
MW-2/SB-2	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	<0 005	<0 002	<0 010	<0 010	<0 010
MW-3/SB-9	7/18/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	0.012	0.004	<0 010	<0 010	<0 010
SW-1	7/17/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	<0 005	<0 002	<0 010	<0 010	<0 010
SW-2	7/17/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	<0 005	<0 002	<0 010	<0 010	<0 010
SW-3	7/17/2006	<0 0003	<0 010	<0 010	<0 010	<0 010	<0 010	<0 050	<0 050	<0 020	<0 010	<0 010	<0 050	<0 010	<0 010	<0 010	<0 010	<0 010	<0 005	<0 002	<0 010	<0 010	<0 010
REMEDIATION	CLASS I	**0.00043**	**1.40**	—	**0.350**	—	**0.140**	—	—	—	**0.0035**	—	—	—	**0.0032**	**0.0018**	**0.001**	**0.100**	—	**0.210**	**0.07**	**0.700**	**0.01**
OBJECTIVES	CLASS II	**0.00215**	**1.40**	—	**0.350**	—	**0.220**	—	—	—	**0.0035**	—	—	—	**0.016**	**0.0018**	**0.005**	**0.100**	—	**1.05**	**1.00**	**3.50**	**0.05**

NOTES
1 - Ground water at the site meets the definition of Class 2 as per 35 IAC 620 and is described in the Site Characterization Report for the site
2 - Ground water standards not applicable to surface water samples obtained Surface water standards applied on a site-by-site basis

Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
Shaded cells indicate exceedence of the MDL
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Method 3510C/8270C

TABLE 6

GROUND WATER METALS ANALYSIS RESULTS

USPS - Aurora MPO
525 N Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

BORING ID	DATE SAMPLED	pH	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Cyanide	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
MW-1/SB-5	7/18/2006	6 91	<0 006	<0 002	0 002	0 002	0 002	0 062	<0 005	0 004	<0 0005	0 091	<0 002	<0 001	<0 002	0 046
MW-2/SB-2	7/18/2006	6 96	<0 006	<0 002	<0 001	<0 001	0 004	0 016	<0 005	0 016	<0 0005	0 014	<0 002	<0 001	<0 002	0 025
MW-3/SB-9	7/18/2006	6 91	<0 006	0 030	<0 001	<0 001	<0 001	0 008	<0 005	0 010	<0 0005	0 006	<0 002	<0 001	<0 002	0 010
SW-1[2]	7/17/2006	7 86	<0 006	<0 002	<0 001	<0 001	<0 001	0 003	<0 005	0 003	<0 0005	0 002	<0 002	<0 001	<0 002	0 022
SW-2	7/17/2006	7 91	<0 006	<0 002	<0 001	<0 001	<0 001	<0 001	<0 005	<0 002	<0 0005	0 002	<0 002	<0 001	<0 002	0 009
SW-3	7/17/2006	7 89	<0 006	0 048	0 003	0 002	0 059	0 105	<0 005	0 122	<0 0005	0 099	<0 002	<0 001	<0 002	0 758
REMEDIATION OBJECTIVES	**CLASS I**	**-**	**0.006**	**0.050**	**0.004**	**0.005**	**0.100**	**0.650**	**0.200**	**0.0075**	**0.002**	**0.100**	**0.050**	**0.050**	**0.002**	**5.000**
	CLASS II	**-**	**0.024**	**0.200**	**0.050**	**0.050**	**1.000**	**0.650**	**0.600**	**0.100**	**0.010**	**2.000**	**0.050**	**-**	**0.020**	**10.000**

NOTES
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Italics Indicates Class II Ground Water Tier 1 Remediation Objective exceeded
Bold Indicates Class I Ground Water Tier 1 Remediation Objective exceeded
NA = chemical not analyzed

Concentrations in milligrams per liter (mg/l)
Analyzed using USEPA Methods 3010A/6010B, and 7470A for mercury

TABLE 7

Ground Water and Boring Elevation Data

USPS - Aurora MPO
525 N. Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

MW ID	GRADIENT POSITION	TOTAL DEPTH	TOC ELEV	GS ELEV	DATE MEASURED	DTW	GW ELEVATION	AVERAGE GW ELEVATION
MW-1/SB-5	UP	8.10	644.84	645.48	07/18/06	6.82	638.02	638 02
MW-2/SB-2	DOWN	14.50	645.60	645 88	07/18/06	13.00	632.60	632.60
MW-3/SB-9	DOWN	9 70	644.34	644.96	07/18/06	7.72	636.62	636.62
SB-1		5.00		645.56				
SB-3		5.50		638.56				
SB-4		7.50		638.01				
SB-6		11.50		645.86				
SB-7		10.00		645.99				
SB-8		8.00		639.08				
SB-10		10 00		645.74				
SB-11		7.50		643.52				
SB-12		10.20		641.98				
SB-13		8.00		643.51				

TABLE 8

Well Survey Data

USPS - Aurora MPO
525 N. Broadway, Aurora, Illinois
LPC#0890050033, ILD981795453
DEI #01031-03

WELL ID #	APPROX. DISTANCE FROM SITE	TYPE OF WELL	DEPTH OF WELL (ft bgs)	YEAR OF INSTALLATION	OWNER NAME
32490	400-1,000	Eng	13	1988	IL Dept. of Transporation IL Rte 25 over Indian Creek
22766	1,000-2,500	Eng	14	1969	Kroeler et al
28961	1,000-2,500	Water	140	1984	Wendel Merk
00675	1,000-2,500	Water	701	Not Listed	American Water Works
22630	1,000-2,500	Water	25	1967	Leriviera Apartments
00678	1,000-2,500	Water	150	1965	Aurora Packing Company
32491	2,500	Eng	20	1978	IL Dept. of Transportation High Street Bridge
00677	2,500-5,000	Water	620	1920	Aurora Ice Cream Co.
00679	2,500-5,000	Water	1414	1940	Tivoli Theatre
00681	3,700	Water	2260	1924	City of Aurora
23026	2,500-5,000	Eng	21	1970	Miss Valley Structural Steel
22548	2,500-5,000	Eng	21	1965	Grace Lutheran Church
22549	2,500-5,000	Eng	23	1975	Grace Lutheran Church
22555	2,500-5,000	Eng	26	1965	Grace Lutheran Church
22528	5,000	Eng	19	1966	Northgate Shopping Center

APPENDIX C - BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-1

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	none encountered
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	5 0 feet

Depth in Feet	Water Level	Surf Elev 645 56	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
		645		FILL, sand and gravel base material for ASPHALT					
1									
		644							
2				FILL, sandy to silty clay, brick fragments	1	60	<1 0	6-3039-002	Laboratory sample obtained
		643							
3									
		642							
4				SILTY CLAY, gray transitioning to brown, dry	2	100	<1 0	--	Bedrock at 5 0 feet
		641							
5				Bedrock encountered at 5 0 feet, brown Silurian Dolomite					
		640							
6									

08-21-2006 \IRO\01031\03\boring logs\SB-1 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

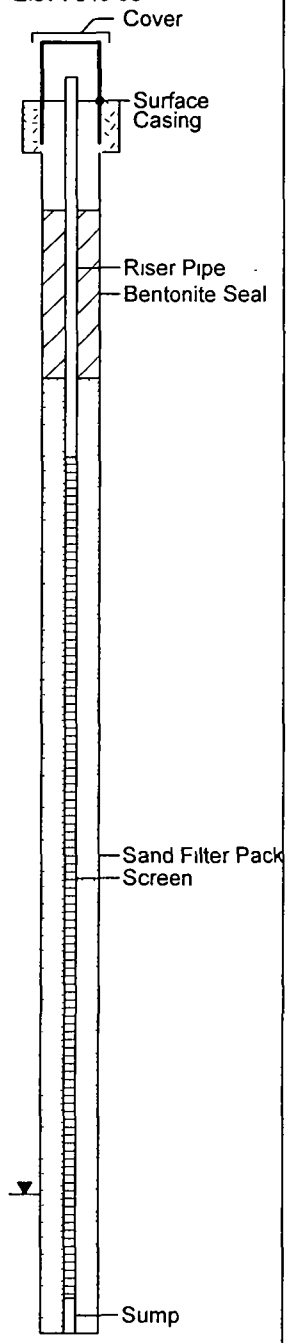
LOG OF BORING MW-2/SB-2

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	13 00
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	15 0 feet

Depth in Feet	Water Level	Surf Elev 645 88	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
1		645		FILL, sand and gravel base material for ASPHALT					
2		644		FILL, dark grey silty clay with some sand, brick fragments, dry	1	40	<1 0	--	
3		643							
4		642		FILL; clay with some silt, dry, various debris present (some wood, brick frags)					
5		641							
6		640			2	60	<1 0	--	
7		639							
8		638		FILL, silty clay, moist, high plasticity, some brick frags					
9		637							
10		636		SILTY CLAY, grey, soft,moist	3	60	<1 0	6-3039-008	Lab Samp
11		635							
12		634		SANDY CLAY, tan, wet					
13	▼	633			4	50	<1 0	--	Bedrock at 15 ft
14		632							
15		631		Bedrock brown Silurian Dolomite					

Well MW-2
Elev . 645 60



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DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-3

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/17/06	Logged By	M Fisher
Date Completed	07/17/06	Depth to Water	none encountered
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	5 5 feet

Depth in Feet	Water Level	Surf Elev 638 56	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				TOP SOIL, loam, organic material, plant roots					
		638		FILL, sand and silt, some pebbles and misc debris					
1									
		637							
2					1	30	<1 0	--	No lab sample obtained
		636							
3									
		635							
4				FILL, brown sand, some brick fragments					
		634			2	100	<1 0	--	Bedrock at 5 5 feet
5									
		633		BEDROCK, encountered at 5.5 feet, browntan Silurian Dolomite					
6									

08-21-2006 /IRO\01031\03\boring logs\SB-3 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-4

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/17/06	Logged By	M Fisher
Date Completed	07/17/06	Depth to Water	none encountered
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	. 7 5 feet

Depth in Feet	Water Level	Surf Elev 638 01	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0		638		TOP SOIL, loam, dark grey, orgainic material, plant roots					
				FILL, sorted fine brown sand					
1		637							
2		636			1	40	<1 0	–	
3		635							
4		634		FILL, sorted fine brown sand					
				SILTY CLAY, grey to brown, drier at top, moist toward bottom					
5		633							
6		632			2	100	<1 0	6-3048-001	Laboratory sample obtained
7		631							
				BEDROCK, encountered at 7 5 feet, browntan Silurian Dolomite					
8									

08-21-2006 J:\RO\01031\03\boring logs\SB-4 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers - Aurora, Illinois

LOG OF BORING MW-1/SB-5

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

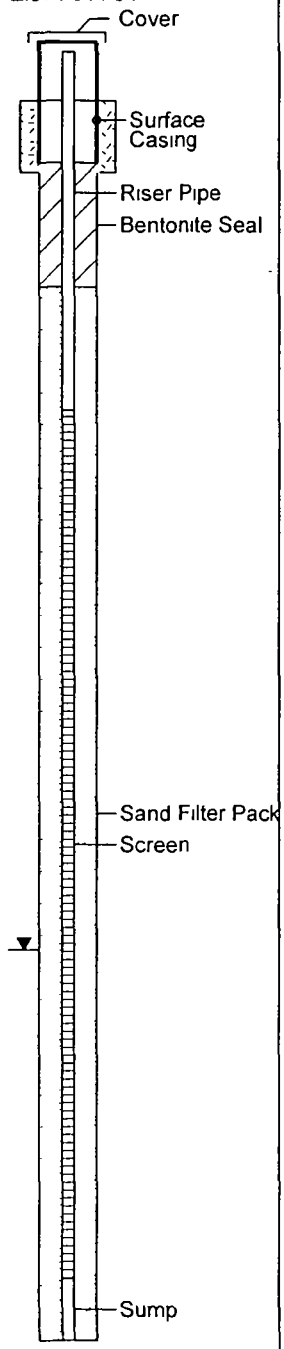
Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	6 82
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	10 0 feet

Depth in Feet	Surf Elev 645 48	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0		ASPHALT					
	645	FILL, sand and gravel base material for ASPHALT					
1	644						
2		SILTY CLAY, medium to dark grey, moist, plastic	1	25	<1 0	--	
	643						
3	642						
4		SILTY CLAY; dark grey, moist, silt and water content increasing toward bottom of section					
	641						
5	640						
6		SANDY CLAY, brown, very moist to wet, moist, high plasticity, some brick frags	2	80	2 0	6-3039-001	Lab Samp
	639						
7	638						
8		SANDY CLAY, brown, wet, increasing sand content toward bottom of section, transitions to clayey sand					
	637						
9	636		3	100	<1 0	--	
10		BEDROCK, brown Silurian Dolomite					

Water Level

GRAPHIC

Well MW-1
Elev . 644 84



/IRO\01031\03\boring logs\SB-5_MW-1 bor

08-21-2006

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers - Aurora, Illinois

LOG OF BORING SB-6

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	10 feet - Drilling
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	11 5 feet

Depth in Feet	Water Level	Surf Elev 645 86	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
1		645		FILL, granular base material for ASPHALT					
2		644		FILL, dark grey/black sandy fill material, brick fragments, some clay, petroleum odor	1	50	<1 0	6-3039-007	Laboratory sample obtained
3		643							
4		642		SILTY CLAY, brown/buff, massive; increasing moisture content, some limestone fragments					
5		641							
6		640			2	50	<1 0	--	
7		639							
8		638		SANDY CLAY, brown, wet bedrock fragmetns toward bottom of section					
9		637							
10	▼	636			3	60	<1 0	--	Bedrock at 11 5 feet
11		635							
12		634		BEDROCK; encountered at 11 5 feet, browntan Silurian Dolomite					

08-21-2006 /IRO\01031\03\boring logs\SB-6 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-7

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	8 feet - Drilling
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	10 0 feet

Depth in Feet	Water Level	Surf Elev 645 99	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
				FILL, granular base material for ASPHALT					
1		645							
2		644		SANDY CLAY, brown, dry, medium plasticity	1	50	<1 0	--	
3		643							
4		642		FILL, rust colored medium sand fill material, sorted					
5		641							
6		640		SILTY CLAY, brown, moist, medium plasticity, some sand present toward bottom	2	50	<1 0	--	
7		639							
8	▼	638		CLAYEY SAND, rust colored, wet					
9		637			3	50	<1 0	6-3039-006	Lab Samp, BR at 10 0 feet
10		636		BEDROCK, brown Silurian Dolomite					
11		635							

08-21-2006 /IRO\01031\03\boring logs\SB-7 bor

DEUCHLER ENVIRONMENTAL, INC
Consulting Engineers - Aurora, Illinois

LOG OF BORING SB-8

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	4 feet - Drilling
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	. Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	8 0 feet

Depth in Feet	Water Level	Surf Elev 639 08	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0		639		TOPSOIL, grey, loamy/silty, dry					
				FILL, black sandy loam fill material, wet at bottom of section					
1		638							
2		637			1	50	<1 0	--	bedrock at 8 0 feet
3		636							
4	▼	635							
5		634		SILTY CLAY, grey, massive, med/high plasticity, wet					
6		633			2	50	<1 0	6-3039-010	Laboratory sample obtained
7		632							
8				BEDROCK, brown Silurian Dolomite					

09-22-2006 /IRO\01031\03\boring logs\SB-8 bor

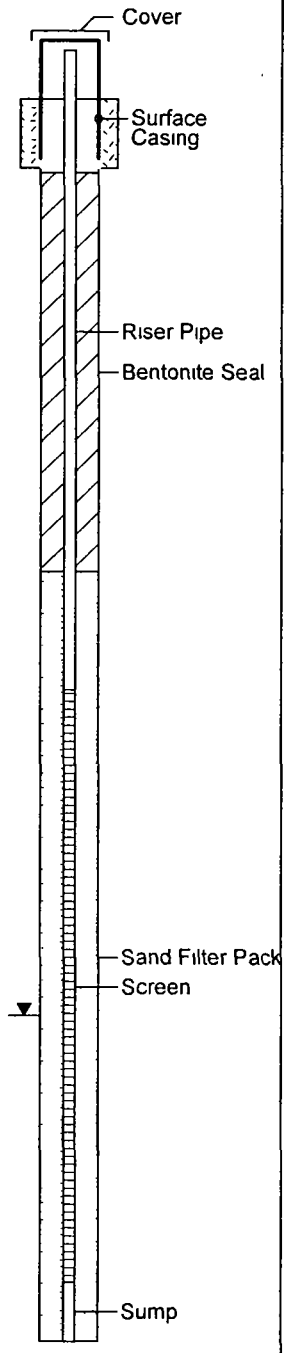
DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING MW-3/SB-9

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/17/06	Depth to Water	7 72
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	10 5 feet

Depth in Feet	Water Level	Surf Elev 644 96	GRAPHIC	DESCRIPTION	Field Samples	% Recovery	PID (units)	Lab No	Remarks
0				ASPHALT					
				FILL, sand and gravel base material for ASPHALT					
1		644		FILL, silty clay, grey, stiff, brick fragment					
2		643		FILL, black, loose, sandy, brick fragments, pebbles	1	25	<1 0	--	
3		642							
4		641		SILTY CLAY, grey, moist, soft, petroleum odor at 7 5 ftbrown, very moist to wet, moist, high plasticity, some brick frags					
5		640							
6		639			2	50	10	--	BR at 10 5 ft
7		638							
8	▼	637		SANDY CLAY, wet, grey to brown, petroleum odor					
9		636			3	50	22	6-3039-008	Lab Samp
10		635							
				BEDROCK, brown Silurian Dolomite					
11		634							



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DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers - Aurora, Illinois

LOG OF BORING SB-10

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	9 feet - Drilling
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	10 0 feet

Depth in Feet	Water Level	Surf Elev 645 74	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
		645		FILL; medium sand base for ASPHALT					
1									
		644							
2				SILTY CLAY, grey, very stiff with some sand	1	10	<1 0	--	
		643							
3									
		642							
4				FILL, sandy, brick fragments, black combusted material					
		641							
5				SILTY CLAY, stiff, dry, some rock fragments toward bottom of section					
		640							
6					2	100	<1 0	6-3039-003	Laboratory sample obtained
		639							
7				SILTY CLAY, dark grey, very stiff, dry					
		638							
8				CLAYEY SAND, Brown to rust color clayey sand, wet					
		637							
9	▼				3	60	<1 0	--	Bedrock at 10 0 feet
		636							
10				BEDROCK, brown Silurian Dolomite					

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DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-11

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No. 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	none encountered
Drilling Method	Geoprobe 6610DT	Project Number	01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	7 5 feet

Depth in Feet	Water Level	Surf. Elev 643 52	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
		643		FILL, medium sand base for ASPHALT					
1									
		642							
2					1	50	5 0	--	
		641							
3				FILL, black sand fill material, slightly oily, slight petroleum odor					
		640							
4				FILL; black sand fill material, very oily, strong petroleum odor (former tank backfill?)					
		639							
5									
		638			2	50	12 0	6-3039-004	Lab samp BR at 7 5 ft
6									
		637							
7									
		636		BEDROCK, brown Silurian Dolomite					
8									

08-21-2006 vIRO\01031\03\boring logs\SB-11 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-12

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/14/06	Logged By	M Fisher
Date Completed	07/14/06	Depth to Water	9 feet - Drilling
Drilling Method	Geoprobe 6610DT	Project Number	. 01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	10 2 feet

Depth in Feet	Water Level	Surf Elev 641 98	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				ASPHALT					
				FILL; medium sand base for ASPHALT					
1		641							
2		640		SILTY CLAY, very stiff, dry, buff color	1	50	3 0	--	
3		639							
4		638		FILL; black sandy fill material, petroleum odor					
5		637							
6		636		SILTY CLAY, black silty clay with some sand, stiff, petroleum odor	2	75	4 0	6-3039-005	Laboratory Sample Obtained
7		635							
8		634		SANDY CLAY; brown sandy clay, wet					
9	▼	633			3	75	1 0	--	Bedrock at 10 2 feet
10		632							
				BEDROCK; brown Silurian Dolomite					

08-21-2006 J:\RO\01031\03\boring logs\SB-12 bor

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING SB-13

United States Postal Service
Aurora Main Post Office
525 North Broadway
Aurora, Illinois
DEI Project No 01031-03

Date Started	07/17/06	Logged By	M Fisher
Date Completed	07/17/06	Depth to Water	none encountered
Drilling Method	Geoprobe 6610DT	Project Number	. 01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	1 of 1
Driller	GeoServe	Total Depth	8 0 feet

Depth in Feet	Water Level	Surf Elev 643 51	GRAPHIC	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0				TOPSOIL; greyish brown, dry, silty					
		643		FILL, rust colored sandy fill material, very thin (0 2 ft) layer of black combusted material near top of section					
1		642							
2				SILTY CLAY; brown silty clay, medium plasticity	1	50	<1 0	6-3048-002	Laboratory sample obtained
		641							
3		640							
4				SILTY CLAY, same as previous section, some bedrock fragments near bottom of section					
		639							
5		638							
6					2	50	<1 0	--	Bedrock at 8 0 feet
		637							
7		636							
8				BEDROCK, brown Silurian Dolomite					

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D

APPENDIX D – SITE PHOTOGRAPHS

PHOTO 1: Aurora MPO looking north from southwest corner of site.

PHOTO 2: Aurora MPO Customer Parking area.

PHOTO 3: Looking north along Broadway Avenue. Site to the right beyond brick wall.

PHOTO 4: Looking south along Broadway Avenue. Site is on the left.

PHOTO 5: At southeast corner of site looking along eastern property boundary. Site is to the left, BNSF property to the right

PHOTO 6: Looking north from the southeast portion of site. USPS access road to the right, employee parking area to the left

PHOTO 7: Building on BNSF property to the east of the site with tracks in the background

PHOTO 8: Covered shipping area to the east behind the MPO building

PHOTO 9: Covered shipping area looking south

PHOTO 10: Monitoring well MW-1 (typical)

PHOTO 11: Shipping/receiving area on north end of MPO building

PHOTO 12: Looking to the east at the VMF

PHOTO 13: Looking SE at surface water retention area; VMF in background

PHOTO 14: Looking SE from NW corner of site; surface water retention area and VMF in background and BNSF access road in foreground.

PHOTO 15: Looking east along the northern property boundary along the BNSF access road. Indian Creek to the left and the surface water retention area to the right.

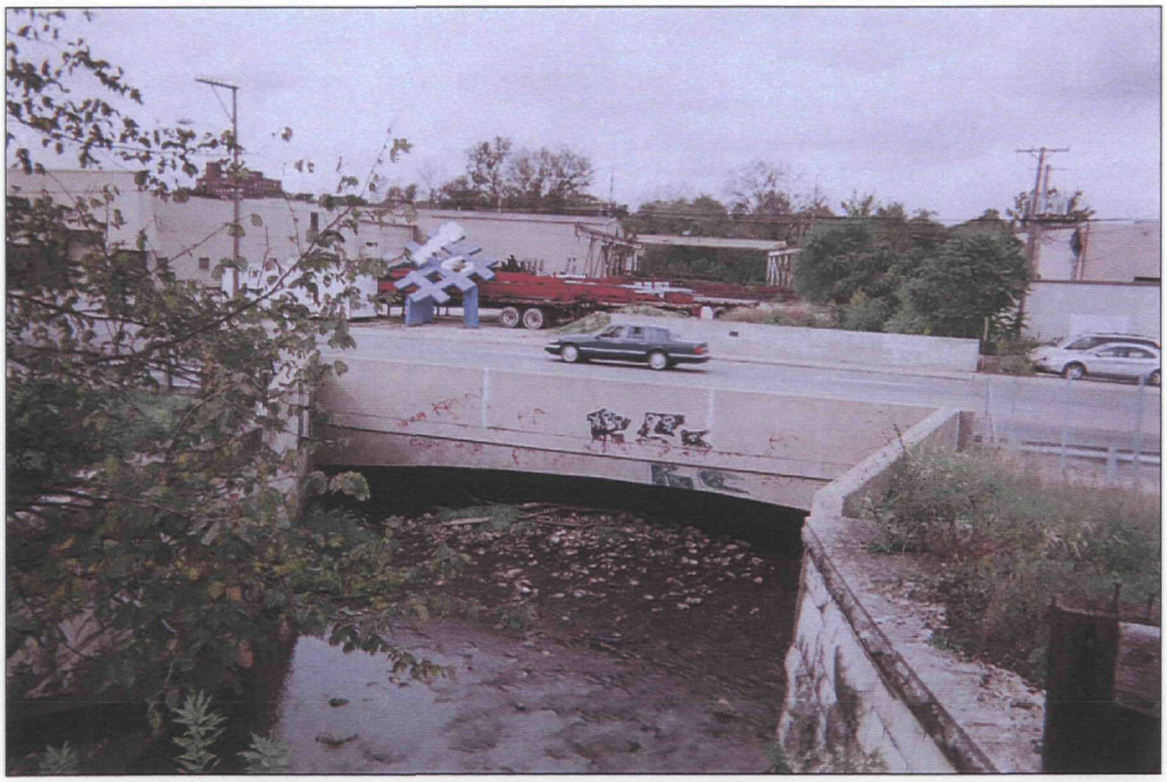

PHOTO 16: Looking west from the NW corner of site at Indian Creek with Broadway Avenue bridge in the background.

PHOTO 17: Looking east along Indian Creek with BNSF access road to the right. Note the concrete channel embankment.

PHOTO 18: Looking down from concrete embankment at Indian Creek

E

APPENDIX E – LABORATORY ANALYSIS SHEETS

First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

July 24, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: USPS-Aurora MPO
First Environmental File ID: 6-3039
Date Received: July 14, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zawerski
Project Manager

First Environmental Laboratories, Inc.
IL ELAP / NELAC Accreditation # 100292
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	83.38		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5 0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		6.0	0.2	mg/kg	
Beryllium		0.6	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		12.8	0.1	mg/kg	
Copper		13.0	0.1	mg/kg	
Lead		14.2	0.2	mg/kg	
Nickel		15.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		38.6	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.31		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-1; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-002	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	79.07		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5 0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5 0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5 0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-1; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-002	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-1; 2-4'
Sample No: 6-3039-002

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-1; 2-4'
Sample No: 6-3039-002

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		11.3	0.2	mg/kg	
Beryllium		0.9	0.1	mg/kg	
Cadmium		0.4	0.1	mg/kg	
Chromium		25.4	0.1	mg/kg	
Copper		18.6	0.1	mg/kg	
Lead		18.1	0.2	mg/kg	
Nickel		20.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		93.8	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.40		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-10; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-003	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	81.38		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10 0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-10; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-003	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-10; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-003	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-10; 4-8'
Sample No: 6-3039-003

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		9.3	0.2	mg/kg	
Beryllium		0.9	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		24.5	0.1	mg/kg	
Copper		18.6	0.1	mg/kg	
Lead		14.7	0.2	mg/kg	
Nickel		22.5	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1 0	1.0	mg/kg	
Zinc		60.5	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.80		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	90.64		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	11.3	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	8.3	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	68.9	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	6,250	330	ug/kg	
Acenaphthylene	< 1,980	330	ug/kg	
Anthracene	21,400	330	ug/kg	
Benzidine	< 1,980	330	ug/kg	
Benzo(a)anthracene	13,900	330	ug/kg	
Benzo(a)pyrene	8,530	90	ug/kg	
Benzo(b)fluoranthene	< 1,980	330	ug/kg	
Benzo(k)fluoranthene	2,280	330	ug/kg	
Benzo(ghi)perylene	4,520	330	ug/kg	
Benzoic acid	< 1,980	330	ug/kg	
Benzyl alcohol	< 1,980	330	ug/kg	
bis(2-Chloroethoxy)methane	< 1,980	330	ug/kg	
bis(2-Chloroethyl)ether	< 1,980	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 1,980	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 1,980	330	ug/kg	
4-Bromophenyl phenyl ether	< 1,980	330	ug/kg	
Butyl benzyl phthalate	< 1,980	330	ug/kg	
Carbazole	< 1,980	330	ug/kg	
4-Chloroaniline	< 1,980	330	ug/kg	
4-Chloro-3-methylphenol	< 1,980	330	ug/kg	
2-Chloronaphthalene	< 1,980	330	ug/kg	
2-Chlorophenol	< 1,980	330	ug/kg	
4-Chlorophenyl phenyl ether	< 1,980	330	ug/kg	
Chrysene	30,800	330	ug/kg	
Di-n-butyl phthalate	< 1,980	330	ug/kg	
Di-n-octylphthalate	< 1,980	330	ug/kg	
Dibenzo(a,h)anthracene	< 540	90	ug/kg	
Dibenzofuran	3,830	330	ug/kg	
1,2-Dichlorobenzene	< 1,980	330	ug/kg	
1,3-Dichlorobenzene	< 1,980	330	ug/kg	
1,4-Dichlorobenzene	< 1,980	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 3,960	660	ug/kg	
2,4-Dichlorophenol	< 1,980	330	ug/kg	
Diethyl phthalate	< 1,980	330	ug/kg	
2,4-Dimethylphenol	< 1,980	330	ug/kg	
Dimethyl phthalate	< 1,980	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 9,600	1600	ug/kg	
2,4-Dinitrophenol	< 9,600	1600	ug/kg	
2,4-Dinitrotoluene	< 1,500	250	ug/kg	
2,6-Dinitrotoluene	< 1,560	260	ug/kg	
Fluoranthene	5,890	330	ug/kg	
Fluorene	11,900	330	ug/kg	
Hexachlorobenzene	< 1,980	330	ug/kg	
Hexachlorobutadiene	< 1,980	330	ug/kg	
Hexachlorocyclopentadiene	< 1,980	330	ug/kg	
Hexachloroethane	< 1,980	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 1,980	330	ug/kg	
Isophorone	< 1,980	330	ug/kg	
2-Methylnaphthalene	62,300	330	ug/kg	
2-Methylphenol	< 1,980	330	ug/kg	
3 & 4-Methylphenol	< 1,980	330	ug/kg	
Naphthalene	5,860	330	ug/kg	
2-Nitroaniline	< 9,600	1600	ug/kg	
3-Nitroaniline	< 9,600	1600	ug/kg	
4-Nitroaniline	< 9,600	1600	ug/kg	
Nitrobenzene	< 1,560	260	ug/kg	
2-Nitrophenol	< 9,600	1600	ug/kg	
4-Nitrophenol	< 9,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 1,980	330	ug/kg	
n-Nitrosodimethylamine	< 1,980	330	ug/kg	
n-Nitrosodiphenylamine	< 1,980	330	ug/kg	
Pentachlorophenol	< 1,980	330	ug/kg	
Phenanthrene	108,000	330	ug/kg	
Phenol	< 1,980	330	ug/kg	
Pyrene	59,300	330	ug/kg	
Pyridine	< 1,980	330	ug/kg	
1,2,4-Trichlorobenzene	< 1,980	330	ug/kg	
2,4,5-Trichlorophenol	< 1,980	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,6-Trichlorophenol		< 1,980	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		8.5	0.2	mg/kg	
Beryllium		0.9	0.1	mg/kg	
Cadmium		0.4	0.1	mg/kg	
Chromium		23.9	0.1	mg/kg	
Copper		16.8	0.1	mg/kg	
Lead		14.2	0.2	mg/kg	
Nickel		90.8	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		66.5	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.06	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		0.21	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		9.85		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-12; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-005	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	76.51		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5 0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-12; 4-8'
Sample No: 6-3039-005

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	587	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-12; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-005	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	420	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-12; 4-8'
Sample No: 6-3039-005

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		5.2	1.0	mg/kg	
Arsenic		11.2	0.2	mg/kg	
Beryllium		0.1	0.1	mg/kg	
Cadmium		1.6	0.1	mg/kg	
Chromium		106	0.1	mg/kg	
Copper		256	0.1	mg/kg	
Lead		2,630	0.2	mg/kg	
Nickel		13.9	0.1	mg/kg	
Selenium		1.2	0.2	mg/kg	
Silver		0.7	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		626	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.85		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-7; 8-10'
Sample No: 6-3039-006

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	75.66		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5 0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5 0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-7; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-006	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-7; 8-10'
Sample No: 6-3039-006

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-7; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-006	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		5.2	0.2	mg/kg	
Beryllium		1.1	0.1	mg/kg	
Cadmium		0.8	0.1	mg/kg	
Chromium		20.6	0.1	mg/kg	
Copper		34.9	0.1	mg/kg	
Lead		27.9	0.2	mg/kg	
Nickel		23.7	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		96.5	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.08	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.93		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-6; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-007	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	79.36		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-6; 2-4'
Sample No: 6-3039-007

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	209	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	679	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-6; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-007	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	529	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	692	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	448	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-6; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-007	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		5.0	1.0	mg/kg	
Arsenic		43.1	0.2	mg/kg	
Beryllium		0.8	0.1	mg/kg	
Cadmium		1.0	0.1	mg/kg	
Chromium		15.2	0.1	mg/kg	
Copper		92.2	0.1	mg/kg	
Lead		28.1	0.2	mg/kg	
Nickel		53.0	0.1	mg/kg	
Selenium		5.3	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		65.1	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.21	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		0.20	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.63		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-9; 8-10'
Sample No: 6-3039-008

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	76.35		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	13.6	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-9; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-008	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	744	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	1,040	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	427	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-9; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-008	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	722	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	3,730	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	988	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-9; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-008	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		5.1	1.0	mg/kg	
Arsenic		39.3	0.2	mg/kg	
Beryllium		1.2	0.1	mg/kg	
Cadmium		2.4	0.1	mg/kg	
Chromium		18.1	0.1	mg/kg	
Copper		190	0.1	mg/kg	
Lead		411	0.2	mg/kg	
Nickel		23.6	0.1	mg/kg	
Selenium		1.8	0 2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		334	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.78		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-2; 12-15'	**Date Received:**	07/14/06
Sample No:	6-3039-009	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	85.64		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-2; 12-15'
Sample No: 6-3039-009

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-2; 12-15'	**Date Received:**	07/14/06
Sample No:	6-3039-009	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-2; 12-15'
Sample No: 6-3039-009

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		9.9	0.2	mg/kg	
Beryllium		0.8	0.1	mg/kg	
Cadmium		0.4	0.1	mg/kg	
Chromium		21.5	0.1	mg/kg	
Copper		18.4	0.1	mg/kg	
Lead		18.9	0.2	mg/kg	
Nickel		32.5	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		59.1	0 5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		0.41	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.75		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-8; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-010	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	77.28		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5 0	ug/kg	
Ethylbenzene	< 5 0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-8; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-010	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	119	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-8; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-010	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C** Analysis Date: 07/19/06		**Preparation Method 3540C** Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	419	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	434	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-8; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-010	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		1.3	1.0	mg/kg	
Arsenic		44.4	0.2	mg/kg	
Beryllium		1.4	0.1	mg/kg	
Cadmium		1.4	0.1	mg/kg	
Chromium		31.3	0.1	mg/kg	
Copper		228	0.1	mg/kg	
Lead		259	0.2	mg/kg	
Nickel		36.5	0.1	mg/kg	
Selenium		1.7	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		323	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.18	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.44		Units	

CHAIN OF CUSTODY RECORD

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First Environmental Laboratories, Inc.

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Company Name: DEI
Street Address: 230 WOODLAWN AVE
City: AURORA State: IL Zip 60506
Phone: 630-897-8380 Fax 630-897-5696
Send Report To: MARC FISHER
Sampled By: MARC FISHER

Project I.D.: USPS - AURORA MPO
P.O. #.: 01031-03

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix	VOC	SVOC	PP METALS	MERCURY	Cyanide	PH			Comments	Lab I.D.
7/14/06	SB-5 6-8ft	S	X	X	X	X	X	X				6-039-001
	SB-1 2-4ft											002
	SB-10 4-8ft.											003
	SB-11 4-8ft											004
	SB-12 4-8ft											005
	SB-7 8-10ft											006
	SB-6 2-4ft											007
	SB-9 8-10ft											008
	SB-2 12-15ft											009
	SB-8 4-8ft											010

Cooler Temperature: 4 °C on ice
Received within 6 hrs. of collection: _____

Notes and Special Instructions: _____

Relinquished By: Marc Fisher Date/Time 7/14/06 1620 Received By: Helen Nonack Date/Time 7/14/06 16 20
Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

First Environmental Laboratories, Inc.

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July 26, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: USPS - Aurora MPO; DEI #01031-03
First Environmental File ID: 6-3048
Date Received: July 17, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zawoński
Project Manager

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	8:05
Sample ID:	SB-4; 4-7.5'	**Date Received:**	07/17/06
Sample No:	6-3048-001	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	76.09		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5 0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	8:05
Sample ID:	SB-4, 4-7.5'	**Date Received:**	07/17/06
Sample No:	6-3048-001	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	8:05
Sample ID:	SB-4; 4-7.5'	**Date Received:**	07/17/06
Sample No:	6-3048-001	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C** Analysis Date: 07/21/06		**Preparation Method 3540C** Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	8:05
Sample ID:	SB-4; 4-7.5'	**Date Received:**	07/17/06
Sample No:	6-3048-001	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		5.9	0.2	mg/kg	
Beryllium		0.8	0.1	mg/kg	
Cadmium		0.8	0.1	mg/kg	
Chromium		21.7	0.1	mg/kg	
Copper		18.5	0.1	mg/kg	
Lead		12.6	0.2	mg/kg	
Nickel		24.8	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		68.9	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.56		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	86.46		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	162	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	525	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	617	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	
2,4,5-Trichlorophenol	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		4.6	1.0	mg/kg	
Arsenic		31.8	0.2	mg/kg	
Beryllium		1.6	0.1	mg/kg	
Cadmium		3.0	0.1	mg/kg	
Chromium		19.2	0.1	mg/kg	
Copper		114	0.1	mg/kg	
Lead		325	0.2	mg/kg	
Nickel		33.7	0.1	mg/kg	
Selenium		3.0	0.2	mg/kg	
Silver		0.7	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		319	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		0.17	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		0.17	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.40		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:00
Sample ID:	SED-1	**Date Received:**	07/17/06
Sample No:	6-3048-003	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	82.01		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5 0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5 0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5 0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:00
Sample ID:	SED-1	**Date Received:**	07/17/06
Sample No:	6-3048-003	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10 0	10.0	ug/kg	
Xylene, Total	< 5.0	5 0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		1.8	0.2	mg/kg	
Beryllium		0.1	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		3.0	0.1	mg/kg	
Copper		6.5	0.1	mg/kg	
Lead		11.1	0.2	mg/kg	
Nickel		3.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		31.6	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.88		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:15
Sample ID:	SED-2	**Date Received:**	07/17/06
Sample No:	6-3048-004	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	83.87		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:15
Sample ID:	SED-2	**Date Received:**	07/17/06
Sample No:	6-3048-004	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:15
Sample ID:	SED-2	**Date Received:**	07/17/06
Sample No:	6-3048-004	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:15
Sample ID:	SED-2	**Date Received:**	07/17/06
Sample No:	6-3048-004	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds Analysis Date: 07/21/06	**Method: 8270C**		**Preparation Method 3540C** Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals Analysis Date: 07/21/06	**Method: 6010B**		**Preparation Method 3050B** Preparation Date: 07/18/06		
Antimony		2.4	1.0	mg/kg	
Arsenic		2.6	0.2	mg/kg	
Beryllium		0.2	0.1	mg/kg	
Cadmium		0.7	0.1	mg/kg	
Chromium		13.0	0.1	mg/kg	
Copper		228	0.1	mg/kg	
Lead		55.4	0.2	mg/kg	
Nickel		21.1	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		0.2	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		125	0.5	mg/kg	
Total Metals Analysis Date: 07/19/06	**Method: 7470A**				
Mercury		0.07	0.05	mg/kg	
Cyanide, Total Analysis Date: 07/21/06	**Method: 4500CN,C,E**				
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10 Analysis Date: 07/18/06	**Method: 4500H+B**				
pH @ 25°C, 1:10		8.77		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:30
Sample ID:	SED-3	**Date Received:**	07/17/06
Sample No:	6-3048-005	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	81.41		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5 0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:30
Sample ID:	SED-3	**Date Received:**	07/17/06
Sample No:	6-3048-005	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-3
Sample No: 6-3048-005

Date Collected: 07/17/06
Time Collected: 9:30
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-3
Sample No: 6-3048-005

Date Collected: 07/17/06
Time Collected: 9:30
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		5.5	0.2	mg/kg	
Beryllium		0.4	0.1	mg/kg	
Cadmium		0.5	0.1	mg/kg	
Chromium		6.8	0.1	mg/kg	
Copper		17.1	0.1	mg/kg	
Lead		26.5	0.2	mg/kg	
Nickel		10.6	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		173	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.92		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9.45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9 45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		< 0.001	0.001	mg/L	
Copper		0.003	0.001	mg/L	
Lead		0.003	0.002	mg/L	
Nickel		0.002	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.022	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30					
pH @ 25°C		7.86		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5 0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5 0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5 0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SW-2
Sample No: 6-3048-007

Date Collected: 07/17/06
Time Collected: 10:00
Date Received: 07/17/06
Date Reported: 07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Total Metals **Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Antimony	< 0.006	0.006	mg/L	
Arsenic	< 0.002	0.002	mg/L	
Beryllium	< 0.001	0.001	mg/L	
Cadmium	< 0.001	0.001	mg/L	
Chromium	0.002	0.001	mg/L	
Copper	< 0.001	0.001	mg/L	
Lead	< 0.002	0.002	mg/L	
Nickel	0.002	0.001	mg/L	
Selenium	< 0.002	0.002	mg/L	
Silver	< 0.001	0.001	mg/L	
Thallium	< 0.002	0.002	mg/L	
Zinc	0.009	0.005	mg/L	
Total Metals **Method: 7470A**				
Analysis Date: 07/18/06				
Mercury	< 0.0005	0.0005	mg/L	
Cyanide, Total **Method: 335.4R1.0**				
Analysis Date: 07/25/06				
Cyanide, Total	< 0.005	0.005	mg/L	
pH @ 25°C **Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30				
pH @ 25°C	7.91		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10.00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		0.048	0.002	mg/L	
Beryllium		0.003	0.001	mg/L	
Cadmium		0.002	0.001	mg/L	
Chromium		0.059	0.001	mg/L	
Copper		0.105	0.001	mg/L	
Lead		0.122	0.002	mg/L	
Nickel		0.099	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.758	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30					
pH @ 25°C		7.89		Units	

CHAIN OF CUSTODY RECORD

First Environmental Laboratories, Inc.

First Environmental Laboratories
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Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: DEUCHLER ENVIRONMENTAL, INC
Street Address: 230 WOODLAWN AVE
City: AURORA, IL 60506 State: Zip:
Phone: 630-897-8330 Fax: 630-897-5696
Send Report To: MARC FISHER
Sampled By: MRF/CC

Project I.D.: USPS - AURORA MPO
P.O. #: DEI# 01031-03

Matrix Codes: S = Soil W = Water O = Other

Analyses: VOC, SVOC, RP metals, Mercury, cyanide, pH

Date/Time Taken	Sample Description	Matrix	VOC	SVOC	RP metals	Mercury	cyanide	pH			Comments	Lab I.D.
7/17/06 0805	SB-4 4-7.5 ft ~~0805~~	S	↓	↓	↓	↓	↓	↓			6-3048-001	
0955	SB-13 0-4 ft ~~0955~~	S	↓	↓	↓	↓	↓	↓				002
0900	SED-1	S	↓	↓	↓	↓	↓	↓			Ind. Creek sediment sample	003
0915	SED-2	S	↓	↓	↓	↓	↓	↓			↓	004
0930	SED-3	S	↓	↓	↓	↓	↓	↓			↓	005
0945	SW-1	W	↓	↓	↓	↓	↓	↓			↑	006
1000	SW-2	W	↓	↓	↓	↓	↓	↓			Ind. Creek Surf. water sample	007
1015	SW-3	W	↓	↓	↓	↓	↓	↓			↓	008

Cooler Temperature: 4 °C mcc
Received within 6 hrs. of collection: _____

Notes and Special Instructions: _____

Relinquished By: [signature] Date/Time 7/17/06 1430 Received By: [signature] Date/Time 7/17/06 14 30

Relinquished _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 1/01

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July 26, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: Aurora MPO
First Environmental File ID: 6-3063
Date Received: July 18, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworski
Project Manager

First Environmental Laboratories, Inc.

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10 0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5 0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C** Analysis Date: 07/20/06		**Preparation Method 3510C** Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C** Analysis Date: 07/21/06		**Preparation Method 3510C** Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		0.002	0.001	mg/L	
Cadmium		0.002	0.001	mg/L	
Chromium		0.002	0.001	mg/L	
Copper		0.062	0.001	mg/L	
Lead		0.004	0.002	mg/L	
Nickel		0.091	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.046	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.91		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5 0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1 0	ug/L	
Bromomethane	< 5.0	5 0	ug/L	
2-Butanone (MEK)	< 10.0	10 0	ug/L	
Carbon disulfide	< 5.0	5 0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5 0	ug/L	
1,1-Dichloroethene	< 5.0	5 0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5 0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C** Analysis Date: 07/20/06		**Preparation Method 3510C** Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		0.004	0.001	mg/L	
Copper		0.016	0.001	mg/L	
Lead		0.016	0.002	mg/L	
Nickel		0.014	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.025	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.96		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	0.68	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	4	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	12	5	ug/L	
Pyrene	4	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		0.030	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		< 0.001	0.001	mg/L	
Copper		0.008	0.001	mg/L	
Lead		0.010	0.002	mg/L	
Nickel		0.006	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.010	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.91		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: Aurora MPO
Sample ID: Trip Blank
Sample No: 6-3063-004

Date Collected:
Time Collected:
Date Received: 07/18/06
Date Reported: 07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5 0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

CHAIN OF CUSTODY RECORD

Page____ of ____ pgs

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name Deuchler Environmental, Inc.
Street Address 230 Woodlawn
City Aurora State IL Zip 60506
Phone 630-897-8380 Fax 630-897-5696 e-mail
Send Report To Marc Fischer Via Fax ☒ e-mail ☐
Sampled By Carrie Carter

Project I.D.: ~~9604~~ Aurora MPO
P.O. #.:

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix	VOCs	SVOCs/PNAs	Priority Poll Metals	Mercury	Cyanide	pH			Comments	Lab I.D.
* 7/18/06 1:00	MW-1 *	W	✓	✓	✓	✓	✓	✓			603063-	001
7/18/06 1:20	MW-2 *	W	✓	✓	✓	✓	✓	✓				002
7/18/06 2:00	MW-3 *	W	✓	✓	✓	✓	✓	✓				003
	Trip Blank	W	✓									004

FOR LAB USE ONLY:

Cooler Temperature. 0.1-6ºC Yes ✓ No.__ _____ºC
Received within 6 hrs. of collection._____
Ice Present: Yes ✓ No__

Sample Refrigerated Yes__ No__
Refrigerator Temperature:_____ºC
5035 Vials Frozen Yes__ No__
Freezer Temperature _____ºC

Containers Received Preserved ☐ Yes ✓ ☐ No

Notes and Special Instructions: Decant Sample

Relinquished By: Carrie J. Carter Date/Time 7/18/06 2:35p Received By: [illegible signature] Date/Time 7/18/06 14:35
Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 4/06

First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

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July 24, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: USPS-Aurora MPO
First Environmental File ID: 6-3039
Date Received: July 14, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworski
Project Manager

First Environmental Laboratories, Inc.
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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	83.38		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5 0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-5; 6-8'	**Date Received:**	07/14/06
Sample No:	6-3039-001	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-5; 6-8'
Sample No: 6-3039-001

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-5; 6-8'
Sample No: 6-3039-001

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		6.0	0.2	mg/kg	
Beryllium		0.6	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		12.8	0.1	mg/kg	
Copper		13.0	0.1	mg/kg	
Lead		14.2	0.2	mg/kg	
Nickel		15.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0 1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		38.6	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1·10		8.31		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-1; 2-4'
Sample No: 6-3039-002

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	79.07		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10 0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-1; 2-4'
Sample No: 6-3039-002

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-1; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-002	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-1; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-002	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		11.3	0.2	mg/kg	
Beryllium		0.9	0.1	mg/kg	
Cadmium		0.4	0.1	mg/kg	
Chromium		25.4	0.1	mg/kg	
Copper		18.6	0.1	mg/kg	
Lead		18.1	0.2	mg/kg	
Nickel		20.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		93.8	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.40		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-10; 4-8'
Sample No: 6-3039-003

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	81.38		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-10; 4-8'
Sample No: 6-3039-003

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-10; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-003	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-10; 4-8'
Sample No: 6-3039-003

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		9.3	0.2	mg/kg	
Beryllium		0 9	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		24.5	0.1	mg/kg	
Copper		18.6	0.1	mg/kg	
Lead		14.7	0.2	mg/kg	
Nickel		22.5	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		60.5	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.80		Units·	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	90.64		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	11.3	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	8.3	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	68.9	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	6,250	330	ug/kg	
Acenaphthylene	< 1,980	330	ug/kg	
Anthracene	21,400	330	ug/kg	
Benzidine	< 1,980	330	ug/kg	
Benzo(a)anthracene	13,900	330	ug/kg	
Benzo(a)pyrene	8,530	90	ug/kg	
Benzo(b)fluoranthene	< 1,980	330	ug/kg	
Benzo(k)fluoranthene	2,280	330	ug/kg	
Benzo(ghi)perylene	4,520	330	ug/kg	
Benzoic acid	< 1,980	330	ug/kg	
Benzyl alcohol	< 1,980	330	ug/kg	
bis(2-Chloroethoxy)methane	< 1,980	330	ug/kg	
bis(2-Chloroethyl)ether	< 1,980	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 1,980	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 1,980	330	ug/kg	
4-Bromophenyl phenyl ether	< 1,980	330	ug/kg	
Butyl benzyl phthalate	< 1,980	330	ug/kg	
Carbazole	< 1,980	330	ug/kg	
4-Chloroaniline	< 1,980	330	ug/kg	
4-Chloro-3-methylphenol	< 1,980	330	ug/kg	
2-Chloronaphthalene	< 1,980	330	ug/kg	
2-Chlorophenol	< 1,980	330	ug/kg	
4-Chlorophenyl phenyl ether	< 1,980	330	ug/kg	
Chrysene	30,800	330	ug/kg	
Di-n-butyl phthalate	< 1,980	330	ug/kg	
Di-n-octylphthalate	< 1,980	330	ug/kg	
Dibenzo(a,h)anthracene	< 540	90	ug/kg	
Dibenzofuran	3,830	330	ug/kg	
1,2-Dichlorobenzene	< 1,980	330	ug/kg	
1,3-Dichlorobenzene	< 1,980	330	ug/kg	
1,4-Dichlorobenzene	< 1,980	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 3,960	660	ug/kg	
2,4-Dichlorophenol	< 1,980	330	ug/kg	
Diethyl phthalate	< 1,980	330	ug/kg	
2,4-Dimethylphenol	< 1,980	330	ug/kg	
Dimethyl phthalate	< 1,980	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 9,600	1600	ug/kg	
2,4-Dinitrophenol	< 9,600	1600	ug/kg	
2,4-Dinitrotoluene	< 1,500	250	ug/kg	
2,6-Dinitrotoluene	< 1,560	260	ug/kg	
Fluoranthene	5,890	330	ug/kg	
Fluorene	11,900	330	ug/kg	
Hexachlorobenzene	< 1,980	330	ug/kg	
Hexachlorobutadiene	< 1,980	330	ug/kg	
Hexachlorocyclopentadiene	< 1,980	330	ug/kg	
Hexachloroethane	< 1,980	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 1,980	330	ug/kg	
Isophorone	< 1,980	330	ug/kg	
2-Methylnaphthalene	62,300	330	ug/kg	
2-Methylphenol	< 1,980	330	ug/kg	
3 & 4-Methylphenol	< 1,980	330	ug/kg	
Naphthalene	5,860	330	ug/kg	
2-Nitroaniline	< 9,600	1600	ug/kg	
3-Nitroaniline	< 9,600	1600	ug/kg	
4-Nitroaniline	< 9,600	1600	ug/kg	
Nitrobenzene	< 1,560	260	ug/kg	
2-Nitrophenol	< 9,600	1600	ug/kg	
4-Nitrophenol	< 9,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 1,980	330	ug/kg	
n-Nitrosodimethylamine	< 1,980	330	ug/kg	
n-Nitrosodiphenylamine	< 1,980	330	ug/kg	
Pentachlorophenol	< 1,980	330	ug/kg	
Phenanthrene	108,000	330	ug/kg	
Phenol	< 1,980	330	ug/kg	
Pyrene	59,300	330	ug/kg	
Pyridine	< 1,980	330	ug/kg	
1,2,4-Trichlorobenzene	< 1,980	330	ug/kg	
2,4,5-Trichlorophenol	< 1,980	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-11; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-004	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,6-Trichlorophenol		< 1,980	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		8.5	0.2	mg/kg	
Beryllium		0.9	0.1	mg/kg	
Cadmium		0.4	0.1	mg/kg	
Chromium		23.9	0.1	mg/kg	
Copper		16.8	0.1	mg/kg	
Lead		14.2	0.2	mg/kg	
Nickel		90.8	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		66.5	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.06	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		0.21	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		9.85		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-12; 4-8'	**Date Received:**	07/14/06
Sample No:	6-3039-005	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	76.51		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10 0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5 0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5 0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-12; 4-8'
Sample No: 6-3039-005

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	587	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-12; 4-8'
Sample No: 6-3039-005

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	420	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-12; 4-8'
Sample No: 6-3039-005

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		5.2	1.0	mg/kg	
Arsenic		11.2	0.2	mg/kg	
Beryllium		0.1	0.1	mg/kg	
Cadmium		1.6	0.1	mg/kg	
Chromium		106	0.1	mg/kg	
Copper		256	0.1	mg/kg	
Lead		2,630	0.2	mg/kg	
Nickel		13.9	0.1	mg/kg	
Selenium		1.2	0.2	mg/kg	
Silver		0.7	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		626	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.85		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-7; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-006	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	75.66		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5 0	5 0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5 0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5 0	ug/kg	
1,2-Dichloroethane	< 5 0	5 0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-7; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-006	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-7; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-006	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-7; 8-10'
Sample No: 6-3039-006

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds Analysis Date: 07/19/06	**Method: 8270C**	**Preparation Method 3540C** Preparation Date: 07/17/06		
2,4,5-Trichlorophenol	< 330	330	ug/kg	
2,4,6-Trichlorophenol	< 330	330	ug/kg	
Total Metals Analysis Date: 07/21/06	**Method: 6010B**	**Preparation Method 3050B** Preparation Date: 07/18/06		
Antimony	< 1.0	1.0	mg/kg	
Arsenic	5.2	0.2	mg/kg	
Beryllium	1.1	0.1	mg/kg	
Cadmium	0.8	0.1	mg/kg	
Chromium	20.6	0.1	mg/kg	
Copper	34.9	0.1	mg/kg	
Lead	27.9	0.2	mg/kg	
Nickel	23.7	0 1	mg/kg	
Selenium	< 0.2	0.2	mg/kg	
Silver	< 0.1	0.1	mg/kg	
Thallium	< 1.0	1.0	mg/kg	
Zinc	96.5	0.5	mg/kg	
Total Metals Analysis Date: 07/18/06	**Method: 7470A**			
Mercury	0.08	0.05	mg/kg	
Cyanide, Total Analysis Date: 07/20/06	**Method: 4500CN,C,E**			
Cyanide, Total	< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10 Analysis Date: 07/18/06	**Method: 4500H+B**			
pH @ 25°C, 1:10	7.93		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-6; 2-4'
Sample No: 6-3039-007

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	79.36		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-6; 2-4'
Sample No: 6-3039-007

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	209	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	679	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-6; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-007	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	529	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	692	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	448	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-6; 2-4'	**Date Received:**	07/14/06
Sample No:	6-3039-007	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds Analysis Date: 07/19/06	**Method: 8270C**		**Preparation Method 3540C** Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals Analysis Date: 07/21/06	**Method: 6010B**		**Preparation Method 3050B** Preparation Date: 07/18/06		
Antimony		5.0	1.0	mg/kg	
Arsenic		43.1	0.2	mg/kg	
Beryllium		0.8	0.1	mg/kg	
Cadmium		1.0	0.1	mg/kg	
Chromium		15.2	0.1	mg/kg	
Copper		92.2	0 1	mg/kg	
Lead		28.1	0.2	mg/kg	
Nickel		53.0	0.1	mg/kg	
Selenium		5.3	0.2	mg/kg	
Silver		< 0 1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		65.1	0.5	mg/kg	
Total Metals Analysis Date: 07/18/06	**Method: 7470A**				
Mercury		0.21	0.05	mg/kg	
Cyanide, Total Analysis Date: 07/20/06	**Method: 4500CN,C,E**				
Cyanide, Total		0.20	0.10	mg/kg	
pH @ 25°C, 1:10 Analysis Date: 07/18/06	**Method: 4500H+B**				
pH @ 25°C, 1:10		7.63		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-9; 8-10'
Sample No: 6-3039-008

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	76.35		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	13.6	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-9; 8-10'
Sample No: 6-3039-008

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10 0	ug/kg	
Vinyl chloride	< 10 0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	744	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	1,040	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	427	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-9; 8-10'
Sample No: 6-3039-008

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	722	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	3,730	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	988	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-9; 8-10'	**Date Received:**	07/14/06
Sample No:	6-3039-008	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		5.1	1.0	mg/kg	
Arsenic		39.3	0.2	mg/kg	
Beryllium		1.2	0.1	mg/kg	
Cadmium		2.4	0.1	mg/kg	
Chromium		18.1	0.1	mg/kg	
Copper		190	0.1	mg/kg	
Lead		411	0.2	mg/kg	
Nickel		23.6	0.1	mg/kg	
Selenium		1.8	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		334	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.78		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-2; 12-15'
Sample No: 6-3039-009
Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	85.64		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-2; 12-15'
Sample No: 6-3039-009
Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO	**Time Collected:**	0:00
Sample ID:	SB-2; 12-15'	**Date Received:**	07/14/06
Sample No:	6-3039-009	**Date Reported:**	07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-2; 12-15'
Sample No: 6-3039-009

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		9.9	0.2	mg/kg	
Beryllium		0.8	0.1	mg/kg	
Cadmium		0.4	0 1	mg/kg	
Chromium		21.5	0.1	mg/kg	
Copper		18.4	0.1	mg/kg	
Lead		18.9	0.2	mg/kg	
Nickel		32.5	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		59.1	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		0.41	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.75		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-8; 4-8'
Sample No: 6-3039-010
Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/17/06				
Total Solids	77.28		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5 0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5 0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5 0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-8; 4-8'
Sample No: 6-3039-010

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/20/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	119	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-8; 4-8'
Sample No: 6-3039-010

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	419	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	434	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS-Aurora MPO
Sample ID: SB-8; 4-8'
Sample No: 6-3039-010

Date Collected: 07/14/06
Time Collected: 0:00
Date Received: 07/14/06
Date Reported: 07/24/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		1.3	1.0	mg/kg	
Arsenic		44.4	0.2	mg/kg	
Beryllium		1.4	0.1	mg/kg	
Cadmium		1.4	0.1	mg/kg	
Chromium		31.3	0.1	mg/kg	
Copper		228	0.1	mg/kg	
Lead		259	0.2	mg/kg	
Nickel		36.5	0.1	mg/kg	
Selenium		1.7	0.2	mg/kg	
Silver		< 0 1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		323	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		0.18	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/20/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.44		Units	

CHAIN OF CUSTODY RECORD

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: DET
Street Address: 230 WOODLAWN AVE
City: AURORA State: IL Zip: 60506
Phone: 630-897-8350 Fax: 630-897-5696
Send Report To: MARC FISHER
Sampled By: MARC FISHER

Project I.D.: USPS - AURORA MPO
P.O. #: 01031-03

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix	VOC	SVOC	PP METALS	MERCURY	Cyanide	pH			Comments	Lab I.D.
7/14/06	SB-5 6-8ft	S	X	X	X	X	X	X				001
	SB-1 2-4ft											002
	SB-10 4-8ft.											003
	SB-11 4-8ft											004
	SB-12 4-8ft											005
	SB-7 8-10ft											006
	SB-6 2-4ft											007
	SB-9 8-10ft											008
	SB-2 12-15ft											009
	SB-8 4-8ft											010

Cooler Temperature: 4 °C on ice
Received within 6 hrs. of collection: _____

Notes and Special Instructions: _____

Relinquished By: [signature] Date/Time 7/14/06 1620 Received By: [signature] Date/Time 7/14/06 16 20

Relinquish[illegible] Date/Time _____ [illegible]ed By: _____ Date/Time _____

Rev 1/01

First Environmental Laboratories, Inc.

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July 26, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: USPS - Aurora MPO; DEI #01031-03
First Environmental File ID: 6-3048
Date Received: July 17, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworski
Project Manager

First Environmental Laboratories, Inc.
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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SB-4; 4-7.5'
Sample No: 6-3048-001

Date Collected: 07/17/06
Time Collected: 8:05
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	76.09		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10 0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SB-4; 4-7.5'
Sample No: 6-3048-001

Date Collected: 07/17/06
Time Collected: 8.05
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SB-4; 4-7.5'
Sample No: 6-3048-001

Date Collected: 07/17/06
Time Collected: 8:05
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SB-4; 4-7.5'
Sample No: 6-3048-001

Date Collected: 07/17/06
Time Collected: 8:05
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
2,4,5-Trichlorophenol	< 330	330	ug/kg	
2,4,6-Trichlorophenol	< 330	330	ug/kg	
Total Metals **Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06		Preparation Date: 07/18/06		
Antimony	< 1 0	1.0	mg/kg	
Arsenic	5.9	0.2	mg/kg	
Beryllium	0.8	0.1	mg/kg	
Cadmium	0.8	0.1	mg/kg	
Chromium	21.7	0.1	mg/kg	
Copper	18.5	0.1	mg/kg	
Lead	12.6	0.2	mg/kg	
Nickel	24.8	0.1	mg/kg	
Selenium	< 0.2	0.2	mg/kg	
Silver	< 0.1	0.1	mg/kg	
Thallium	< 1.0	1.0	mg/kg	
Zinc	68.9	0.5	mg/kg	
Total Metals **Method: 7470A**				
Analysis Date: 07/19/06				
Mercury	< 0.05	0.05	mg/kg	
Cyanide, Total **Method: 4500CN,C,E**				
Analysis Date: 07/21/06				
Cyanide, Total	< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10 **Method: 4500H+B**				
Analysis Date: 07/18/06				
pH @ 25°C, 1:10	8.56		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	86.46		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	162	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	525	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:55
Sample ID:	SB-13; 0-4'	**Date Received:**	07/17/06
Sample No:	6-3048-002	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	617	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	
2,4,5-Trichlorophenol	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SB-13; 0-4'
Sample No: 6-3048-002

Date Collected: 07/17/06
Time Collected: 9:55
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		4.6	1.0	mg/kg	
Arsenic		31.8	0.2	mg/kg	
Beryllium		1.6	0.1	mg/kg	
Cadmium		3.0	0.1	mg/kg	
Chromium		19.2	0.1	mg/kg	
Copper		114	0.1	mg/kg	
Lead		325	0.2	mg/kg	
Nickel		33.7	0.1	mg/kg	
Selenium		3.0	0.2	mg/kg	
Silver		0.7	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		319	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		0.17	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		0.17	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		7.40		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	82.01		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-1
Sample No: 6-3048-003

Date Collected: 07/17/06
Time Collected: 9:00
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		< 1.0	1.0	mg/kg	
Arsenic		1.8	0.2	mg/kg	
Beryllium		0.1	0.1	mg/kg	
Cadmium		0.2	0.1	mg/kg	
Chromium		3.0	0.1	mg/kg	
Copper		6.5	0.1	mg/kg	
Lead		11.1	0.2	mg/kg	
Nickel		3.4	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		< 0.1	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		31.6	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.05	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.88		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:15
Sample ID:	SED-2	**Date Received:**	07/17/06
Sample No:	6-3048-004	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	83.87		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10 0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5.0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-2
Sample No: 6-3048-004

Date Collected: 07/17/06
Time Collected: 9:15
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-2
Sample No: 6-3048-004

Date Collected: 07/17/06
Time Collected: 9:15
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-2
Sample No: 6-3048-004

Date Collected: 07/17/06
Time Collected: 9:15
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Semi-Volatile Compounds	**Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
2,4,5-Trichlorophenol		< 330	330	ug/kg	
2,4,6-Trichlorophenol		< 330	330	ug/kg	
Total Metals	**Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06			Preparation Date: 07/18/06		
Antimony		2.4	1.0	mg/kg	
Arsenic		2.6	0.2	mg/kg	
Beryllium		0.2	0.1	mg/kg	
Cadmium		0.7	0.1	mg/kg	
Chromium		13.0	0.1	mg/kg	
Copper		228	0.1	mg/kg	
Lead		55.4	0.2	mg/kg	
Nickel		21.1	0.1	mg/kg	
Selenium		< 0.2	0.2	mg/kg	
Silver		0.2	0.1	mg/kg	
Thallium		< 1.0	1.0	mg/kg	
Zinc		125	0.5	mg/kg	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		0.07	0.05	mg/kg	
Cyanide, Total	**Method: 4500CN,C,E**				
Analysis Date: 07/21/06					
Cyanide, Total		< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10	**Method: 4500H+B**				
Analysis Date: 07/18/06					
pH @ 25°C, 1:10		8.77		Units	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-3
Sample No: 6-3048-005

Date Collected: 07/17/06
Time Collected: 9:30
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Solids, Total **Method: 160.3**				
Analysis Date: 07/19/06				
Total Solids	81.41		%	
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/kg	
Benzene	< 5.0	5.0	ug/kg	
Bromodichloromethane	< 5.0	5.0	ug/kg	
Bromoform	< 5.0	5.0	ug/kg	
Bromomethane	< 10.0	10.0	ug/kg	
2-Butanone (MEK)	< 10.0	10.0	ug/kg	
Carbon disulfide	< 5.0	5.0	ug/kg	
Carbon tetrachloride	< 5.0	5.0	ug/kg	
Chlorobenzene	< 5 0	5.0	ug/kg	
Chlorodibromomethane	< 5.0	5.0	ug/kg	
Chloroethane	< 10.0	10.0	ug/kg	
Chloroform	< 5.0	5.0	ug/kg	
Chloromethane	< 10.0	10.0	ug/kg	
1,1-Dichloroethane	< 5.0	5.0	ug/kg	
1,2-Dichloroethane	< 5.0	5.0	ug/kg	
1,1-Dichloroethene	< 5.0	5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/kg	
1,2-Dichloropropane	< 5.0	5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	5.0	ug/kg	
Ethylbenzene	< 5.0	5.0	ug/kg	
2-Hexanone	< 10.0	10.0	ug/kg	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/kg	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/kg	
Methylene chloride	< 5.0	5.0	ug/kg	
Styrene	< 5.0	5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/kg	
Tetrachloroethene	< 5.0	5.0	ug/kg	
Toluene	< 5.0	5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	5.0	ug/kg	
Trichloroethene	< 5.0	5.0	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-3
Sample No: 6-3048-005

Date Collected: 07/17/06
Time Collected: 9:30
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5035A/8260B**				
Analysis Date: 07/21/06				
Vinyl acetate	< 10.0	10.0	ug/kg	
Vinyl chloride	< 10.0	10.0	ug/kg	
Xylene, Total	< 5.0	5.0	ug/kg	
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
Acenaphthene	< 330	330	ug/kg	
Acenaphthylene	< 330	330	ug/kg	
Anthracene	< 330	330	ug/kg	
Benzidine	< 330	330	ug/kg	
Benzo(a)anthracene	< 330	330	ug/kg	
Benzo(a)pyrene	< 90	90	ug/kg	
Benzo(b)fluoranthene	< 330	330	ug/kg	
Benzo(k)fluoranthene	< 330	330	ug/kg	
Benzo(ghi)perylene	< 330	330	ug/kg	
Benzoic acid	< 330	330	ug/kg	
Benzyl alcohol	< 330	330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	330	ug/kg	
bis(2-Chloroethyl)ether	< 330	330	ug/kg	
bis(2-Chloroisopropyl)ether	< 330	330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	330	ug/kg	
4-Bromophenyl phenyl ether	< 330	330	ug/kg	
Butyl benzyl phthalate	< 330	330	ug/kg	
Carbazole	< 330	330	ug/kg	
4-Chloroaniline	< 330	330	ug/kg	
4-Chloro-3-methylphenol	< 330	330	ug/kg	
2-Chloronaphthalene	< 330	330	ug/kg	
2-Chlorophenol	< 330	330	ug/kg	
4-Chlorophenyl phenyl ether	< 330	330	ug/kg	
Chrysene	< 330	330	ug/kg	
Di-n-butyl phthalate	< 330	330	ug/kg	
Di-n-octylphthalate	< 330	330	ug/kg	
Dibenzo(a,h)anthracene	< 90	90	ug/kg	
Dibenzofuran	< 330	330	ug/kg	
1,2-Dichlorobenzene	< 330	330	ug/kg	
1,3-Dichlorobenzene	< 330	330	ug/kg	
1,4-Dichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:30
Sample ID:	SED-3	**Date Received:**	07/17/06
Sample No:	6-3048-005	**Date Reported:**	07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
3,3'-Dichlorobenzidine	< 660	660	ug/kg	
2,4-Dichlorophenol	< 330	330	ug/kg	
Diethyl phthalate	< 330	330	ug/kg	
2,4-Dimethylphenol	< 330	330	ug/kg	
Dimethyl phthalate	< 330	330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	1600	ug/kg	
2,4-Dinitrophenol	< 1,600	1600	ug/kg	
2,4-Dinitrotoluene	< 250	250	ug/kg	
2,6-Dinitrotoluene	< 260	260	ug/kg	
Fluoranthene	< 330	330	ug/kg	
Fluorene	< 330	330	ug/kg	
Hexachlorobenzene	< 330	330	ug/kg	
Hexachlorobutadiene	< 330	330	ug/kg	
Hexachlorocyclopentadiene	< 330	330	ug/kg	
Hexachloroethane	< 330	330	ug/kg	
Indeno(1,2,3-cd)pyrene	< 330	330	ug/kg	
Isophorone	< 330	330	ug/kg	
2-Methylnaphthalene	< 330	330	ug/kg	
2-Methylphenol	< 330	330	ug/kg	
3 & 4-Methylphenol	< 330	330	ug/kg	
Naphthalene	< 330	330	ug/kg	
2-Nitroaniline	< 1,600	1600	ug/kg	
3-Nitroaniline	< 1,600	1600	ug/kg	
4-Nitroaniline	< 1,600	1600	ug/kg	
Nitrobenzene	< 260	260	ug/kg	
2-Nitrophenol	< 1,600	1600	ug/kg	
4-Nitrophenol	< 1,600	1600	ug/kg	
n-Nitrosodi-n-propylamine	< 330	330	ug/kg	
n-Nitrosodimethylamine	< 330	330	ug/kg	
n-Nitrosodiphenylamine	< 330	330	ug/kg	
Pentachlorophenol	< 330	330	ug/kg	
Phenanthrene	< 330	330	ug/kg	
Phenol	< 330	330	ug/kg	
Pyrene	< 330	330	ug/kg	
Pyridine	< 330	330	ug/kg	
1,2,4-Trichlorobenzene	< 330	330	ug/kg	

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Analytical Report

Client: DEUCHLER ENVIRONMENTAL
Project ID: USPS - Aurora MPO; DEI #01031-03
Sample ID: SED-3
Sample No: 6-3048-005

Date Collected: 07/17/06
Time Collected: 9:30
Date Received: 07/17/06
Date Reported: 07/26/06

Results are reported on a dry weight basis.

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3540C**		
Analysis Date: 07/21/06		Preparation Date: 07/20/06		
2,4,5-Trichlorophenol	< 330	330	ug/kg	
2,4,6-Trichlorophenol	< 330	330	ug/kg	
Total Metals **Method: 6010B**		**Preparation Method 3050B**		
Analysis Date: 07/21/06		Preparation Date: 07/18/06		
Antimony	< 1.0	1.0	mg/kg	
Arsenic	5.5	0.2	mg/kg	
Beryllium	0.4	0.1	mg/kg	
Cadmium	0.5	0.1	mg/kg	
Chromium	6.8	0.1	mg/kg	
Copper	17.1	0.1	mg/kg	
Lead	26.5	0.2	mg/kg	
Nickel	10.6	0.1	mg/kg	
Selenium	< 0 2	0.2	mg/kg	
Silver	< 0.1	0.1	mg/kg	
Thallium	< 1.0	1.0	mg/kg	
Zinc	173	0.5	mg/kg	
Total Metals **Method: 7470A**				
Analysis Date: 07/19/06				
Mercury	< 0.05	0 05	mg/kg	
Cyanide, Total **Method: 4500CN,C,E**				
Analysis Date: 07/21/06				
Cyanide, Total	< 0.10	0.10	mg/kg	
pH @ 25°C, 1:10 **Method: 4500H+B**				
Analysis Date: 07/18/06				
pH @ 25°C, 1:10	8.92		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5 0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	9:45
Sample ID:	SW-1	**Date Received:**	07/17/06
Sample No:	6-3048-006	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Total Metals **Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06		Preparation Date: 07/17/06		
Antimony	< 0.006	0.006	mg/L	
Arsenic	< 0.002	0.002	mg/L	
Beryllium	< 0.001	0.001	mg/L	
Cadmium	< 0.001	0.001	mg/L	
Chromium	< 0.001	0.001	mg/L	
Copper	0.003	0.001	mg/L	
Lead	0.003	0.002	mg/L	
Nickel	0.002	0.001	mg/L	
Selenium	< 0.002	0.002	mg/L	
Silver	< 0.001	0.001	mg/L	
Thallium	< 0.002	0.002	mg/L	
Zinc	0.022	0.005	mg/L	
Total Metals **Method: 7470A**				
Analysis Date: 07/18/06				
Mercury	< 0.0005	0.0005	mg/L	
Cyanide, Total **Method: 335.4R1.0**				
Analysis Date: 07/25/06				
Cyanide, Total	< 0.005	0.005	mg/L	
pH @ 25°C **Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30				
pH @ 25°C	7.86		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5 0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-2	**Date Received:**	07/17/06
Sample No:	6-3048-007	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		0.002	0.001	mg/L	
Copper		< 0.001	0.001	mg/L	
Lead		< 0.002	0.002	mg/L	
Nickel		0.002	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.009	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30					
pH @ 25°C		7.91		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10 00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/19/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5 0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1 0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5 0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/17/06
Project ID:	USPS - Aurora MPO; DEI #01031-03	**Time Collected:**	10:00
Sample ID:	SW-3	**Date Received:**	07/17/06
Sample No:	6-3048-008	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/19/06			Preparation Date: 07/17/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		0.048	0.002	mg/L	
Beryllium		0.003	0.001	mg/L	
Cadmium		0.002	0.001	mg/L	
Chromium		0.059	0.001	mg/L	
Copper		0.105	0.001	mg/L	
Lead		0.122	0.002	mg/L	
Nickel		0.099	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.758	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/18/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/17/06 14:30					
pH @ 25°C		7.89		Units	

CHAIN OF CUSTODY RECORD

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: DEUCHLER ENVIRONMENTAL, INC
Street Address: 230 WOODLAWN AVE
City: AURORA, IL 60506 State: Zip:
Phone: 630-897-8330 Fax: 630-897-5696
Send Report To: MARC FISHER
Sampled By: MRF/CC

Project I.D.: USPS - AURORA MPO
P.O. #.: DEI # 01031-03

Matrix Codes: S = Soil W = Water O = Other

Analyses: VOC, SVOC, RP metals, Mercury, cyanide, pH

Date/Time Taken	Sample Description	Matrix	VOC	SVOC	RP metals	Mercury	cyanide	pH			Comments	Lab I.D.
7/17/06 0805	SB-4 4-7.5 ft ~~0805~~	S									6-3048-001	
0955	SB-13 0-4 ft ~~0955~~	S										002
0900	SED-1	S									Ind. Creek sediment sample	003
0915	SED-2	S										004
0930	SED-3	S										005
0945	SW-1	W										006
1000	SW-2	W									Ind. Creek Surf. water sample	007
1015	SW-3	W										008

Cooler Temperature: 4 °C
Received within 6 hrs. of collection: _____

Notes and Special Instructions: _____

Relinquished By: [signature] Date/Time 7/17/06 1430 Received By: [signature] Date/Time 7/17/06 14 30

Relinquishe _____ Date/Time _____ F ed By: _____ Date/Time _____

Rev. 1/01

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July 26, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: Aurora MPO
First Environmental File ID: 6-3063
Date Received: July 18, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworski
Project Manager

First Environmental Laboratories, Inc.

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1 0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10 0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1 0	ug/L	
Chloroethane	< 10.0	10 0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5 0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5 0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:00
Sample ID:	MW-1	**Date Received:**	07/18/06
Sample No:	6-3063-001	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		0.002	0.001	mg/L	
Cadmium		0.002	0.001	mg/L	
Chromium		0.002	0.001	mg/L	
Copper		0.062	0.001	mg/L	
Lead		0.004	0.002	mg/L	
Nickel		0.091	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.046	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.91		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5 0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5 0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5 0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	< 0.13	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	< 2	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	< 5	5	ug/L	
Pyrene	< 2	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	13:20
Sample ID:	MW-2	**Date Received:**	07/18/06
Sample No:	6-3063-002	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		< 0.002	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		0.004	0.001	mg/L	
Copper		0.016	0.001	mg/L	
Lead		0.016	0.002	mg/L	
Nickel		0.014	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.025	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.96		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/22/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10 0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5 0	ug/L	
1,1,1-Trichloroethane	< 5.0	5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
Benzidine	< 10	10	ug/L	
Benzoic acid	< 50	50	ug/L	
Benzyl alcohol	< 20	20	ug/L	
bis(2-Chloroethoxy)methane	< 10	10	ug/L	
bis(2-Chloroethyl)ether	< 10	10	ug/L	
bis(2-Chloroisopropyl)ether	< 10	10	ug/L	
bis(2-Ethylhexyl)phthalate	< 5	5	ug/L	
4-Bromophenyl phenyl ether	< 10	10	ug/L	
Butyl benzyl phthalate	< 10	10	ug/L	
Carbazole	< 10	10	ug/L	
4-Chloroaniline	< 10	10	ug/L	
4-Chloro-3-methylphenol	< 20	20	ug/L	
2-Chloronaphthalene	< 10	10	ug/L	
2-Chlorophenol	< 10	10	ug/L	
4-Chlorophenyl phenyl ether	< 10	10	ug/L	
Dibenzofuran	< 10	10	ug/L	
Di-n-butyl phthalate	< 10	10	ug/L	
1,2-Dichlorobenzene	< 10	10	ug/L	
1,3-Dichlorobenzene	< 10	10	ug/L	
1,4-Dichlorobenzene	< 10	10	ug/L	
2,4-Dichlorophenol	< 10	10	ug/L	
Diethyl phthalate	< 10	10	ug/L	
2,4-Dimethylphenol	< 10	10	ug/L	
Dimethyl phthalate	< 10	10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	50	ug/L	
2,4-Dinitrophenol	< 10	10	ug/L	
2,4-Dinitrotoluene	< 10	10	ug/L	
2,6-Dinitrotoluene	< 10	10	ug/L	
Di-n-octylphthalate	< 10	10	ug/L	
Hexachlorobenzene	< 10	10	ug/L	
Hexachlorobutadiene	< 10	10	ug/L	
Hexachlorocyclopentadiene	< 10	10	ug/L	
Hexachloroethane	< 5	5	ug/L	
Isophorone	< 10	10	ug/L	
2-Methylnaphthalene	< 10	10	ug/L	
2-Methylphenol	< 10	10	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Semi-Volatile Compounds **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/20/06		Preparation Date: 07/19/06		
3 & 4-Methylphenol	< 10	10	ug/L	
2-Nitroaniline	< 50	50	ug/L	
3-Nitroaniline	< 50	50	ug/L	
4-Nitroaniline	< 20	20	ug/L	
Nitrobenzene	< 10	10	ug/L	
2-Nitrophenol	< 10	10	ug/L	
4-Nitrophenol	< 50	50	ug/L	
n-Nitrosodimethylamine	< 10	10	ug/L	
n-Nitrosodiphenylamine	< 10	10	ug/L	
n-Nitrosodi-n-propylamine	< 10	10	ug/L	
Pentachlorophenol	< 10	10	ug/L	
Phenol	< 10	10	ug/L	
1,2,4-Trichlorobenzene	< 10	10	ug/L	
2,4,5-Trichlorophenol	< 10	10	ug/L	
2,4,6-Trichlorophenol	< 10	10	ug/L	
Polynuclear Aromatic Hydrocarbons **Method: 8270C**		**Preparation Method 3510C**		
Analysis Date: 07/21/06		Preparation Date: 07/19/06		
Acenaphthene	< 10	10	ug/L	
Acenaphthylene	< 10	10	ug/L	
Anthracene	< 5	5	ug/L	
Benzo(a)anthracene	0.68	0.13	ug/L	
Benzo(a)pyrene	< 0.2	0.2	ug/L	
Benzo(b)fluoranthene	< 0.18	0.18	ug/L	
Benzo(k)fluoranthene	< 0.17	0.17	ug/L	
Benzo(ghi)perylene	< 0.4	0.4	ug/L	
Chrysene	< 1.5	1.5	ug/L	
Dibenzo(a,h)anthracene	< 0.3	0.3	ug/L	
Fluoranthene	< 2	2	ug/L	
Fluorene	4	2	ug/L	
Indeno(1,2,3-cd)pyrene	< 0.3	0.3	ug/L	
Naphthalene	< 10	10	ug/L	
Phenanthrene	12	5	ug/L	
Pyrene	4	2	ug/L	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/18/06
Project ID:	Aurora MPO	**Time Collected:**	14:00
Sample ID:	MW-3	**Date Received:**	07/18/06
Sample No:	6-3063-003	**Date Reported:**	07/26/06

Analyte		Result	R.L.	Units	Flags
Total Metals	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 07/21/06			Preparation Date: 07/20/06		
Antimony		< 0.006	0.006	mg/L	
Arsenic		0.030	0.002	mg/L	
Beryllium		< 0.001	0.001	mg/L	
Cadmium		< 0.001	0.001	mg/L	
Chromium		< 0.001	0.001	mg/L	
Copper		0.008	0.001	mg/L	
Lead		0.010	0.002	mg/L	
Nickel		0.006	0.001	mg/L	
Selenium		< 0.002	0.002	mg/L	
Silver		< 0.001	0.001	mg/L	
Thallium		< 0.002	0.002	mg/L	
Zinc		0.010	0.005	mg/L	
Total Metals	**Method: 7470A**				
Analysis Date: 07/19/06					
Mercury		< 0.0005	0.0005	mg/L	
Cyanide, Total	**Method: 335.4R1.0**				
Analysis Date: 07/25/06					
Cyanide, Total		< 0.005	0.005	mg/L	
pH @ 25°C	**Method: 4500H+,B**				
Analysis Date: 07/18/06 15:15					
pH @ 25°C		6.91		Units	

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	
Project ID:	Aurora MPO	**Time Collected:**	
Sample ID:	Trip Blank	**Date Received:**	07/18/06
Sample No:	6-3063-004	**Date Reported:**	07/26/06

Analyte	Result	R.L.	Units	Flags
Volatile Organic Compounds **Method: 5030B/8260B**				
Analysis Date: 07/21/06				
Acetone	< 100	100	ug/L	
Benzene	< 5.0	5.0	ug/L	
Bromodichloromethane	< 1.0	1.0	ug/L	
Bromoform	< 1.0	1.0	ug/L	
Bromomethane	< 5.0	5.0	ug/L	
2-Butanone (MEK)	< 10.0	10.0	ug/L	
Carbon disulfide	< 5.0	5.0	ug/L	
Carbon tetrachloride	< 5.0	5.0	ug/L	
Chlorobenzene	< 5.0	5.0	ug/L	
Chlorodibromomethane	< 1.0	1.0	ug/L	
Chloroethane	< 10.0	10.0	ug/L	
Chloroform	< 1.0	1.0	ug/L	
Chloromethane	< 10.0	10.0	ug/L	
1,1-Dichloroethane	< 5.0	5.0	ug/L	
1,2-Dichloroethane	< 5.0	5.0	ug/L	
1,1-Dichloroethene	< 5.0	5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	5.0	ug/L	
1,2-Dichloropropane	< 5.0	5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	1.0	ug/L	
Ethylbenzene	< 5.0	5.0	ug/L	
2-Hexanone	< 10.0	10.0	ug/L	
Methyl-tert-butylether (MTBE)	< 5.0	5.0	ug/L	
4-Methyl-2-pentanone (MIBK)	< 10.0	10.0	ug/L	
Methylene chloride	< 5.0	5.0	ug/L	
Styrene	< 5.0	5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	5.0	ug/L	
Tetrachloroethene	< 5.0	5.0	ug/L	
Toluene	< 5.0	5.0	ug/L	
1,1,1-Trichloroethane	< 5.0	5 0	ug/L	
1,1,2-Trichloroethane	< 5.0	5.0	ug/L	
Trichloroethene	< 5.0	5.0	ug/L	
Vinyl acetate	< 10.0	10.0	ug/L	
Vinyl chloride	< 2.0	2.0	ug/L	
Xylene, Total	< 5.0	5.0	ug/L	

CHAIN OF CUSTODY RECORD

Page____ of ____ pgs

First Environmental Laboratories, Inc.

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IEPA Certification# 100292

Company Name: Deuchler Environmental, Inc.
Street Address: 230 Woodlawn
City: Aurora State: IL Zip: 60506
Phone: 630-897-8380 Fax: 630-897-5696 e-mail:
Send Report To: Marc Fischer Via: Fax ☒ e-mail ☐
Sampled By: Carrie Carter

Project I.D.: ~~9604~~ Aurora MPO
P.O. #.:

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix	VOCs	SVOCs/PNAs	Priority Poll Metals	Mercury	Cyanide	pH			Comments	Lab I.D.
* 7/18/06 1:00	MW-1 *	W	✓	✓	✓	✓	✓	✓				6-3063-001
7/18/06 1:20	MW-2 *	W	✓	✓	✓	✓	✓	✓				002
7/18/06 2:00	MW-3 *	W	✓	✓	✓	✓	✓	✓				003
	Trip Blank	W	✓									004

FOR LAB USE ONLY:

Cooler Temperature 0 1-6ºC Yes ✓ No __ _____ºC
Received within 6 hrs. of collection _____
Ice Present Yes ✓ No__

Sample Refrigerated Yes__ No__
Refrigerator Temperature _____ºC
5035 Vials Frozen Yes__ No__
Freezer Temperature _____ºC

Containers Received Preserved ☑ Yes ☐ No

Notes and Special Instructions: Decant Sample

Relinquished By: Carrie J. Carter Date/Time 7/18/06 2:35p Received By: [signature] Date/Time 7/18/06 14:35
Relinquishe _____ Date/Time _____ [illegible]ed By: _____ Date/Time _____

Rev. 4/06

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August 04, 2006

Mr. Marc Fisher
DEUCHLER ENVIRONMENTAL
230 Woodlawn Ave.
Aurora, IL 60506

Project ID: USPS-Aurora MPO; P.O. #01031-03
First Environmental File ID: 6-3257
Date Received: July 31, 2006

Dear Mr. Marc Fisher:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number 001532: 04/26/06 through 02/28/07.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworski
Project Manager

First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

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Analytical Report

Client:	DEUCHLER ENVIRONMENTAL	**Date Collected:**	07/14/06
Project ID:	USPS-Aurora MPO; P.O. #01031-03	**Time Collected:**	16:20
Sample ID:	SB-12; 4-8'	**Date Received:**	07/31/06
Sample No:	6-3257-001	**Date Reported:**	08/04/06

Analyte		Result	R.L.	Units	Flags
TCLP Metals Method 1311	**Method: 6010B**		**Preparation Method 3010A**		
Analysis Date: 08/03/06			Preparation Date: 08/01/06		
Lead		0.003	0.002	mg/L	

CHAIN OF CUSTODY RECORD

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IEPA Certification# 100292

Company Name: DET
Street Address: 230 WOODLAWN AVE
City: AURORA State: IL Zip: 60506
Phone: 630-897-8370 Fax 630-897-5696
Send Report To: MARC FISHER
Sampled By: MARC FISHER

Project I.D.: USPS - AURORA MPO
P.O. #: 01031-03

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix	VOC	SVOC	PP METALS	MERCURY	Cyanide	PH	TCLP LEAD MARC 7/21/06		Comments	Lab I.D.
7/14/06	SB-5 6-8ft	S	X	X	X	X	X	X				001
	SB-1 2-4ft											002
	SB-10 4-8ft											003
	SB-11 4-8ft											004
	SB-12 4-8ft							X			6-3257-001	005
	SB-7 8-10ft											006
	SB-6 2-4ft											007
	SB-9 8-10ft											008
	SB-2 12-15ft											009
	SB-8 4-8ft											010

Cooler Temperature: 4 °C on ice
Received within 6 hrs. of collection: _____

Notes and Special Instructions: _____

Relinquished By: [signature] Date/Time 7/14/06 1620 Received By: [signature] Date/Time 7/14/06 1620

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 1/01

APPENDIX F – DEI SITE INVESTIGATION SOP's

DEUCHLER ENVIRONMENTAL, INC.

Consulting Engineers

230 Woodlawn Avenue • Aurora, Illinois 60506 • (630) 897-8380 • Fax (630) 897-5696

Standard Operating Procedures for

Environmental Subsurface Soil Assessments

SOP #1-A

Version 2.0

Date of Original Draft: June 7, 2001

Date of Most Recent Modification: December 14, 2005

09-27-06

Philippe Moreau, P.E.
DEI President and Principal Engineer

Date

9/26/06

Marc R. Fisher
DEI Environmental Manager

Date

9/26/06

Carrie Carter
DEI Project Manager

Date

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Figure 2: USCS Soil Classification Chart
Figure 3: Example Container Labels
Figure 4: Chain-of-Custody Record

1.0 GENERAL APPLICABILITY

This Standard Operating Procedure ("SOP") establishes the methods to be used by Deuchler Environmental, Inc. ("DEI") personnel as part of subsurface soil assessments. The subsurface soil assessments covered by this SOP are conducted in association with the investigation of subsurface contaminant releases and will identify the geology, hydrogeology and the magnitude and extent of soil and ground water contamination.

This SOP is intended to comply with the requirements of subsurface assessments associated with property transaction due diligence (Phase II Environmental Site Assessments) and with governmental (state or federal) enforcement and/or corrective action programs. The subsurface assessments will characterize the conditions present at the subject site through the collection of soil samples for physical and chemical testing.

This SOP is applicable only to the assessment of unconsolidated materials that exist between the ground surface and bedrock and includes methodologies for advancing boring and/or sampling devices to desired depths as well as specific soil sampling and field analysis procedures. In most cases, borings will be advanced using hollow stem augers or direct push technology and soil samples will be retrieved using stainless steel, split-barrel samplers in 2-, 3- or 4-foot lengths.

2.0 DEFINITIONS

This section includes the definitions of the terms used in this SOP to describe the subsurface assessment methodologies.

2.1 Boring Logs: Standard forms utilized during installation of the boring to document conditions as they are encountered at depth.

2.2 Casing: Rigid tubular material installed in borehole prior to drilling and/or sampling to prevent borehole collapse or interzonal communication.

2.3 Clasts: Larger particles incorporated into a finer grained matrix of diamicton (document size, abundance, type).

2.4 Coarse Grained Soil: Soil with less than 50% fines (#200 sieve); sand, gravel.

2.5 Color: Soil color determined using Munsell Soil Color Chart.

2.6 Consistency/Density (field determination): Based on hand penetrometer values: less than 0.25 (very soft), 0.25-0.5 (soft), 0.5-1.0 (medium), 1.0-2.0 (stiff), 2.0-4.0 (very stiff) and greater than 4.0 (hard).

2.7 Cross-Contamination: Contamination of a sample, by the sampler, due to poor decontamination or unacceptable field practices.

2.8 Decontamination: Process utilized to ensure that all equipment and materials utilized in a sampling program have been adequately cleaned to ensure that they will not contaminate future samples.

2.9 Dilatency: Field measure for fine grained material: none (no water appears), slow (water appears slowly on surface), rapid (water appears quickly on surface).

2.10 Dry Strength: Field measure for fine grained materials: none (powder with no pressure), low (powder with light finger pressure), medium (powder/crumbles with hard finger pressure), high (broken between thumb and hard surface), very high (not broken between thumb and hard surface).

2.11 Field Book: Bound, hard-cover book assigned to individual field personnel or to individual sites for use in documenting all field activities.

2.12 Fine Grained Soils: Soil with greater than 50% fines (#200 sieve); clay, silt, organic.

2.13 Five-foot Continuous Sampler: Stainless steel tube sampling device utilized for collecting a vertical subsurface sample, typically five feet in length.

2.14 Hand Penetrometer: Hand held device used for measuring the relative strength of a cohesive soil sample in tons per square foot ("TSF") = q_u.

2.15 Joints: Vertical/subvertical separations in glacial deposits, typical to oxidized surfaces. Or fractures that occur at varying spatial relationships in lithified rocks.

2.16 Photoionization Detector ("PID") and Flame Ionization Detector ("FID"): Portable air monitoring instruments capable of determining quantitative levels of volatile organic compounds ("VOC's"), in the parts per million ("ppm") range in soil samples.

2.17 Plasticity: Field determination for fine grained sediments: non (1/8-in. thread cannot be rolled at any water content), low (thread barely rolled, and lump cannot be formed after), medium (thread is easy to roll, cannot form lump after), high (thread re-rolled several times).

2.18 Split-spoon or Split-barrel samplers: Stainless steel soil sampling devices which can be driven with the drill rig hammer and upon removal can be opened to reveal a sample of vertical section of the subsurface. Typically 2 or 4 feet in length.

2.19 Stratigraphic Contacts: Contact between two different geologic units; can be sharp (abrupt) or gradational (nature and depth).

2.20 Structure: Characteristic used to describe the physical appearance and make-up of geologic units (consolidated/unconsolidated sediments, soils or rock). Includes terms like massive (same color and texture throughout), bedded (thickness of beds, horizontal or inclined), graded, subgraded, sorting, bedding planes, joints, fractures and folding.

2.21 Toughness: Field description for fine grained sediments: low (slight pressure to roll thread), medium (medium pressure to roll thread), and high (considerable pressure to roll thread).

2.22 Weathering Zones: Field description for glacial deposits: oxidized (yellow, yellow-brown, brown, reddish), reduced (olive or light grey), and unoxidized (dark grey).

3.0 HEALTH AND SAFETY CONSIDERATIONS

For any field project, a project-specific Health and Safety Plan ("HASP") will be prepared by the DEI Health and Safety Officer before field work commences. This plan must be distributed to, and signed by, the Field Manager and each member of the DEI field team, and must be adhered to as field activities are performed. In addition, the Field Manager must maintain a copy in his/her possession and make it available on-site for review at any time during the field activities.

Soil boring installation may involve chemical hazards associated with contaminants in the environmental media (air, soil or ground water) being explored and will always involve the physical hazards associated with the field operations being conducted.

The following minimum protective measures are required, regardless of the situation:

- All persons within 50 feet of the drill rig must wear hard hats and hearing protection; and

- Personnel who are not directly involved in overseeing, inspecting or performing the drilling will remain at least 100 feet away from the drill rig.

Care should be taken to avoid injury during all field activities and steel toe/shank safety boots must be worn when on any part of the site.

Decontamination solvents should be stored in their own cooler or box, and latex gloves should be worn when handling solvents. In addition, the appropriate personal protective equipment ("PPE") must be utilized as required in the project-specific Health and Safety Plan.

It is recommended that in addition to the required OSHA 40-hour hazardous waste site worker certification, each of the team members be trained in basic first aid, including CPR and a first aid kit must be provided during all field activities.

4.0 RESPONSIBILITIES

All field personnel performing soil investigations for DEI projects will be degreed (geologist, hydrogeologist, engineer, or scientist) professionals with at least two years of experience and will be properly trained in sampling techniques, sample handling, decontamination, health and safety, and project Quality Assurance ("QA") procedures. Specific training and/or orientation will be provided for each project to insure that personnel understand the objectives and special circumstances or requirements of that project.

4.1 Project Manager

It is the Project Managers responsibility to:

- Ensure that a properly designed scope-of-work ("SOW") is prepared prior to any field activities. The SOW should identify the sampling location(s), frequency, sample type (grab vs. composite), parameters, and analytical procedures.

- Ensure that each project is properly executed and that all health and safety considerations are addressed.

- Designate a Field Manager to oversee all field activities and assign specific duties to members of the Sampling Team.

- Ensure that all personnel performing field activities have been properly trained in soil boring installation, soil classification, sample collection, and quality assurance procedures, including specific requirements of the project SOW and applicable standard operating procedures.

- Determine which samples will be analyzed for which constituents, utilizing the project-specific SOW.

- Ensure that proper decontamination procedures are selected.

- Review all data generated in the field and ensure that all necessary forms (e.g., subsurface soil boring logs) are completed and filed in the proper project file.

- Ensure that all wastes generated are properly managed.

4.2 Field Manager

It is the Field Manager's responsibility to:

- Ensure that all necessary field equipment and health and safety equipment are in good working order, and are transported to the field.
- Coordinate subcontractors; drillers (availability, proper equipment, decontamination, etc.), laboratory (sample containers, preservatives, holding times, etc.), delivery service (pick-up, delivery location, insurance, etc.), and others as applicable.
- Obtain the necessary utility clearances, and document accordingly.
- Ensure that all members of the Sample Team adhere to the requirements in the Health and Safety Plan.
- Select specific sample locations in accordance with the project-specific SOW.
- Ensure that the boring-installation/sample-collection specifications defined in the project-specific SOW and the relevant standard operating procedures are followed, including quality assurance/quality control ("QA/QC").
- Maintain detailed field records in his/her field book.
- Ensure that the proper forms (e.g., subsurface soil boring log) are completed fully and correctly.
- Ensure that the samples collected are properly labeled and that proper chain-of-custody is maintained by the Sampling Team.
- Ensure that proper packaging and shipping requirements, as identified in the SOW or SOP are followed. This includes identification of and adherence to applicable U.S. Department of Transportation ("DOT") regulations regarding shipment of materials which may be classified as waste or containing hazardous constituents.
- Ensure that all field data collected is delivered to the Project Manager upon returning from the field.
- Assist the Project Manager in determining the soil samples to analyze and in determining the parameter list.

- Notify the Project Manager of any waste materials generated as a result of field activities, which will require management.

4.3 Sampling Team

The Sampling Team is responsible for:

- Implementation of the project-specific SOW and SOP specifications for subsurface soil sampling.
- Proper use and maintenance of all field equipment and health and safety equipment in accordance with the applicable equipment manuals and SOP's.
- Maintaining detailed field records in the project field book.
- Oversight of subcontractor activities in the field.
- Selection of sample depths and specific samples, and performance of field measurements and analyses.
- Completing the proper forms (e.g., subsurface soil boring logs) fully and correctly and full documentation of all field activities in the field book for the site.
- Handling, labeling, storing, packaging, and documenting all samples collected.
- Maintaining proper chain-of-custody.
- Ensuring that all appropriate QA/QC procedures are addressed as stated in the project-specific SOW.
- Following all health and safety requirements.
- Ensuring that no cross-contamination of samples or sample locations occurs due to negligence or unacceptable operating procedures.

4.4 Subcontractors

It shall be the responsibility of the contract driller to provide the necessary materials for obtaining subsurface soil samples (drill rig, augers, split-barrel/spoon samplers, continuous samplers, etc.). Drilling equipment decontamination shall be the responsibility of the driller with oversight by the Sampling Team members.

5.0 SUPPORTING MATERIALS

The following subsections identify the equipment and supplies recommended for performing field work. **Section 5.5** lists additional equipment specific to this SOP.

5.1 Sampling Equipment/Supplies

- Aluminum foil
- Boring/sample log sheets
- Camera/film
- Deionized water rinse bottle
- Field book
- Five gallon bucket(s)
- Folding ruler (6 foot)
- Garbage Bags
- Keys (as appropriate)
- 100-foot measuring tape
- Paper towels - chemical free
- Permanent marker
- Project-specific HASP
- Project-specific SOW
- Sample containers/labels
- Shovel
- Site plan map(s)
- Spray paint - pink
- Tape measure
- Trowel
- Writing instrument (water-proof ink)
- Wristwatch or other time-piece
- Zip-lock bags

5.2 Decontamination Equipment

- Alconox or Liquinox detergent
- Steam cleaner
- Bucket
- Solvent rinse bottle
- Scrub brush
- Plastic sheets

5.3 Shipping Equipment

- Bubble wrap
- Packing tape (clear)
- Chain-of-custody forms
- Rubber bands
- Chain-of-custody seals
- Styrofoam pellet packaging
- Cooler(s)
- Large plastic container boxes
- Zip-lock bags
- Ice/cold packs

5.4 Health and Safety Equipment (as determined to be necessary by HASP)

- Ear plugs
- Respirator/cartridges (as needed)
- Eye wash
- Sampling gloves (chemically resistant and compatible for COC's)
- First aid kit
- Steel toe/shank safety shoes
- Goggles/safety glasses
- Tyvek® or splash/chemical resistant garments (as needed)
- Hard hat
- Weather-appropriate clothing
- Monitoring equipment (as needed)

5.5 SOP Specific Equipment

- Hand penetrometer
- Photoionization detector ("PID")

6.0 SOIL BORING METHODS AND PROTOCOLS

This Section of the SOP contains information regarding the soil boring methods and protocols to be used for typical site assessment activities.

6.1 General Boring Procedures

Borings are typically installed using either rotary drilling or hydraulic pushing techniques. All borings will be continuously sampled throughout the entire boring interval, unless site conditions prevent this from occurring or unless the site-specific SOW states otherwise. In most cases, borings will be advanced to the depth specified in the SOW, until bedrock is encountered or until refusal is met. Soil samples will be obtained at depth intervals equivalent to the length of the sampler used (2-, 3- or 4-foot lengths) in order to facilitate continuous logging and visual classification of the soils encountered. Soil samples for laboratory analysis will be obtained at the frequency outlined in the site-specific SOW. Soil samples for field analysis will be collected from each sampling interval as per the SOW.

The following are the standard procedures to be used in advancing casing and obtaining soil samples. Soil borings are typically advanced utilizing either a truck-mounted drill rig employing rotary drilling methods and hollow-stem augers ("HSA's") or direct-push methods. Augers will be 4.25-inch inside diameter unless otherwise specified in the SOW. Borings advanced utilizing direct-push soil-probes will either be driven via pneumatic hammer or hydraulic systems. The soil sampling protocols are the same regardless of the method employed to advance the bore holes.

Requirements described in a project-specific SOW may call for deviations in the standard procedures but these will be taken into account on a project-by-project basis. Any deviations from specified procedures will be recorded on the boring log or into a field notebook and the site-specific SOW will be referenced.

All drilling equipment will be decontaminated between locations and all sampling equipment between samples according to the "Decontamination of Equipment" SOP, in order to preclude the possibility of cross-contamination.

6.2 Advancement of Soil Borings without Outer Casing

Unless site conditions or the site-specific SOW indicate otherwise, soil borings conducted as part of environmental site assessments will be done so with no outer casing. Soil borings will be advanced using a drill rig outfitted with 4.25-inch continuous-flight, HSA's or using a direct-push, soil-probe driven via pneumatic hammer or hydraulic systems. The auger flights/probe sections will be decontaminated between borings using Alconox® (or

equivalent) detergent (triple rinsed) to prevent cross contamination. Borings are advance to the following depths:

- To the depth identified in the site-specific SOW;
- Until ground water is encountered;
- Until bedrock is encountered; or
- Until obstruction or refusal prevents further penetration of the boring.

During advancement of the boring, the depth of first ground water occurrence will be recorded as well as the stabilized depth to ground water. This is to insure that the well screen is of proper length to maintain the ground water level within the middle of the screened interval, provided monitoring wells are called for.

The following information will be documented in the field book associated with the site as part of the soil boring activities:

- Date of boring activities;
- Time of arrival at the site and the start time and end time for each boring;
- The name of the drilling subcontractor and the names of the drilling subcontractor personnel conducting the borings;
- A detailed description of the boring locations including the horizontal coordinates and ground elevation if the boring locations have been surveyed prior to the initiation of boring activities;
- The visual logging of the borehole using USCS System terminology;
- The total depth of the boring;
- The depth that ground water was first encountered;
- Stabilized depth to ground water;
- Boring ID number;
- Borehole diameter and drilling method;
- Blow counts to drive the sampler in advance of the HSA;
- The depth intervals that soil samples were obtained for field analysis and the results of the field analysis noted in the boring log; and
- The depth intervals that soil samples were obtained for laboratory analysis, including the type of analysis to be conducted and the sample identification number used on the chain-of-custody ("COC") sheets.

6.3 Advancement of Soil Borings with Outer Casing

In some instances (e.g., presence of discrete, independent water bearing units, etc.) it may be appropriate to advance outer casing to seal off the independent units.

1. The outer casing typically consists of rigid tubular material that is installed in the

borehole prior to drilling and/or sampling to prevent borehole collapse or interzonal communication. The casing shall be advanced to the required depth according to project requirements. All loose material within the casing shall be removed prior to sampling. Borings are typically advanced by two methods, drive-and-wash casing or hollow-stem augering. The casing shall be of the flush joint or flush couple type and of sufficient size to allow for soil sampling, coring, and/or monitoring well (or piezometer) installation. All casing sections shall be straight and free of any obstructions. Hollow-stem augers or solid flight augers with casing may be used according to specific project requirements as described in the project SOW. If hollow-stem augers are to be used, the bit shall be equipped with a plug device to be removed at the required sampling depth.

2. For those borings in which obstructions are encountered, the casing shall be advanced either past or through the obstruction by drilling (if possible). If the obstruction cannot be removed, the boring will be terminated and a new boring initiated at a 5 to 10 foot offset. Such an incident will be duly recorded in the field book and on the boring log.

3. To minimize the potential for external contamination, the use of recirculated water to remove sediment from the borehole will not be permitted when casing is being driven, unless specified in the project-specific SOW, directed and properly documented (in field notebook, logs) by the Sample Team Leader.

4. If recirculated water is used, all loose material within the casing will be removed by washing to the required sampling depth using a minimum amount of water. Care must be taken to limit recirculation of the wash water to those times when the water supply is extremely limited or unavailable.

7.0 SOIL SAMPLING METHODOLOGIES AND PROTOCOLS

Subsurface soil samples will be obtained using a stainless steel, split-barrel (tube) type sampler having a 2-inch outside diameter ("O.D.") with a corresponding 1-3/8 inch inside diameter ("I.D.") and outfitted with a plastic sampling sleeve to facilitate easier sample extraction. The samplers will be 2-, 3- or 4-feet long. A basket-type retainer may be required for sample collection in loose soil. Sampling frequency will be continuous, sampling each successive interval, or as otherwise specified in the project SOW.

The sampling depth will be independently determined by the inspecting Sample Team member and any discrepancies shall be resolved prior to obtaining the sample. Representative soil samples will be collected and retained for field analysis and potentially for laboratory analysis from each sampling interval. Two aliquots from each sampling interval will be retained. The sample for field analysis will be retained in a Ziploc® or equivalent bag and the sample for potential laboratory analysis will be placed in a sterile, laboratory-supplied glass sample jar.

7.1 Sample Collection and Extraction

If the sampler is not driven directly by direct push methodology, it is placed within the hollow portion of the HSA and advanced ahead of the leading auger flight to a depth that is the equivalent of the total length of the sampler. Where appropriate, samples will be obtained using the standard penetration test ("SPT"), which allows for determination of resistance within the deposit. The sampler will be driven using a 140 pound hammer with a vertical drop of 30-inches. A certificate indicating exact weight may be required for documentation purposes. The number of hammer blows required for every six inches of penetration will be recorded on the boring log.

The sampler will be opened immediately upon removal from the auger by the DEI geologist on-site. If the recovery is inadequate, another attempt will be made before drilling progresses. Adequate recovery should be no less than twenty-five (25%) percent of any discrete sampling interval, not including any residual wash material brought up with the sample, in order to provide sufficient sample volume for logging and possible chemical or physical analysis.

7.2 Physical Characterization and Logging of Soil Samples

All sampling intervals will be logged by the DEI geologist present on-site. The DEI geologist will insure that a sufficient quantity of soil is collected for the desired chemical

or physical analyses. Each sample will be visually classified and logged and placed into an appropriate laboratory-supplied container. The sample container will be labeled, and placed in a cooler for transport to the subcontracting laboratory for analysis (see Section 6.3 for sample labeling, handling and chain-of-custody procedures).

All relevant information regarding the physical classification and characteristics of the soil samples will be recorded on the field boring logs (please refer to **Appendix A, Figure 1** for a sample field log) and the sample will be classified using the Unified Soil Classification System (ASTM D-2487 and D-2488). Depending on the nature of the investigation, soil characterization will include, at a minimum, visual determination of the following:

- USCS soil/sediment type;
- Consistency/density - hand penetrometer value (q_u): very soft, soft, medium, stiff, very stiff, hard;
- Color (primary and mottling) via Munsell (name and notation);
- Moisture (dry, moist, wet);
- Plasticity (non, low, medium, high);
- Structure (massive or betted - horizontal/inclined);
- Weathering zone (oxidized, reduced, unoxidized);
- Secondary observations (joints, clasts);
- Stratigraphic contacts (sharp, gradational);
- Dry strength (none, low, medium, high, very high);
- Dilatency (none, slow, rapid); and
- Toughness (low, medium, high).

7.3 Field Analysis of Soil Samples

Unless otherwise specified in the site SOW, aliquots from all sampling intervals will be analyzed via static headspace analysis. The aliquot retained for field analysis is placed in self-locking plastic bags (Ziploc® or equivalent) such that the sample occupies no more than one-half of the bag to allow for organic contaminants to volatilize into the headspace of the bag. The sample bag is fully sealed so that no air will escape and it is placed in an environment of 70° F or higher for a minimum period of 30 minutes. If the ambient air temperature is below 70°F, then the samples obtained for static headspace analysis will be placed in a heated vehicle for the specified period of time prior to conducting the analysis.

The headspace in the bag is then tested for organic vapors using a portable photoionization detection ("PID") meter, fitted with a 10.2 eV lamp. The reading is obtained by carefully opening the corner of the bag while simultaneously inserting the PID probe into the empty space at the top of the bag. Care will be taken to not place the tip of the probe into the sample to prevent it from becoming clogged and introducing

particulates into the detector. The reading off of the PID meter is observed and recorded in the boring log or field book along with the following information:

- Sample location;
- Sample depth;
- Date sample obtained;
- Time sample obtained; and
- Time analysis conducted.

The static headspace analysis results will give a relative picture of the soil contamination that is present at the site. The PID is capable of providing qualitative measurements of volatile organic compounds ("VOC's") in the parts per million ("ppm") range. Use of the PID will allow for relative evaluation of potential contamination between soil samples from different locations. The results of the field analysis will also be used to assist in identification of those samples to be selected for specific, quantitative laboratory chemical analyses.

Proper procedures for delivery to the designated laboratory will be initiated at the appropriate time interval (e.g., at the end of each day, week, once all samples are collected, etc.) while ensuring that the samples will be delivered within the proper analytical holding times.

7.4 Laboratory Analysis of Soil Samples

This subsection of the SOP pertains the procedures for obtaining and containerizing soil samples for laboratory analysis.

7.4.1 Determination of the Soil Sampling Locations

In most site assessments that are conducted, at least one soil sample is obtained from each soil boring for laboratory analysis. The specific requirements of the sampling program will be outlined in the site SOW.

The depth interval from which samples are obtained for laboratory analysis will be specified in the site-specific SOW. In some instances, samples from specific depth intervals will be collected for laboratory analysis (e.g., from 0 to 1-foot for surface soil evaluation, from the ground water interface, from transition zones from one sediment type to another, from the interface between bedrock and unconsolidated sediments, etc.). The site SOW will outline the number of soil samples to be collected from each boring location.

In many instances, the depth interval that is either most likely to be contaminated or the depth interval exhibiting the highest relative level of contamination will be sampled for

laboratory analysis. This determination is typically based upon the results of the field analyses that are conducted during the site assessment. Once the soil samples from each depth interval have been analyzed via static headspace analysis, the depth interval which exhibits the highest level of contamination is typically chosen for laboratory analysis.

Other indicators of contamination may be used to determine the proper depth interval from which to obtain laboratory samples such as visual observation and olfactory evidence. The specific criteria to be used in making this determination will be outlined in the site-specific SOW and it is the responsibility of the Sampling Team Leader to insure that the methods and protocols in this SOP and the site SOW are strictly adhered to.

Once the sample depth interval(s) have been chosen for laboratory analysis, the remaining field analysis samples and laboratory analysis samples (not chosen) will be disposed in accordance with the Investigation Derived Waste SOP. In some cases, the excess laboratory samples will be retained for future evaluation. In this case, these samples will be transported to the holding area under the same chain-of-custody requirements as the samples transported to the laboratory.

7.4.2 Sample Labels

The soil samples chosen for laboratory analysis will be placed in sterile, laboratory supplied containers (jars or bottles), of the appropriate size, according to the analyses to be performed. Each label (please refer to **Appendix A, Figure 3** for an example of the sample labels to be used) should be completed as follows:

- Boring location identification – This is the description of the boring location number that is used for the site assessment from which the sample is obtained. Typically, boring locations are identified with the letter "B" followed by a numeral indicating the order in which the boring was conducted (i.e., B-1, B-2, B-3, etc.). Once the boring locations have been surveyed, this will provide the exact lateral location from which the sample was obtained.

- Date: A six digit number (MM/DD/YY) indicating the month, day and year that the sample was collected;

- Time: A four digit number indicating the military time of sample collection;

- Sample Number: A unique identification number which may contain the above information, but which distinguishes samples, among those collected from the same site at the same time from the same boring location;

- Preservative: Type, if any;

- Sampler: Name of team member collecting the sample; and

- Remarks: Any pertinent observations, further sample description, or analysis to be conducted.

In most cases, the sample containers will have labels pre-affixed and typically are filled once the sample has been placed in the container. Once labeled, the samples will be placed in a cooler packed with ice to ensure a constant temperature at or near 4° C, pending transport to the laboratory for analyses. Prior to transport, a custody seal is placed on the cooler such that if the cooler is opened prior to receipt by the laboratory, the seal will be broken.

7.4.3 Custody Procedures

Once the soil samples have been labeled they are packaged for shipment to the selected laboratory. Typically, each sample container is surrounded with bubble wrap for shipment to the laboratory directly within the cooler. After the samples have been packaged for shipment, the chain-of-custody record is completed (please refer to **Appendix A, Figure 4** for the chain-of-custody form). One chain-of-custody form may be used for as many samples as will fit on the form, but all samples sharing a single chain-of-custody form must be packaged and shipped together. The sampler must complete all of the heading information on the form accurately and legibly. The method of shipment, courier name(s) and other pertinent information are entered in the "Remarks" box. A copy of the shipper's waybill or air bill must be retained by the last custodian prior to shipment.

Each cooler will contain a separate chain-of-custody record sealed within it. The entire contents of each cooler must be recorded on the chain-of-custody record(s) and the samples identified on each chain-of-custody record must be only those contained within the cooler represented by that record. Once all of the contents have all been placed within the cooler, the DEI Field Team member will perform a final check to insure that all custody procedures have been properly performed. After the final check is completed, the entire cooler is either transported to the directly to the laboratory by DEI personnel or is prepared for shipment to the laboratory by a third party. If a third party will be shipping the cooler, then it will be wrapped with custody tape such that it will be evident if the cooler is opened prior to receipt by the laboratory.

If the chain-of-custody tape is to be employed, then before each package is sealed, two pieces of chain-of-custody tape are selected and their serial numbers entered in the signature box of the appropriate chain-of-custody form(s), along with the relinquishing person's signature. Once all of the contents (including the chain-of-custody record) are inside the cooler, it is closed and sealed. The chain-of-custody tape then is affixed to

opposite ends of the lid, so that the lid cannot be opened without breaking the chain-of-custody tape. Each chain-of-custody tape is signed and dated by the person sealing the package. Cellophane tape should be affixed over each chain-of-custody seal to protect it from weathering and abrasion. At this stage, the package should be wrapped with clear fiber shipping tape to ensure that it will not open upon transport. The shipping tape should be placed over the chain-of-custody tape so that the package cannot be opened without tearing it.

8.0 REFERENCES

ASTM Method D-2487, "Classification of Soils for Engineering Purposes." Annual Book of ASTM Standards, Volumes 4.08 and 4.09 Soil and Rock (Revision Issued Annually), ASTM, Philadelphia, PA.

ASTM Method D-2488, "Visual Manual Procedure for Description and Identification of Soils." Annual Book of ASTM Standards, Volumes 4.08 and 4.09 Soil and Rock (Revision Issued Annually), ASTM, Philadelphia, PA.

"Compendium of Superfund Field Operation Methods." United States Environmental Protection Agency. EPA/540/P-87/001. December 1987.

"Field Measurements: Dependable Data When You Need It." United States Environmental Protection Agency. EPA/530/MUST-90/003. September 1990.

"Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells." United States Environmental Protection Agency. EPA/600/4-89/034. March 1991.

"Improving Descriptions of Glacigenic Sediments: Adding Geologic Emphasis to the USCS." Kelleher, D. Improving Hydrogeologic Investigations Seminar Workshop Notebook. Midwest Geosciences Group. October 1997

Munsell Soil Color Charts. Koll Morgen Instruments Corp. 1994.

"RCRA Facility Investigation (RFI) Guidance." United States Environmental Protection Agency. EPA/530/SW-89-031. May 1989.

"Test Methods for Evaluating Solid Waste, Volume II: Field Manual." USEPA, SW-846. November 1986.

FIGURE 1

EXAMPLES OF BORING LOGS
(field and final)

Sheet ____ of ____

Field Boring Log

EUCHLER ENVIRONMENTAL, INC.
Consulting Engineers
) WOODLAWN AVENUE • AURORA, ILLINOIS 60506
HONE (630) 897-8330 FAX (630) 897-5696

Boring: ____
Date Started: ____
Completed: ____

GROUNDWATER DEPTH

W.D. ____
B.C.R. ____
A.C.R. ____

Job No. ____
Site: ____
Location: ____
Logged By: ____
Drilled By: ____
Drilling Method: ____

D2, CONSTITUENTS, CONSISTANCY, DENSITY, MOISTURE, ODOR, LENSES (?), PID, HAND PEN.

Description	Depth (Feet)	Sample No./Type	Blows	Recovery (inches)	Hnu (ppm)	Remarks

FLDBORLG

DEUCHLER ENVIRONMENTAL, INC.
Consulting Engineers – Aurora, Illinois

LOG OF BORING MW-3/SB-3

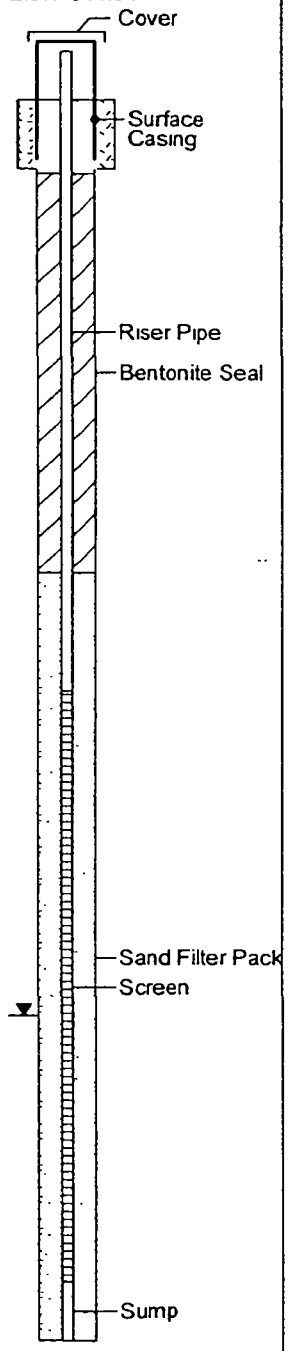
ABC Site
Aurora, Illinois
DEI Project No 000000-00

Date Started	07/14/06	Logged By	M. Fisher
Date Completed	07/17/06	Depth to Water	: 7 72
Drilling Method	Geoprobe 6610DT	Project Number	: 01031-03
Sampling Method	Direct Push 2" Split Spoon	Page	: 1 of 1
Driller	GeoServe	Total Depth	: 10 5 feet

Depth in Feet	Surf Elev 644.96	DESCRIPTION	Field Samples	% Rec-overy	PID (units)	Lab No	Remarks
0		ASPHALT					
		FILL, sand and gravel base material for ASPHALT					
1	644	FILL, silty clay, grey, stiff, brick fragment					
2	643	FILL, black, loose, sandy, brick fragments, pebbles	1	25	<1 0	–	
3	642						
4	641	SILTY CLAY, grey, moist, soft, petroleum odor at 7.5 ftbrown, very moist to wet, moist, high plasticity, some brick frags					
5	640						
6	639		2	50	10	–	BR at 10 5 ft
7	638						
8	637	SANDY CLAY; wet, grey to brown, petroleum odor					
9	636		3	50	22	6-3039-008	Lab Samp
10	635						
		BEDROCK; brown Silurian Dolomite					
11	634						

Water Level

Well MW-3
Elev. 644.34



09-26-2006

FIGURE 2

USCS SOIL CLASSIFICATION CHART

Unified Soil Classification System; from American Society for Testing and Materials, 1985

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO.200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO.4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO.200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

UNIFIED SOIL CLASSIFICATION
INCLUDING IDENTIFICATION AND DESCRIPTION

	FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 3 inches and basing fractions on estimated weights)			Group Symbols	TYPICAL NAMES
Coarse-grained Soils (More Than Half Of Material Is Larger Than No. 200 Sieve Size. The No. 200 U.S. Standard Sieve Is About The Smallest Particle Visible To The Naked Eye)	Gravels (More Than Half Of Coarse Fraction Is Larger Than No. 4 Sieve Size. For Visual Classification, The 1/4 in. Size May Be Used As Equivalent To The No. 4 Sieve Size)	Clean Gravels (Little Or No Fines)	Wide range in grain size and substantial amounts of intermediate particle sizes	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
			Predominately one size or a range of sizes with some intermediate sizes missing	GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		Gravels With Fines (Appreciable Amount Of Fines)	Non-plastic fines (for identification procedures see ML below)	GM	Silty gravels, gravel-sand-silt mixtures
			Plastic fines (for identification procedures see CL below)	GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More Than Half Of Coarse Fraction Is Smaller Than No. 4 Sieve Size)	Clean Sands (Little Or No Fines)	Wide range in grain size and substantial amounts of intermediate particle sizes	SW	Well-graded sand or gravelly sands, little or no fines
			Predominately one size or a range of sizes with some intermediate sizes missing	SP	Poorly-graded sands or gravelly sands, little or no fines
		Sands With Fines (Appreciable Amount Of Fines)	Non-plastic fines (for identification procedures see ML below)	SM	Silty sands, sand-silt mixtures
			Plastic fines (for identification procedures see CL below)	SC	Clayey sands, sand-clay mixtures

ID Procedures on Fraction Smaller Than No. 40 Sieve Size

		Dry Strength (Crushing Characteristics)	Dilatancy (Reaction to Shaking)	Toughness (Consistency Near Plastic Limit)		
Fine-grained Soils (More Than Half Of Material Is Smaller Than No. 200 Sieve Size. The No. 200 U.S. Standard Sieve Is About The Smallest Particle Visible To The Naked Eye)	Silts & Clays (Liquid Limit Less Than 50)	None to low	Rapid to slow	None	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands with slight plasticity
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Low to medium	Slow	Low	OL	Organic silts and organic silt-clays of low plasticity
	Silts & Clays (Liquid Limit Greater Than 50)	Low to medium	Slow to none	Slight to medium	MH	Inorganic silts and organic silt-clays of low plasticity
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays
		Medium to high	None to very slow	Low to medium	OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils		Readily identified by color, odor, spongy feel and frequently by fibrous texture			PT	Peat and other highly organic soils

Group Symbols: GW, GP, GM, GC, SW, SP, SM, SC, ML, CL, OL, MH, CH, OH, PT

Light Gray N7 · Gray N5 · Dark Gray N3 · Olive Gray 5Y4/1 · Greenish Gray 5G6/1 · Reddish Brown 10R3/6 · Yellowish Red 5YR4/6 · Brownish Yellow 10YR6/8 · Brown 10YR5/3 · Light Brown 10YR6/3 · Dark Brown 10YR3/3

Less than 5% – GW, GP, SW, SP
More than 12% – GM, GC, SM, SC
5% - 12% – Borderline cases requiring use of dual symbols

SOIL CLASSIFICATION

Must Include

1. Group Symbol
2. Color (Field Moisture Condition)
3. Group Name
4. Particle Size Range
5. Consistency (Soft, Hard, etc.)
6. Moisture Content (Dry, Moist, Wet)
7. Structure (Stratified, Laminated, Fissured)
8. Geologic Origin
9. Additional comments indicating soil characteristics which might affect engineering properties (organics, root holes, mica, gypsum, caving, sloughing, loss of drilling water, contamination, etc.)

May Include

10. Percentage of Boulders, Cobbles, Gravel, Sand or Fines
11. Particle Angularity (angular, rounded, etc.)
12. Particle Shape (if appropriate)
13. Maximum Particle Size
14. Hardness of Coarse Particles
15. Cementation (if present)
16. Odor (if Organic or unusual)
17. Local Name (if known)
18. Plasticity of Fines
19. Dilatancy
20. Toughness
21. Reaction with Acid

Example: SM DARK GRAY SILTY FINE SAND with trace of dark gray silty clay (wet) (loose) [FILL] (caving of borehole sides)

Clay Consistency	THUMB PENETRATION	SPT, N Blows/ft.	Unconfined Shear Strength c (PSF) TORVANE	Unconfined Compressive Strength q_u (PSF) POCKET PENETROMETER
Very soft	Easily penetrated several inches by thumb. Exudes between thumb and fingers when squeezed in hand.	<2	250	500
Soft	Easily penetrated one inch by thumb. Molded by light finger pressure.	2-4	250-500	500-1000
Medium stiff	Can be penetrated over 1/4 inch by thumb with moderate effort. Molded by strong finger pressure.	4-8	500-1000	1000-2000
Stiff	Indented about 1/4 inch by thumb but penetrated only with great effort.	8-15	1000-2000	2000-<4000
Very stiff	Readily indented by thumbnail.	15-30	2000-<4000	4000-8000
Hard	Indented with difficulty by thumbnail.	>30	>4000	>8000

Criteria for Describing Angularity of Coarse-grained Particles

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but having rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

Criteria for Describing Particle Shape

The particle shape shall be described as follows where length, width and thickness refer to the greatest, intermediate and least dimensions of a particle, respectively:

Flat	Particles with width/thickness >3
Elongated	Particles with length/width >3
Flat & Elongated	Particles meet criteria for both flat and elongated

Criteria for Describing Moisture Content

Description	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp, but no visible water
Wet	Visible free water, usually soil is below water table

Criteria for Describing the Reaction with HCl

Description	Criteria
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

Criteria for Describing Cementation

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb & a hard surface
Very High	The dry specimen cannot be broken between the thumb & a hard surface

Criteria for Describing Dilatancy

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-in. (3mm) thread cannot be rolled at any water content
Low	The thread can barely be rolled and the lump cannot be formed when dried than the plastic limit
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when dried than the plastic limit
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when dried than the plastic limit

VARIATIONS IN SOIL STRATIGRAPHY

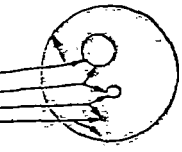
Descriptive Term	Thickness or Configuration
Parting	— 0 to 1/16 inch thickness
Seam	— 1/16 to 1/2 inch thickness
Layer	— 1/2 to 12 inch thickness
Stratum	— Greater than 12 inch thickness
Pocket	— Small, erratic deposit, usually less than 1 foot
Varved clay	— Alternating seams or layers of sand, silt and clay (laminated)
Occasional	— One or less per foot of thickness
Frequent	— More than one per foot of thickness
Thin	— 5 to 15 percent
Trace	— Less than 5 percent

CRITERIA FOR DESCRIBING STRUCTURE

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 1/4 inch thick; note thickness.
Laminated	Alternating layers of varying material or color with the layers less than 1/4 millimeter thick; note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.
Homogeneous	Same color and appearance throughout.

Soil Type	SPT, N blows/ft	Relative Density, %	Field Test
Very loose sand	4	0-15	Easily penetrated with 1/2-in. reinforcing rod pushed by hand
Loose sand	4-10	15-35	Easily penetrated with 1/2-in. reinforcing rod pushed by hand
Medium dense sand	10-30	35-65	Penetrated a foot with 1/2-in. reinforcing rod driven with a 5-lb hammer
Dense sand	30-50	65-85	Penetrated a few inches with 1/2-in. reinforcing rod driven with a 5-lb hammer
Very dense sand	50	85-100	Penetrated a few inches with 1/2-in. reinforcing rod driven with a 5-lb hammer

Material	Fraction	Sieve Size	Grain Size	Approximate Scale Size
Boulders		12 inches +	>12 inches	Larger than Basketball
Cobbles		3 in. to 12 in.	3 in. to 12 in.	Fist-sized to Basketball
Gravel	Coarse	3/4 in. to 3 in.	3/4 in. to 3 in.	Thumb-sized to Fist-sized
	Fine	No. 4 to 3/4 in.	0.19 in. to 0.75 in.	Pea-sized to Thumb-sized
Sand	Coarse	No. 10 to No. 4	0.079 in. to 0.19 in.	Rock Salt to Pea-sized
	Medium	No. 40 to No. 10	0.017 in. to 0.079 in.	Sugar-sized to Rock Salt
	Fine	No. 200 to No. 40	0.0029 in. to 0.017 in.	Flour-sized to Sugar-sized
Fines (silt/clay)		Passing No. 200	0.0029 in.	Flour-sized and smaller



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Conversion Factors – U.S. Customary to SI

To convert from	To	Multiply by
in	m	0.025 400
ft	m	0.304 800
in.^{2}	mm^2	645.160 000
ft^2	m^2	0.092 903
acre	ft^2	43 560
ft^3	m^3	28.316 847 x 10^{-3}
quart (U.S. liquid)	liter (1000 mm^3)	0.946 353
gallon (U.S. liquid)	m^3	3.785 412 X 10^{-3}
gram	dyne	980.665 000
kg (force or mass)	N	9.806 650
lb (mass)	kg (mass)	0.453 592
lb (force)	N	4.448 222
kips (1000 lbs)	kN	4.448 222
ft/min	m/min	0.304 8
ft/min	m/hr	0.011 363 63
kip/ft	kN/m	14.593 904
lb/ft	kg/m	1.488 164
atmosphere	bars	1.013 3
kg/m^2	N/m^2 (pascal)	9.806 650
kg/cm^2	kN/m^2 (kPa)	98.066 500
kip/ft^2	kN/m^2	47.880 260
kip/ft^2	kg/cm^2	0.448 244
lb/in^2 (psi)	kN/m^2	6.894 757
lb/in^2	atmosphere	0.068 046
lb/in^2	ft of H_2O	2.307
cm^2/sec	in^2/yr	4.88 4 X 10^6
T°F = 9/5 T°C+32		
lb-in (torque)	N-m	0.112 985
kip-ft	kN-m	1.355 818
ft/lb (energy or work)	joule	1.355 818
lb/ft^3	kg/m^3	16.018 460
kip/ft^3	kN/m^3	157.087 616
g/cm^3	lb/m^3	62.427 900
g/cm^3	kN/m^3	9.806 650

KEY TO SOIL SAMPLERS

- D - Dames & Moore Type "D" Sampler
- U - Dames & Moore Type "U" Sampler
- P - Dames & Moore Piston Sampler
- CA - California Modified Sampler
- TW - Dames & Moore Type "U" Sampler With Thin Wall Attachment
- C - Core Sampler (Diameter Varies)
- SPT - Standard Penetration Test Sampler
- PT - Pitcher Tube Sampler
- ST - Shelby Tube Sampler
- BL - Hand Cut Block
- BU - Bulk Sampler

KEY TO SAMPLES

- Depth of Undisturbed Sample
- Depth of Disturbed Sample
- Depth of Sampling Attempt w/ No Recovery
- Depth of Standard Penetration Test
- Depth of Standard Penetration Test With No Recovery
- Depth & Length Of Coring Run With Core Barrel or "P.T." Sampler
- Depth of Vane Shear Test

STANDARD PENETRATION TEST

Use 2-in. O.D. split-barrel sampler and 140 lb hammer dropped 30 in. Drive sampler three 6-in. increments for a total of 18 in. and record blows for each increment. EXAMPLE: 10-16-25. In a dense or hard formation a test may be terminated at less than 18 in. penetration using the following procedures:

FIRST 6 in. This increment is for seating the sampler. Drive maximum of 50 blows (refusal) and record inches penetration. EXAMPLE: 50/3."

SECOND 6 in. Drive maximum of 50 blows after seating and record inches penetration. EXAMPLE: 32-50/4."

THIRD 6 in. Drive maximum of 50 blows after seating including the second 6-in. and record inches penetration in the third increment. EXAMPLE: 10-20-30/5."

When transcribing to pencil log, enter information for first 6 in. only if 50-blow limit reached in this increment. Otherwise combine blows and inches penetration for second and third increments only.

Mohs' Hardness Scale	Mineral	Common Object for Comparison
1	Talc	
2	Gypsum	
(2.2)		Fingernail
3	Calcite	
(3.5)		Copper Penny
4	Fluorite	
5	Apatite	
(5.1)		Geological hammer
(5.2)		Pocketknife
(5.5)		Window glass
6	Feldspar	
7	Quartz	
8	Topaz	
9	Corundum	
10	Diamond	

Class	Strength	Field Test	Approximate Range of Uniaxial Compression Strength kg/cm^2 (tons/ft^2)
I	Extremely Strong	Many blows with geologic hammer required to break intact specimen.	>2000
II	Very Strong	Hand held specimen breaks with hammer end of pick under more than one blow.	2000 - 1000
III	Strong	Cannot be scraped or peeled with knife, hand held specimen can be broken with single moderate blow with pick.	1000 - 500
IV	Moderately Strong	Can just be scraped or peeled with knife. Indentations 1mm to 3mm show in specimen with moderate blow with pick.	500 - 125
V	Moderately Weak to Weak	Material crumbles under moderate blow with sharp end of pick and can be peeled with a knife, but is too hard to hand trim for triaxial test specimen.	125 - 12

Grade	Symbol	Diagnostic Features
Fresh	F	No visible sign of decomposition or discoloration. Rings when struck by hammer.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric & structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Description for Structural Features: Bedding, Foliation, or Flow Banding	Spacing	Description for Joints, Faults or Other Fractures
Very Thickly (bedded, foliated or banded)	More than 6 feet	Very Widely (fractured or jointed)
Thickly	2 – 6 feet	Widely
Medium	8 – 24 inches	Medium
Thinly	2-1/2 – 8 inches	Closely
Very Thinly	3/4 – 2-1/2 inches	Very Closely

Description for Microstructural Features: Lamination, Foliation, or Cleavage		Description for Joints, Faults or Other Fractures
Intensely (laminated, foliated or cleaved)	1/4 – 3/4 inch	Extremely Close
Very Intensely	Less than 1/4 inch	

well graded =

poorly graded =

FIGURE 3

EXAMPLE CONTAINER LABELS

Pace Analytical ®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected: _____ Time: _____
Collected by: _____
Analysis: _____

Pace Analytical ®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected _____ Time: _____
Collected by: _____
Analysis: _____

CUSTODY SEAL

Date _____

Signature _____

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by: Date Time

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

First Environmental Laboratories, Inc.

Client

Sample Description

Sampled by Date: Time:

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

First Environmental Laboratories, Inc.

Client.

Sample Description

Sampled by: Date Time

Lab ID#

First Environmental Laboratories, Inc.

FIGURE 4

CHAIN-OF-CUSTODY RECORD

st
Environmental
Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page___ __ pgs

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name:

Street Address:

City. State. Zip:

Phone. Fax. e-mail:

Send Report To: Via: Fax ☐ e-mail ☐

Sampled By:

Analyses

Project I.D.:

P.O. #.:

Matrix Codes. S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature 0 1-6ºC Yes__ No __ _____ºC
Received within 6 hrs of collection:_____
Ice Present: Yes__ No__

Sample Refrigerated Yes__ No__
Refrigerator Temperature:_____ºC
5035 Vials Frozen Yes__ No__
Freezer Temperature._____ºC

Containers Received Preserved ☐ Yes ☐ No

Notes and Special Instructions:

Relinquished By: _____ Date/Time _____ Received By. _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 4/06

DEUCHLER ENVIRONMENTAL, INC.

Consulting Engineers

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Standard Operating Procedures for

The Installation of Ground Water Monitoring Wells

SOP #2-A

Version 2.0

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09-27-06

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Date

9/26/06

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9/26/06

Carrie Carter
DEI Project Manager

Date

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1.0 GENERAL APPLICABILITY

This Standard Operating Procedure ("SOP") establishes the methods to be used by Deuchler Environmental, Inc. ("DEI") personnel for the installation of ground water monitoring wells and piezometers to be used as part of environmental site assessments and investigations. Ground water monitoring wells and piezometers are installed to quantify the depth-to-groundwater, to characterize aquifer properties and to obtain samples of groundwater for chemical analysis.

2.0 DEFINITIONS

2.1 Annulus - The space between the borehole wall and the outside of the well casing.

2.2 Aquifer - A geologic formation, group of formations, or part of a formation that can yield water to a well or spring.

2.3 Centralizer - Guide placed on the outside of well casing to center the casing in a borehole to ensure effective placement of filter pack or grout.

2.4 Bentonite - A soft, plastic, light colored clay formed by chemical alteration of volcanic ash. Bentonite will absorb large quantities of water increasing in volume up to 8 times.

2.5 Cross-Contamination - Contamination of a sample, by the sampler, due to poor decontamination or unacceptable field practices.

2.6 Decontamination - Process utilized to ensure that all equipment and materials used in a sampling program have been cleaned adequately to ensure that they will not contaminate future samples.

2.7 Field Book - Bound, hard cover book assigned to individual field personnel for use in documenting all field activities.

2.8 Filter Pack - A clean, well-rounded granular material placed in the annulus of a well between the borehole wall and well intake, to prevent solid formation material from entering the well intake and to stabilize the adjacent formation.

2.9 Groundwater - Any water below the surface of the earth, usually referring to as the zone of saturation.

2.10 Grout - A fluid mixture of cement and water with various additives or bentonite, of a consistency that can be forced through a pipe and emplaced in the annulus to form an impermeable seal.

2.11 Monitoring Well - A device installed in an excavation (borehole), constructed by a variety of techniques, for the purpose of extracting groundwater for physical, chemical, or biological testing or for measuring water levels.

2.12 Piezometer - A pressure measuring device used for monitoring water pressure in earthen dams, under foundations, or in aquifers. Typically, a well used only for water level measurements is called a piezometer.

2.13 Plumb - Vertical

2.14 Protective Casing - An outer casing, usually made of steel, placed around that portion of the well riser that extends above the ground surface. In addition to providing security to a well, it will help ensure well and sample integrity by precluding introduction of natural elements (e.g., rain, ice, etc.) into the well interior.

2.15 Riser - The section of unperforated well construction material used to connect the well screen with the ground surface. Typically, it is made of the same material and has the same diameter as the well screen.

2.16 Road Box - A manhole set into the ground around a well installation. Usually constructed in areas where the monitoring well cannot extend above the ground surface for traffic or security reasons.

2.17 Tremie Pipe - A small diameter pipe that will fit in the annulus and is used to inject filter sands, seal materials, or cement/bentonite grout under pressure.

2.18 Well Rim - The upper edge (rim) of the monitoring well riser pipe, located inside the locked protective casing.

2.19 Well Screen - That portion of the well casing material that is perforated in some manner so as to provide a hydraulic connection to the aquifer. Typically, a monitoring well screen has slots but holes, slits, louvers, and other perforations can in some situations be used.

3.0 HEALTH AND SAFETY CONSIDERATIONS

For any field project, a project-specific Health and Safety Plan ("HASP") must be prepared and approved by the DEI Health and Safety Officer before field work commences. This plan must be distributed to, and signed by, the Field Manager and each member of the DEI sampling team, and must be adhered to as field activities are performed. In addition, the Field Manager must maintain a copy in his/her possession and make it available for review at any time during the field activities.

Monitoring well installation may involve chemical hazards associated with materials in the soil or aquifer being explored; and always involves physical hazards associated with the drill rig and well construction methods. The following general protective measures are required:

- All persons within 50 feet of the drill rig must wear hard hats. Hearing protection must be provided during excessive noise, and

- Personnel who are not directly involved in overseeing, inspecting or performing the drilling will remain at least 100 feet away from the drill rig.

Care should be taken to avoid injury during all field activities and steel toe/shank safety shoes should be worn when on-site.

Decontamination solvents should be stored in their own cooler or box, and latex gloves should be worn when handling solvents. In addition, the appropriate personal protective equipment ("PPE") must be utilized as required in the project-specific HASP, for all field activities.

It is recommended that in addition to the required 40-hour hazardous waste site worker certification, each of the team members be trained in basic first aid, including CPR and a first aid kit is provided for all field trips.

4.0 RESPONSIBILITIES

Each person designing monitoring wells for DEI projects and overseeing their installation should be degreed (geologist, hydrogeologist, engineer, or scientist) with at least two years of experience in groundwater monitoring and be properly trained in sampling techniques, sample handling, decontamination, health and safety and project quality assurance/quality control ("QA/QC") procedures. Specific training and/or orientation should be provided for each project to ensure that personnel understand the objectives and special circumstances or requirements of that project.

4.1 Project Manager

It is the Project Managers responsibility to:

- Ensure that a properly designed scope of work is prepared prior to any field activities. The scope of work should identify the general monitoring well/piezometer location(s), depth, screen length, construction material and other applicable information.

- Ensure that each project is properly executed, and that all health and safety considerations are addressed.

- Designate a Field Manager to oversee all field activities, and assign specific duties to members of the Sampling Team.

- Ensure that all personnel performing field activities have been properly trained in monitoring well installation and quality assurance procedures, including specific requirements of the project scope of work and applicable standard operating procedures.

- Ensure that proper decontamination procedures are selected.

- Review all data generated in the field and ensure that all necessary forms (e.g., monitoring well construction details) are completed and filed in the proper project file.

- Ensure that all wastes generated are properly managed.

4.2 Field Manager

It is the Field Manager's responsibility to:

- Ensure that all necessary field equipment and health and safety equipment are in good working order, and are transported to the field.
- Acquire all necessary well materials.
- Coordinate subcontractors; drillers (availability, proper equipment, decontamination, etc.), laboratory (sample containers, preservatives, holding times, etc.), delivery service (pick-up, delivery location, insurance, etc.), and others as applicable.
- Obtain the necessary utility clearances, and document accordingly.
- Ensure that all members of the Sample Team adhere to the requirements in the HASP.
- Select specific monitoring well/ piezometer location in accordance with the project-specific scope of work.
- Ensure that the well installation specifications defined in the project-specific scope of work and the relevant standard operating procedures are followed, including QA/QC.
- Maintain detailed field records in his/her field book.
- Ensure that the proper forms (i.e., monitoring well construction detail) are completed fully and correctly.
- Ensure that all field data collected is delivered to the Project Manager upon returning from the field.
- Notify the Project Manager of any waste materials generated as a result of field activities, which will require management.
- Research and address any state-specific requirements regarding the construction, permitting or recording of monitoring wells.

4.3 *Sampling Team*

The Sampling Team is responsible for:

- Enactment of the project-specific scope of work and standard operating procedure specifications for monitoring well/piezometer installation.
- Proper use and maintenance of all field equipment and health and safety equipment in accordance with the applicable equipment manuals and standard operating procedures.
- Maintaining detailed field records in the project field book.
- Oversight of subcontractor's activities.
- Identification of aquifer depths and well screen placement, and performance of field measurements.
- Completing the proper forms (i.e., monitoring well construction details) fully and correctly.
- Ensuring that all appropriate QA/QC procedures are addressed as stated in the project-specific scope of work.
- Following all health and safety requirements.
- Ensuring that no cross-contamination of monitoring well piezometer locations occurs due to negligence or unacceptable operating procedures.

5.0 SUPPORTING MATERIALS

The following subsections identify the equipment and supplies recommended for performing field work. Section 5.5 lists additional equipment specific to this SOP.

5.1 Sampling Equipment/Supplies

- Aluminum foil
- Bailer (disposal)
- Bailer cord
- Boring/sample log sheets
- Camera/film
- Deionized water rinse bottle
- Depth-to-water meter
- Field book
- Five gallon bucket
- Folding ruler (6 foot)
- Garbage bags
- Interface probe
- Keys (As appropriate)
- Measuring tape of sufficient length to reach the bottom of the proposed monitoring wells
- Paper towels - chemical free
- Permanent marker
- Project-specific health and safety plan
- Project-specific scope of work
- Sample containers/labels
- Shovel
- Site plan map
- Spray paint - pink
- Tape measure
- Time-keeping device
- Trowel
- Writing instrument (water-proof ink)
- Zip-lock bags

5.2 *Decontamination Equipment*

- Alconox® detergent or equivalent Steam cleaner
- Bucket (at least three with a minimum 5-gallon capacity each)
- Chemical resistant gloves and boot covers
- Plastic sheeting
- Scrubbing brushes
- Solvent rinse bottles

5.3 *Shipping Equipment*

- Bubble pack
- Chain-of-custody forms
- Chain-of-custody seals
- Cooler/crate
- Ice/cold packs
- Packing tape (clear)
- Rubber bands
- Insulating Packaging materials
- Zip-lock bags

5.4 *Health and Safety Equipment (as determined to be necessary by the HASP)*

- Ear plugs
- Eye wash
- First aid kit
- Goggles/safety glasses
- Hard hat
- Monitoring equipment (as needed)
- Respirator/cartridges (as needed)
- Sampling gloves (chemically resistant/compatible)
- Steel toe/shank safety shoes
- Tyvek® or splash/chemical resistant garments (as needed)
- Weather-appropriate outerwear

5.5 *SOP Specific Equipment*

- Bentonite chips or pellets for seal
- Bentonite powder for grout/slurry

- Corrosion resistant padlocks
- Portland cement or equivalent for wellhead
- Silica sand of appropriate grain size for filter
- Well construction specifications and design plans
- Well plug and locking cap
- Well screen of appropriate slot size
- Riser pipe
- Shovel
- Tremie pipe
- Tools, especially socket wrench, screw driver, hammer
- Outer casing

6.0 MONITORING WELL CONSTRUCTION METHODS

This section outlines the monitoring well construction methods and protocols.

6.1 General Standards

Please refer to **Figure 1** for a diagram depicting typical monitoring well design components.

The goal of monitoring well construction is to provide an access point into the aquifer or saturated unit that will allow representative quantification of the physical properties of the ground water and the chemicals that may be present. All physical characterization chemical analysis methods must yield results that are representative of the in situ hydrogeologic conditions that are present at the site. The information to be obtained from the monitoring wells includes, but is not strictly limited to, the following:

- Hydraulic conductivity;
- Hydraulic gradient;
- Initial and stabilized ground water elevations;
- Thickness of saturation;
- Ground water flow direction;
- Representative ground water sampling for contaminant laboratory analysis; and
- Contaminant plume delineation in the vertical and horizontal planes.

In general, the diameter of the borehole in which the monitoring well will be constructed should be at least 4-inches greater than the outside diameter of the well screen or riser pipe used to construct the well. This is necessary to insure that sufficient annular space is available to install filter packs, bentonite seals, and grout seals to allow the ground water to freely enter the monitoring well void space such that ground water samples that are representative of the in situ conditions can be collected. Annular space thicknesses of greater than 4-inches could potentially physically deform the monitoring well screen and riser pipe due to the heat of hydration of the bentonite seal and grout.

6.2 *Drilling and Boring Methods*

A variety of drilling methods can be used for monitoring well installation. The drilling method selected should be based upon the following factors:

- Desired depth of the well(s);
- Well diameter;
- Ability of drilling method to preserve the natural subsurface conditions;
- Availability of drilling equipment; and
- Project considerations such as budget, schedule, project specific goals, etc.

In any case the selected drilling method should provide the least amount of disturbance to the subsurface materials, while being able to meet the specifications of the job.

According to the United States Environmental Protection Agency ("USEPA") Draft Technical Guidance Document for RCRA Ground Water Monitoring (November 1992) the following factors should be considered when choosing the drilling method for monitoring well construction:

- Drilling should be performed in a manner that preserves the natural properties of the subsurface materials;
- Contamination and/or cross-contamination of ground water and aquifer materials during drilling should be avoided;
- The drilling method should allow for the collection of representative samples of rock, unconsolidated materials, and soil;
- The drilling method should allow the owner/operator to determine when the appropriate location for the screened interval has been encountered;
- The drilling method should allow for proper placement of the filter pack and annular sealants. The borehole should be at least 4 inches larger in diameter than the nominal diameter of the well casing and screen to allow adequate space for placement of the filter pack and annular sealants;

- The drilling method should allow for the collection of representative groundwater samples. Drilling fluids (including air) should be used only when minimal impact to the surrounding formation and ground water can be ensured.

Some drilling methods require drilling fluids (bentonite mud, water, air, etc.) and should be used with caution when used for monitoring well construction. The mud or fluid (sometimes partially comprised of bentonite) may build up on the borehole walls and clog the adjacent formation, significantly impeding the ability of the ground water from the saturated unit from entering the monitoring well.

If drilling fluids are to be used during drilling or well installation, samples of these fluids should be obtained and analyzed for chemical constituents that may be of interest at the site. The results of this analysis will prove beneficial in confirming or excluding this water as a potential contribution if later monitoring indicates unexplained contamination within the boring or well.

In most instances, monitoring wells will be installed using either direct-push or rotary drilling with continuous flight, hollow stem augers ("HSA's") since a majority of the environmental site assessments and investigations will be conducted in unconsolidated Quarternary sediments. Continuous flight refers to the fact that the flights ("screw" or "thread") extend along the entire length of the auger core or stem. Individual auger sections, typically 5-feet in length, are also called flights.

When drilling, a cutting head is attached to the first auger flight, and as the auger is rotated downward, additional auger flights are attached, one at a time, to the upper end of the previous auger flight. As the augers are advanced downward, the cuttings move upward along the continuous flights of the stems. The hollow-stem or core of the auger allows drill rods and samplers to be inserted through the center of the augers. The hollow-stem of the augers also acts to temporarily case the borehole, so that the well screen and casing may be inserted down through the center of the augers once the desired depth is reached, minimizing the risk of possible collapse of the borehole that might occur if it is necessary to withdraw the augers completely before installing the well casing and screen.

If direct push technology is employed to advance borings, then the wells installed will be either 1-inch or 2-inch in diameter. This is due to the fact that these are the maximum diameter wells that can typically be installed from direct push borings. Due to the limitations of the typical direct push equipment, such wells typically will be 15 feet or less in depth. Additionally, this type of boring and monitoring well construction is used to conduct screening-type site assessments and the wells are often temporary. Unless the needs of a particular site assessment call for the advantages of direct push wells, all assessments will employ wells that are constructed from solid or hollow stem augers.

6.3 Specific Procedures

1. After drilling and soil sampling have been completed, the borehole shall be checked for total depth with a weighted, calibrated tape measure (typically a depth-to-water meter).

2. If the borehole has been advanced to a depth more than 6-inches greater than that of the bottom of the well to be installed, a new boring, offset 5 feet to 10 feet, should be drilled to the desired depth. This off-set boring may be "blind drilled" (i.e. no screening or sampling). Bottom grouting, or bentonite pellet sealing of the base of a borehole in which a well is to be installed is not recommended.

3. If not pre-packaged, the well construction materials (screen and riser) shall be decontaminated with a detergent and water wash and deionized water rinse before being placed in the borehole. Steam cleaning also can be done to decontaminate the well materials. Decontaminated well components should be wrapped in plastic until installed in the boring. All personnel handling the decontaminated well components should exercise great care not to contaminate these components as they are installed in the borehole.

4. The well screen and riser pipe generally are assembled as they are lowered into the borehole. Solvent cements used to joint sections of pipe are prohibited. All pipes must be flush threaded for easy assembly in the field. As the assembled well is lowered, care shall be taken to ensure that it is centered in the hole. In boreholes which are not plumb, centralizers should be used on the well below the screen and/or the midpoint and top of the screen. This will assure that the screened portion of the well is centrally located in the borehole with a uniform thickness of sand or filter pack between the screen and the borehole wall. In holes greater than 25 feet in depth, centralizers should be used.

5. The annular space surrounding the screened section of the monitoring well and at least 2 to 3 feet above the top of the screen (to allow for settling) shall be filled with an appropriately graded, clean sand or gravel filter pack. Filter pack installation should be done carefully to avoid bridging in the borehole and to allow uniform filling around the screen. In hollow-stem auger installations, the annular space between the auger and the well casing can be used to convey the filter pack to the screened interval; in other installations a tremie pipe should be used. A weighted tape should be lowered in the annular space periodically to verify that the filter pack has reached an acceptable level.

6. Bentonite seals, either pellets or slurry, a minimum of 2 to 5 feet thick, shall be installed immediately above the filter pack in all monitoring wells. The purpose of the seal is to provide a barrier to vertical flow of water in the annular space between the borehole and the well. Bentonite is used because it swells significantly upon contact with water and results in a lower hydraulic conductivity than the surrounding formation. Pellets generally can be installed in shallow boreholes by pouring them very slowly from the surface. If they are poured too quickly, they may bridge at some shallow, undesired depth.

   Dry bentonite (pellets, chips, granular) should only be used below the water table, as it is only effective when hydrated. Powdered bentonite can be installed by mixing very thick slurry and using a tremie pipe to inject the seal material at the desired depth in the borehole. Bentonite slurry should be pumped into the annular space using a side discharge tremie pipe located about two feet above the fine-sand pack. Side discharge will ensure the integrity of the sand pack.

   In situations where the monitoring well screen straddles the water table, the seal will be in the unsaturated zone and pure bentonite (pellets or powder) will not work effectively as seals, due to desiccation. Seals in this situation should be a cement/bentonite mixture containing 2% to 10% bentonite by weight. This type of mixture should be tremied to the desired depth in the borehole.

7. The remaining length of the borehole shall be backfilled with grout to a depth below maximum frost thickness with a minimum depth of 2 feet below ground surface. This grouting will consist of a cement/bentonite mixture. A tremie pipe shall be used to install the grout and should be filled from the bottom up, displacing water and drill cuttings from the hole during grouting. Drill cuttings, even those known not to be contaminated, are not recommended for use as backfill material, as they may not crate an impermeable seal.

8. The steel protective casing shall be placed around the riser, and the borehole around the protective casing shall be dug out to approximately a one foot radius to a depth of two feet, and filled with concrete. The concrete pad shall be sloped so that drainage occurs away from the well. All completed wells will have identification numbers clearly painted on the outside and inside cap of the protective cover with bright colored paint.

   The protective cover will be lockable. A point on the top of the riser pipe will be marked (typically a cut notch) to indicate the surveyed elevation position, known as the "measuring point" (MP) as discussed in Section 6.5.

A vent hole must be installed in the protective casing in an area that is protected from precipitation. Road box installations should not be vented. In areas potentially susceptible to impact, a minimum of three bumper posts may be appropriate, evenly spaced around non-flush-mounted wells.

9. Measure the depth to the stabilized water level and record it on the Groundwater Monitoring Well Detail Report (shown in **Figure 2**).

10. Prior to use of the well for water level measurements or water quality samples, development of the well shall be undertaken. Please refer to DEI SOP#3A for monitoring well development procedures.

6.4 Sample Handling

Samples of excavated soils, field blanks, equipment blanks, or other materials may be collected during the course of the monitoring well/ piezometer installation in accordance with the project-specific scope of work. Samples collected for laboratory analysis will be placed in pre-cleaned, laboratory supplied containers (jars or bottles) of the appropriate size, according to the analyses to be performed. Each label (**Figure 3**) should be completed as follows:

- Station Location - Description of the place where the sample was taken;
- Date - A six digit number indicating the year, month and day of collection;
- Time - A four digit number indicating the military time of collection;
- Sample Number - A unique identification number which may contain the above information, but which distinguishes samples, among those collected from the same site at the same time;
- Preservative - Type, if any;
- Sampler - Name of team member collecting the sample;
- Remarks - Any pertinent observations or further sample description.

The container should then be capped and labeled (see Section 7.0) and the label should be placed such that the sample container could not be opened without breaking the seal of the label.

All observations (visual description, odor, sample time and date, etc.) should be fully recorded on the appropriate form or in the field book.

Quality control samples (blanks, duplicates, etc.) are labeled as above, and are not identified as quality control samples on the labels. Identify all QC samples in the field notebook.

Once labeled, samples should be placed in a cooler packed with ice, to ensure a constant temperature at or near 4° C, pending submittal to the laboratory for analyses. Once each sample has been collected, containerized and labeled, it is entered on the chain-of-custody form (**Figure 4**). One chain-of-custody form may be used for as many samples as will fit on the form, but all samples sharing a single chain-of-custody form must be packaged and hipped together. The sampler must complete all of the heading information on the form accurately and legibly. For each sample, the following information is entered:

- Sample Number (this identification number must be identical to the identification number on the sample label),
- Date and time of sample collection,
- Type and quantity of sample,
- Number of containers per sample, and
- Analyses to be performed.

Quality control samples (blanks and duplicates) are entered as above, but not identified as quality control samples on the chain-of-custody record. Identify all QC samples in the field notebook.

The method of shipment, courier name(s), and other pertinent information are entered in the "Remarks" box. A copy of the shipper's waybill or air bill must be retained by the last custodian prior to shipment.

Once they have been properly labeled and logged, samples are packaged for shipment and sent to the laboratory with a separate chain-of-custody record sealed into each package. The entire contents of each package must be recorded on the enclosed chain-of-custody record(s); and the samples identified on each chain-of-custody record must be only those contained in the package represented by that record.

If chain-of-custody tape is to be employed, then before each package is sealed, two pieces of chain-of-custody tape are selected and their serial numbers entered in the signature box of the appropriate chain-of-custody form(s), along with the relinquishing person's signature. Once all of the contents (including the chain-of-custody record) are inside the package, it is closed (sealed). The chain-of-custody tape then is affixed to opposite ends of the lid, so that the lid cannot be opened without breaking the chain-of-custody tape. Each chain-of-custody tape is signed and dated by the person sealing the package. Cellophane tape should be affixed over each chain-of-custody seal to protect it from weathering and abrasion. At this stage, the package should be wrapped with clear fiber shipping tape to ensure that it will not open upon transport. The shipping tape should be placed over the chain-of-custody tape so that the package cannot be opened without tearing it.

6.5 Waste Management Practices

All waste materials generated as a result of field activities (e.g., drill cuttings, decon water, etc.) must be containerized until a determination can be made regarding proper disposal. This typically consists of containing the materials in DOT approved 55-gallon drums until analytical results can be obtained. If the material is contaminated to the extent that it must be managed as special or hazardous waste, then the Project Manager must be notified so that appropriate measures can be taken.

6.6 Sampling Location I.D.

At the completion of sampling, each sample location should be staked, marked, or noted for easy identification pending elevation and location surveying, to accurately determine the sampling location's position on site plan maps or its elevation for preparation of cross-sections, groundwater contours, etc.

7.0 DOCUMENTATION

The following forms should be utilized to ensure that the specific activities performed are appropriately documented:

- Monitoring Well Construction Detail
- Sample Labels
- Chain-of-Custody Forms
- Shipping Receipts

Sample labels shall be completed at the time each sample is collected and will include the information listed below. A sample label is shown in **Figure 3**.

- Client or project name,
- Sample I.D. (number),
- Designation (sampling point identification),
- Analysis,
- Preservation,
- Sample collection date and time,
- Sampler's name

A chain-of-custody form (**Figure 4**) is a record of sample collection and transfer of custody. The information listed above must also be entered on the chain-of-custody. In addition, in accordance with 40 CFR 261.4(d), the following information must accompany samples:

- Sample collector's name, company, mailing address and telephone number,
- Analytical laboratory's name, mailing address and telephone number,
- Quantity of each sample,
- Date of shipment,
- Description of sample.

The chain-of-custody forms provide specific locations for entering the above information.

A field book will be maintained as an overall log of all events which occur throughout the project, including conditions encountered, samples collected, deviations from the scope of work, unusual circumstances, etc.

All documents are to be retained in the appropriate project files indefinitely. It is important that all field documentation be as complete as possible to ensure traceability.

8.0 REFERENCES

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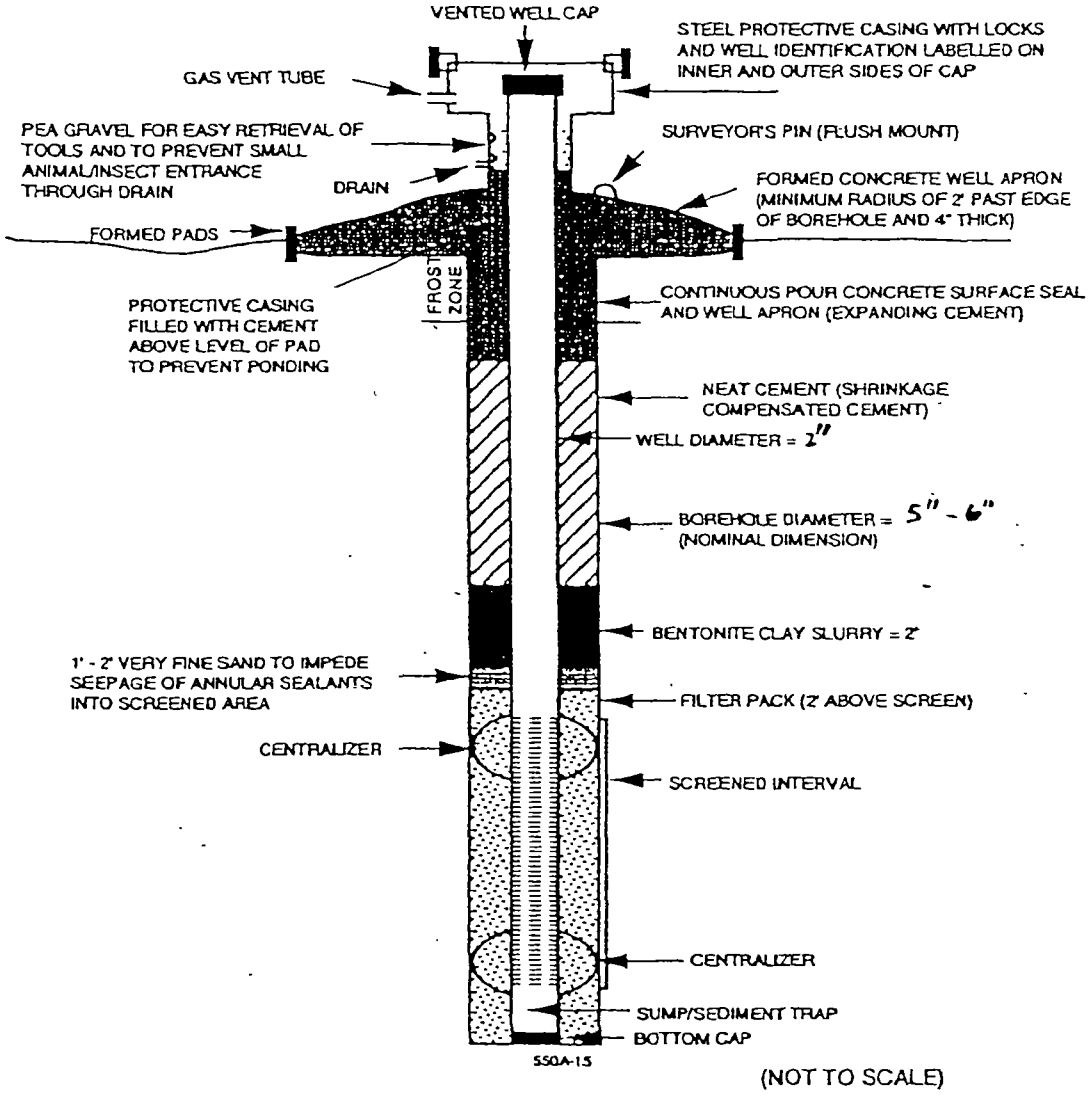
"Practical Guide for Ground-Water Sampling." Barcelona, M.J. et. al Illinois State Water Survey, Champaign, IL. 1995.

"RCRA Facility Investigation (RFI) Guidance." United States Environmental Protection Agency. EPA/530/SW-89-031. May 1989.

FIGURE 1

TYPICAL MONITORING WELL DESIGN COMPONENTS



Modified from USEPA Ground-Water TEGD, 1986

FIGURE 2

TYPICAL MONITORING WELL DETAILS

Incident No.: _____ Well No.: _____

Site Name: _____ Date Drilled Start: _____

Drilling Contractor: _____ Date Completed: _____

Driller: _____ Geologist: _____

Drilling Method: _____ Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: _____

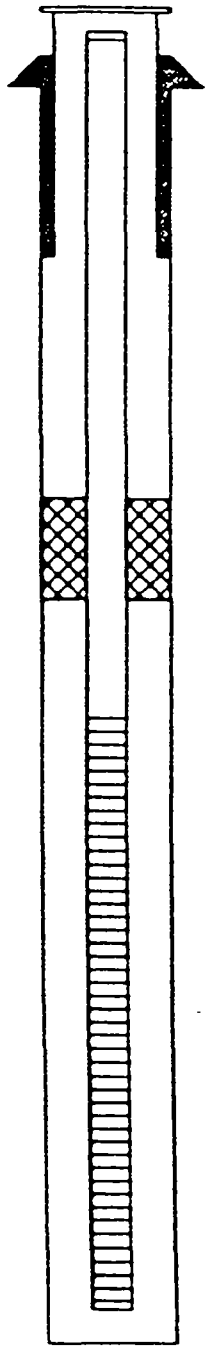
Type of Annular Sealant: _____

Type of Bentonite Seal (Granular, Pellet): _____

_____

Type of Sand Pack: _____

Elevations - .01 ft.



_____ Top of Protective Casing

_____ Top of Riser Pipe

_____ Ground Surface

_____ Top of Annular Sealant

_____ Casing Stickup

_____ Top of Seal

_____ Total Seal Interval

_____ Top of Sand

_____ Top of Screen

_____ Total Screen Interval

_____ Bottom of Screen

_____ Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.			
Riser pipe below w.t.			
Screen			
Coupling joint screen to riser			
Protective casing			

Measurements

to .01 ft (where applicable)

Riser pipe length	
Screen length	
Screen slot size	
Protective casing length	
Depth to water	
Elevation of water	
Free Product thickness	
Gallons removed (develop)	
Gallons removed (purge)	
Other	

Completed by: _____

FIGURE 3

SAMPLE CONTAINER LABEL

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID. _____
Date Collected: _____ Time: _____
Collected by: _____
Analysis: _____

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected. _____ Time: _____
Collected by: _____
Analysis: _____

CUSTODY SEAL

Date _____

Signature _____

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by: Date:
Time:

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by: Date:
Time:

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description.

Sampled by: Date:
Time:

Lab ID#

FIGURE 4

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY RECORD

Page____ of _ ngs

Fi
En..ronmental
Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: _____

Street Address: _____

City. _____ State. _____ Zip: _____

Phone: _____ Fax. _____ e-mail: _____

Send Report To: _____ Via: Fax ☐ e-mail ☐

Sampled By: _____

Analyses

Project I.D.: _____

P.O. #.: _____

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6ºC Yes__ No.__ _____ºC
Received within 6 hrs. of collection:_____
Ice Present: Yes__ No__

Sample Refrigerated. Yes__ No__
Refrigerator Temperature._____ºC
5035 Vials Frozen: Yes__ No__
Freezer Temperature:_____ºC

Containers Received Preserved. ☐ Yes ☐ No

Notes and Special Instructions: _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

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Standard Operating Procedures for

Monitoring Well Development

SOP #3-A

Version 2.0

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09.27.06

Philippe Moreau, P.E.
DEI President and Principal Engineer — Date

9/26/06

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9/26/06

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Figure 1: Surge Block Design
Figure 2: Monitoring Well Development Record
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1.0 GENERAL APPLICABILITY

This Standard Operating Procedure ("SOP") establishes the methods used by Deuchler Environmental, Inc. ("DEI") personnel for developing monitoring wells and piezometers after original installation and prior to use of the well for obtaining water level measurements or water quality samples. Development should not be confused with purging, the purpose of which is to evacuate the monitoring well system of stagnant water which may not be representative of the aquifer.

Monitoring well/piezometer development and/or rehabilitation are necessary to ensure that complete hydraulic connection is made and maintained between the well and the aquifer material surrounding the well screen and packing materials. Development is necessary after original installation of a monitoring well to:

1. Reduce the compaction and inter-mixing of grain sizes produced during drilling;

2. Increase the porosity and permeability of the artificial filter pack by removing the finer grain-size fraction introduced near the screen by drilling and well installation; and

3. Remove any foreign drilling fluids that coat the borehole or that may have invaded the adjacent natural formation.

Rehabilitation applies to monitoring wells/piezometers in which siltation has been determined to have occurred. After a well/piezometer has been installed for some period of time (ranging from months to years), siltation of the well may occur and rehabilitation may be necessary to re-establish complete hydraulic connection with the aquifer.

2.0 DEFINITIONS

2.1 Bailer - A long, narrow, bucket-like device with an open top and a check valve at the bottom that is used to remove water and/or sediment from a well or piezometer.

2.2 Bridging - A condition within the filter pack outside the well screen whereby the smaller particles are wedged together in a manner that causes blockage of pore spaces.

2.3 Cross-Contamination - Contamination of a sample, by the sampler, due to poor decontamination or unacceptable field practices.

2.4 Decontamination - Process utilized to ensure that all equipment and materials utilized in a sampling program have been adequately cleaned to ensure that they will not contaminate future samples.

2.5 Field Book - Bound, hard cover book assigned to individual field personnel for use in documenting all field activities.

2.6 Hydraulic Conductivity - A characteristic property of aquifer materials which describes the permeability of the material to a particular fluid (usually water).

2.7 Hydraulic Connection - A properly installed and developed monitoring well should have a complete hydraulic connection with the aquifer. The well screen and filter material should not provide any restriction to the flow of water from the aquifer to the well.

2.8 Permeability Test - Used to determine the hydraulic conductivity of the aquifer formation near a well screen. Generally conducted by displacing the water level in a well and monitoring the rate of recovery of the water level as it returns to equilibrium. Various methods of analysis are available to calculate the hydraulic conductivity from these data.

2.9 Pump - A pump is necessary to remove large quantities of groundwater from a well. In some situations, the pump alone is used to both surge the well and remove the fines. Since the purpose of well development is to remove suspended solids from a well, the pump must be capable of moving some solids without damage.

2.10 Screened Interval - That portion of a monitoring well that is open to the aquifer.

2.11 Static Water Level - The water level in a well that represents an equilibrium condition when the aquifer is not being stressed (no nearby withdrawal or injection of water). Since the groundwater conditions are generally dynamic, static is a condition that holds true only for a period of time (anywhere from minutes to years, depending on cultural and climatic influences).

2.12 Surge Block - A surge block consists of a rubber (or leather) and metal plunger attached to rod or pipe of sufficient length to reach the bottom of the well. A recommended design is shown in **Figure 1**.

2.13 Well Surging - That process of moving water in and out of a well screen to remove fine sand, silt and clay size particles from the adjacent formation typically performed using a bailer, surge-block or pump.

2.14 Well Purging - The process of removing water from a well to allow in-situ formation water to enter the well. Generally thought of in terms of removing standing water from a well prior to the collection of water samples for quality determination, the process is also conducted to remove suspended particles from the well after well surging.

2.15 Well screen - That portion of the well casing material that is perforated in some manner so as to provide a hydraulic connection to the aquifer. Typically, a well screen has slots but holes, slits, louvers, and other perforations can in some situations be used.

3.0 HEALTH AND SAFETY CONSIDERATIONS

For any field project, a project-specific Health and Safety Plan ("HASP") must be prepared and approved by the DEI Health and Safety Officer before field work commences. This plan must be distributed to, and signed by, the Field Manager and each member of the DEI sampling team, and must be adhered to as field activities are performed. In addition, the Field Manager must maintain a copy in his/her possession and make it available for review at any time during the field activities.

Monitoring well/piezometer development may involve chemical hazards associated with materials in the soil or aquifer being explored; and may involve physical hazards associated with heavy equipment that may be used for various development techniques.

Care should be taken to avoid injury during all field activities and steel toe/shank safety shoes should be worn when on-site. Groundwater from the well should not be ingested.

Decontamination solvents, if needed, should be stored in their own cooler or box, and latex gloves should be worn when handling solvents. In addition, the appropriate personal protective equipment (PPE) must be utilized as required in the project-specific Health and Safety Plan, for all field activities.

It is recommended that in addition to the required OSHA 40-hour hazardous waste site worker certification, each of the team members be trained in basic first aid, including CPR and a first aid kit is provided for all field trips.

4.0 RESPONSIBILITIES

All field personnel performing monitoring well or piezometer development for DEI projects must be properly trained in well development techniques, decontamination, health and safety and project quality assurance/quality control ("QA/QC") procedures; and be familiar with this SOP. Specific training and/or orientation should be provided for each project to ensure that personnel understand the objectives and special circumstances or requirements of that project.

4.1 Project Manager

It is the Project Managers responsibility to:

- Ensure that a properly designed scope of work is prepared prior to any field activities. The scope of work should identify all procedures to be followed.
- Ensure that each project is properly executed, and that all health and safety considerations are addressed.
- Designate a Field Manager to oversee all field activities, and assign specific duties to members of the Sampling Team.
- Ensure that all personnel performing field activities have been properly trained in development and quality assurance procedures, including specific requirements of the project scope of work and applicable standard operating procedures.
- Ensure that proper decontamination procedures are selected.
- Review all data generated in the field and ensure that all necessary forms (i.e., monitoring development record) are completed and filed in the proper project file.
- Ensure that all wastes generated are properly managed.

4.2 Field Manager

It is the Field Manager's responsibility to:

- Ensure that all necessary field equipment and health and safety equipment are in good working order, and are transported to the field.

- Coordinate subcontractors; if necessary.

- Ensure that all members of the Sample Team adhere to the requirements in the Health and Safety Plan.

- Ensure that the well development specifications defined in the project-specific scope of work and the relevant standard operating procedures are followed, including QA/QC.

- Maintain detailed field records in his/her field book.

- Ensure that the proper forms (i.e., monitoring well development record) are completed fully and correctly.

- Ensure that all field data collected is delivered to the Project Manager upon returning from the field.

- Notify the Project Manager of any waste materials generated as a result of field activities, which will require management.

4.3 Sampling Team

The Sampling Team is responsible for:

- Enactment of the project-specific scope of work and standard operating procedure specifications for monitoring well/piezometer development.

- Proper use and maintenance of all field equipment and health and safety equipment in accordance with the applicable equipment manuals and standard operating procedures.

- Maintaining detailed field records in the project field book.

- Following all health and safety requirements.

- Ensuring that no cross-contamination of samples or sample locations occurs due to negligence or unacceptable operating procedures.

- Any sample team member using existing monitoring wells for any purpose is

responsible for verifying the original well construction details and determining if a well requires rehabilitation

- Performance of field measurements.
- Completing the proper forms (i.e., monitoring well development record) fully and correctly.
- Ensuring that all appropriate QA/QC procedures are addressed as stated in the project-specific scope of work.

5.0 SUPPORTING MATERIALS

The following subsections identify the equipment and supplies recommended for performing field work. Section 5.4 lists additional equipment specific to this SOP.

5.1 Sampling Equipment/Supplies

- Bailer
- Bailer cord
- Bolt cutter
- Camera/Film
- Deionized water rinse bottle
- Depth-to-water meter
- Field book
- Five gallon bucket
- Garbage bags
- Interface probe
- Monitoring Well Development Forms
- Paper towels - chemical free
- Permanent marker
- Plastic sheets
- Project-specific health and safety plan
- Project-specific scope of work
- Site plan map
- Spray paint - pink
- Tape measure
- Writing instrument (water-proof ink)
- Keys (as appropriate)
- Wristwatch

5.2 Decontamination Equipment

- Alconox or Liquinox detergent
- Bucket
- Plastic sheets
- Scrub brush
- Steam cleaner
- Solvent rinse bottle

5.3 *Health and Safety Equipment*

- Eye wash
- First aid kit
- Goggles/safety glasses
- Monitoring equipment (as needed)
- Respirator/cartridges (as needed)
- Sampling gloves (chemically resistant and compatible)
- Steel toe/shank safety shoe
- Tyvek® or splash/chemical resistant garments (as needed)
- Weather gear

5.4 *SOP Specific Equipment*

- Surge block and pipe, if appropriate
- Pump, if appropriate

6.0 WELL DEVELOPMENT METHODS AND PROTOCOLS

This section outlines the specific methods and protocols to be used for monitoring well development.

6.1 General Procedures

All drilling techniques cause some damage to the borehole, by clogging formation pore spaces with drilling fluids or smearing formation materials on the borehole wall. Also, wells may be installed in formations with significant percentages of fine grained materials which will restrict water entry into the well. The purpose of well development is to rectify the formation damage and remove fine grained materials adjacent to the borehole, to improve the well yield.

Water is caused to move in and out through the monitoring well screen to move fines (silt and clay particles) out of the filter pack around the well screen and into suspension within the well. Water movement is effected using a surge block or bailer. Development with a compressed gas is not recommended because formation chemistry may be affected. In some situations, pumping water may effect satisfactory development, but pumping alone is not generally sufficient.

The sediment laden water is removed from the monitoring well using a pump or bailer. Surging of the well is continued until the water removed is essentially free of suspended silt and clay particles.

6.2 Specific Procedures

The construction details of the well can be used to initially define the method of purging a well, with due consideration being given to the level of contamination.

The criteria for selecting a well development method include well diameter, total well depth, static water depth, screen length, the likelihood and level of contamination, and the type of geologic formation adjacent to the screened interval. The limitations, if any, of a specific procedure are discussed within each of the following procedures.

Methods that involve placing water into the well may be objectionable to some state and federal agencies. In such cases, the surge block or bailer procedure may be preferable to the jetting/pumping procedure. Applicable information should be documented on the Monitoring Well Development Record (**Figure 2**).

6.2.1 Surge Block

A surge block effectively develops most monitoring wells. If the geologic layering in the screened interval includes permeable and impermeable layers (e.g., gravels and clays), it is possible that surging could remove fines from the impermeable layers and force them into the permeable layers. This problem can be minimized by using fewer surging cycles, using a surge block which is looser fitting and/or increasing the purging volume or time of development.

1. Construct a surge block using the design in **Figure 1** as a guide. Specific materials will depend upon the diameter of well to be developed. The diameter of the flexible rings must be sufficient to cause a tight seal within the well casing, and the rods must be of sufficient length to reach to the bottom of the monitoring well.

2. Insert the surge block into the well and lower it slowly to the level of static water. Start the surge action slowly and gently above the well screen using the water column to transmit the surge action to the screened interval. A slow initial surging, using plunger strokes of three to five feet, will allow material which is blocking the screen to separate and become suspended.

3. After a number (five to ten) of plunger strokes, remove the surge block and purge the well using a pump or bailer. The returned water should be heavily laden with suspended silt and clay particles. As development continues, slowly increase the depth of surging to the bottom of the well screen. For monitoring wells with long screens (greater than 10 feet) surging should be undertaken along the entire screen length in short intervals (two to three feet) at a time.

4. Continue this cycle of surging and purging until the water yielded by the well is free of visible suspended material.

6.2.2 Pump

Well development using only a pump is most effective in those monitoring wells that will yield water continuously. Effective development cannot be accomplished if the pump has to be shut off to allow the well to recharge.

1. Set the intake of the pump in the center of the screened interval of the monitoring well.

2. Pump a minimum of three well volumes of water from the well while using the

intake hose of the pump as a plunger. The motion of the intake hose will act to a limited extent as a surge block.

3. Occasionally, where appropriate, use the pump to fill the monitoring well to the top of the casing and allow the water level to decline to the static level, thereby forcing water back into the formation. This action will cause water to exit the well screen and reduce the bridging of materials caused by water flowing in one direction through the well screen while pumping.

4. The water used to fill the monitoring well should be the same water removed from the well during the previous pumping cycle. The sediment previously pumped from the well must be removed from the water prior to reintroduction to the well. A 55-gallon drum can be used to containerize the water and also act as a sediment settling vessel.

5. Continue pumping water into and out of the well until sediment free water is obtained.

6.2.3 Bailer

1. Lower the bailer into the screened interval of the monitoring well.

2. Using long, slow strokes, raise and lower the bailer in the screened interval simulating the action of a surge block.

3. Periodically bail standing water from the well to remove silt and clay particles drawn into the well.

4. Continue surging the well using the bailer and bailing water from the well until sediment free water is obtained.

6.3 Sample Handling

Any samples which may be collected for laboratory analysis should be placed in pre-cleaned, laboratory supplied containers (jars or bottles) of the appropriate size, according to the analyses to be performed. Each label (**Figure 3**) should be completed as follows:

- Station Location - Description of the place where the sample was taken;

- Date - A six digit number indicating the year, month and day of collection;

- Time - A four digit number indicating the military time of collection;
- Sample Number - A unique identification number which may contain the above information, but which distinguishes samples, among those collected from the same site at the same time;
- Preservative - Type, if any;
- Sampler - Name of team member collecting the sample;
- Remarks - Any pertinent observations or further sample description.

The container should then be capped and labeled (see Section 7.0) and the label should be placed such that the sample container could not be opened without breaking the seal of the label.

All observations (visual description, odor, sample time and date, etc.) should be fully recorded on the appropriate form or in the field book.

QC samples (blanks, duplicates, etc.) are labeled as above, and are not identified as quality control samples on the labels. Identify all QC samples in the field notebook.

Once labeled, samples should be placed in a cooler packed with ice, to ensure a constant temperature at or near 4° C, pending submittal to the laboratory for analyses. Once each sample has been collected, containerized and labeled, it is entered on the chain-of-custody form (**Figure 4**). One chain-of-custody form may be used for as many samples as will fit on the form, but all samples sharing a single chain-of-custody form must be packaged and hipped together. The sampler must complete all of the heading information on the form accurately and legibly. For each sample, the following information is entered:

- Sample Number (this identification number must be identical to the identification number on the sample label),
- Date and time of sample collection,
- Type and quantity of sample,
- Number of containers per sample, and

- Analyses to be performed.

QC samples (blanks and duplicates) are entered as above, and not identified as QC samples on the chain-of-custody record. Identify all QC samples in the field notebook.

The method of shipment, courier name(s), and other pertinent information are entered in the "Remarks" box. A copy of the shipper's waybill or air bill must be retained by the last custodian prior to shipment.

Once they have been properly labeled and logged, samples are packaged for shipment and sent to the laboratory with a separate chain-of-custody record sealed into each package. The entire contents of each package must be recorded on the enclosed chain-of-custody record(s); and the samples identified on each chain-of-custody record must be only those contained in the package represented by that record.

If chain-of-custody tape is to be employed, then before each package is sealed, two pieces of chain-of-custody tape are selected and their serial numbers entered in the signature box of the appropriate chain-of-custody form(s), along with the relinquishing person's signature. Once all of the contents (including the chain-of-custody record) are inside the package, it is closed (sealed). The chain-of-custody tape then is affixed to opposite ends of the lid, so that the lid cannot be opened without breaking the chain-of-custody tape. Each chain-of-custody tape is signed and dated by the person sealing the package. Cellophane tape should be affixed over each chain-of-custody seal to protect it from weathering and abrasion. At this stage, the package should be wrapped with clear fiber shipping tape to ensure that it will not open upon transport. The shipping tape should be placed over the chain-of-custody tape so that the package cannot be opened without tearing it.

6.4 Waste Management Practices

All waste materials generated as a result of field activities (e.g., development water) must be managed in accordance with the project-specific Investigation-Derived Waste Plan and with DEI SOP# 8A.

6.5 Sampling Location I.D.

At the completion of sampling, each sample location should be staked, marked, or noted for easy identification pending possible surveying, to accurately determine the sampling location's position on site plan maps or its elevation for preparation of cross-sections.

7.0 DOCUMENTATION

The following forms will be utilized to ensure that the specific activities performed are appropriately documented:

- Monitoring Well Development Form
- Sample Labels
- Chain-of-Custody Forms
- Shipping Receipts

Sample labels shall be completed at the time each sample is collected and will include the information listed below. A sample label is shown in **Figure 3**.

- Client or project name,
- Sample I.D. (number),
- Designation (sampling point identification),
- Analysis,
- Preservation,
- Sample collection date and time,
- Sampler's name

A chain-of-custody form (**Figure 4**) is a record of sample collection and transfer of custody. The information listed above must also be entered on the chain-of-custody. In addition, in accordance with 40 CFR 261.4(d), the following information must accompany the samples:

- Sample collector's name, company, mailing address and telephone number,
- Analytical laboratory's name, mailing address and telephone number,
- Quantity of each sample,
- Date of shipment,
- Description of sample.

The chain-of-custody forms provide specific locations for entering the above information. A field book will be maintained as an overall log of all events which occur throughout the project, including conditions encountered, samples collected, deviations from the scope of work, unusual circumstances, etc.

All documents are to be retained in the appropriate project files indefinitely. It is important that all field documentation be as complete as possible to ensure traceability.

All documentation will be retained in the project files following completion of the project.

8.0 REFERENCES

ASTM Method D-5521, "Standard Guide for Development of Groundwater Monitoring Wells in Granular Aquifers." Annual Book of ASTM Standards, Volumes 4.08 and 4.09 Soil and Rock (Revision Issued Annually), ASTM, Philadelphia, PA.

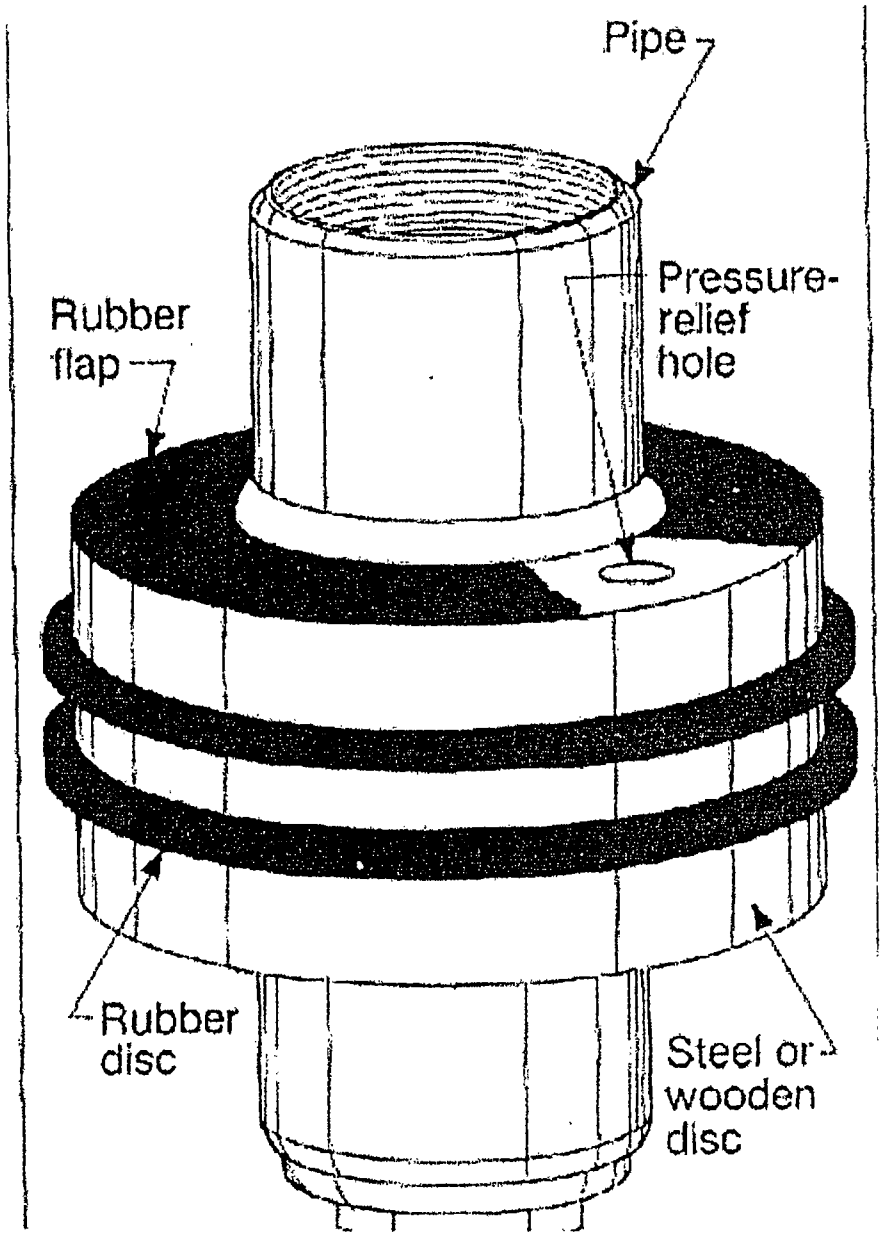
"Compendium of Superfund Field Operation Methods." United States Environmental Protection Agency. EPA/540/P-87/001. December 1987.

"Guide to the Selection of Materials for Monitoring Well Construction and Ground-Water Sampling." Barcelona, M.J., J.P. Gibb and R.A. Miller. Illinois State Water Survey. 1983.

"Practical Guide for Ground-Water Sampling." Barcelona, M.J. et. al Illinois State Water Survey, Champaign, IL. 1995.

FIGURE 1

SURGE BLOCK DESIGN


Pipe
Pressure-relief hole
Rubber flap
Rubber disc
Steel or wooden disc

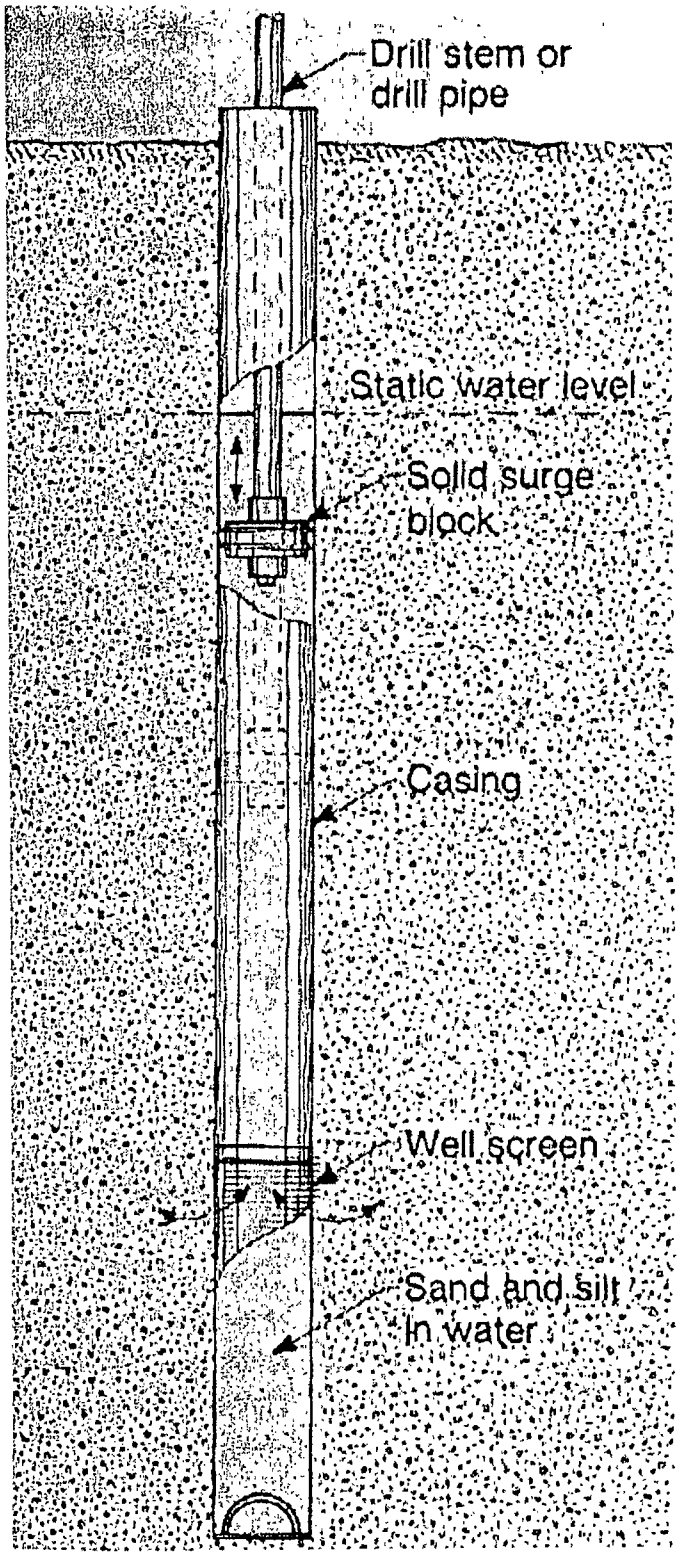

Drill stem or drill pipe
Static water level
Solid surge block
Casing
Well screen
Sand and silt in water

FIGURE 2

MONITORING WELL DEVELOPMENT RECORD

Figure 8.1 EXAMPLE RECORD OF WELL DEVELOPMENT

Site Name:	Initial Well Depth:	Final Well Depth:
Well ID:	Well Diameter:	Screen Length:
Developers:	Static Water Level:	Total Purged Volume:
Start Date: End Date:	Weather Conditions:	
General Comments (e.g., presence of NAPLS):	General Development Method(s):	

Date	Time	Method	Pumping Rate (gal/min)	Volume Purged (gal)	Temp. (°C)	Spec. Cond. (µS/cm)	pH	Turbidity (NTU)	Other ____	Comments (e.g., clarity of water and success of development)

Field Parameter and Stability Guidance: pH (±0.1 standard units); Temperature (±1 °C); specific conductance (±3%, µS/cm); turbidity (10% when turbidity is ≤10 NTU); dissolved oxygen (± 0.3 mg/L); oxidation-reduction potential (± 3%)

NTU- nephelometric unit, µS/cm- microsiemens per centimeter

FIGURE 3

SAMPLE CONTAINER LABEL

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected: _____ Time: _____
Collected by: _____
Analysis: _____

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected: _____ Time: _____
Collected by: _____
Analysis: _____

CUSTODY SEAL

Date _____

Signature _____

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

Client

Sample Description:

Sampled by

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

Client.

Sample Description.

Sampled by:

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by:

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

FIGURE 4

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY RECORD

F
Environmental
Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name.

Street Address:

City. State: Zip:

Phone: Fax: e-mail:

Send Report To: Via: Fax ☐ e-mail ☐

Sampled By:

Analyses

Project I.D.:

P.O. #.:

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6°C Yes__ No __ _____°C
Received within 6 hrs. of collection:_____
Ice Present. Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature:_____°C
5035 Vials Frozen: Yes__ No__
Freezer Temperature:_____°C

Containers Received Preserved. ☐ Yes ☐ No

Notes and Special Instructions:

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

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Consulting Engineers

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Standard Operating Procedures for

Monitoring Well Purging and Ground Water Sampling

SOP #4-A

Version 2.0

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09-27-06

Philippe Moreau, P.E. — Date

DEI President and Principal Engineer

9/26/06

Marc R. Fisher — Date

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9/26/06

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DEI Project Manager

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Figure 1: Ground Water Sample Collection Record
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Figure 3: Sample Container Labels
Figure 4: Chain-of-Custody Record

1.0 GENERAL APPLICABILITY

This Standard Operating Procedure ("SOP") establishes the methods to be used by Deuchler Environmental, Inc. ("DEI") personnel to ensure the collection of valid and representative samples from ground water monitoring wells. The scope of this document is limited to field operations and protocols applicable during ground water sample collection.

2.0 DEFINITIONS

2.1 Bailer - Sampling device which fits inside a well and is attached to a cord (to be raised and lowered). It has a check valve at the bottom to allow capture of water for retrieval to the surface.

2.2 Centrifugal Pump - Designed to provide a high rate of pumping, in the range of 1 to 40 gallons per minute, depending on pump capacity. Discharge rates can also be regulated provided the pump has an adjustable throttle.

2.3 Cross-Contamination - Contamination of a sample, by the sampler, due to poor decontamination or unacceptable field practices.

2.4 Decontamination - Process utilized to ensure that all equipment and materials used in a sampling program have been cleaned adequately to ensure that they will not contaminate future samples.

2.5 Depth to Water Meter - electronic device used in the field for down-well measurement of the water surface. Emits an audible sound upon emersion in the water (a.k.a. water level indicator).

2.6 DO - Measure of dissolved oxygen dependent upon partial pressure of O_2 in atmosphere, dissolved solids and temperature. Determined in the field with a portable meter.

2.7 Drawdown - The extent of lowering of the water surface in a well and water-bearing zone resulting from the discharge of water from the well.

2.8 Eh - Measure of the oxidation-reduction potential; the availability of orbital electrons in solution. Determined in the field with a portable meter.

2.9 Field Book - Bound, hard covered book assigned to individual field personnel or sites for use in documenting all field activities

2.10 Filtration Apparatus - A device (typically a pump within an in-line filter) which can process water through a 0.45-μm membrane filter for preparation of laboratory samples (specifically dissolved metals).

2.11 Ground water - Any water below the surface of the earth, usually referring to the

zone of saturation.

2.12 Interface Probe - electronic device used in the field for identifying separate phase liquids by emitting distinct audible sounds upon emersion into the individual phases.

2.13 Monitoring Well - A device installed in an excavation (borehole) constructed by a variety of techniques, for the purpose of extracting ground water for physical, chemical, or biological testing or for measuring water levels.

2.14 Peristaltic Pump - Provides a low rate of flow, typically in the range of 0.02 - 0.2 gallons/min. (75 - 750 ml/min). Peristaltic pumps are suitable for purging situations where disturbance of the water column must be kept minimal for particularly sensitive analyses. Peristaltic pumps are most often used in conjunction with field filtering of samples and therefore can be used to obtain water samples for direct filtration at the well head. It should be noted that peristaltic pumps are not effective at depths of more than approximately 25 feet, and may be inappropriate for sample collection of organic constituents of interest.

2.15 pH - Measure of the effective hydrogen ion concentration (availability of protons) in solution. Determined in the field with a portable meter.

2.16 Recharge - Infiltration of ground water into a monitoring well replacing water that has been removed by purging or sampling.

2.17 Riser - The unslotted portion of the monitoring well pipe.

2.18 Specific Conductance - Measure of the ability of a solution to conduct current which represents the measure of ionized salts and gives an indication of the dissolved solids. Determined in the field with a portable meter.

2.19 Submersible Pump - Provides an effective means for well purging and, in some cases, sample collection. Submersible pumps are useful for situations where depth-to-water tables are greater than 20 to 30 feet and the depth or diameter of the well requires that a large water volume be removed during purging.

2.20 Surging - A well development technique where a surge block or bailer is alternately lifted or dropped within the borehole in order to remove fines from the monitoring well screen interval and restore hydraulic conductivity.

2.21 Turbidity - Measure of the clarity (or lack of) of water, as determined in the field

through visual observation or with a portable meter.

2.22 Well Purging - The process of removing water from a well to allow in-situ formation water to enter the well. Generally thought of in terms of removing stagnant water from a well prior to the collection of water samples for quality determination. The process is also conducted to remove suspended particles from the well after well surging.

2.23 Well Rim - The upper edge (rim) of the monitoring well pipe, located inside the locked, protective casing.

3.0 HEALTH AND SAFETY CONSIDERATIONS

For any field project, a project-specific Health and Safety Plan ("HASP") must be prepared and approved by the DEI Health and Safety Officer before field work commences. This plan must be distributed to, and signed by, the Field Manager and each member of the DEI sampling team, and must be adhered to as field activities are performed. In addition, the Field Manager must maintain a copy in his/her possession and make it available for review at any time during the field activities.

Ground water sampling may involve chemical hazards associated with materials in the water being sampled, and may involve physical hazards associated with monitoring well location access and heavy equipment which may be utilized.

Care should be taken to avoid injury during all field activities and steel toe/shank safety shoes should be worn when on-site. Ground water from the well should not be ingested.

Decontamination solvents should be stored in their own cooler or box, and latex gloves should be worn when handling solvents. In addition, the appropriate personal protective equipment (PPE) must be utilized as required in the project-specific Health and Safety Plan, for all field activities.

It is recommended that in addition to the required OSHA 40-hour hazardous waste site worker certification, each of the team members be trained in basic first aid, including CPR and a first aid kit is provided for all field trips.

4.0 RESPONSIBILITIES

All field personnel performing ground water sampling for DEI projects must be trained in sampling techniques, sample handling, decontamination, health and safety considerations and project quality assurance/quality control ("QA/QC") procedures; and be familiar with this SOP. Specific training and/or orientation should be provided for each project to ensure that personnel understand the objectives and special circumstances of requirements of that project.

4.1 Project Manager

It is the Project Managers responsibility to:

- Ensure that a properly designed scope of work is prepared prior to any field activities. The scope of work should identify the general sampling location(s), frequency, sample type (grab vs. composite), parameters, and analytical procedures.

- Ensure that each project is properly executed, and that all health and safety considerations are addressed.

- Designate a Field Manager to oversee all field activities, and assign specific duties to members of the Sampling Team.

- Ensure that all personnel performing field activities have been properly trained in well purging, sample collection, and quality assurance procedures, including specific requirements of the project scope of work and applicable standard operating procedures.

- Ensure that proper decontamination procedures are selected.

- Review all data generated in the field and ensure that all necessary forms (i.e., ground water sample collection record) are completed and filed in the proper project files.

- Ensure that all wastes generated are properly managed.

4.2 Field Manager

It is the Field Manager's responsibility to:

- Ensure that all necessary field equipment and health and safety equipment are in good working order, and are transported to the field.

- Coordinate subcontractors; laboratory (sample containers, preservatives, holding times, etc.), delivery service (pick-up, delivery location, insurance, etc.), and others as applicable.

- Ensure that all members of the Sample Team adhere to the requirements in the Health and Safety Plan.

- Ensure that the sample collection specifications defined in the project-specific scope of work and the relevant standard operating procedures are followed, including QA/QC.

- Maintain detailed field records in the designated field book.

- Ensure that the proper forms (i.e., ground water sample collection record) are completed fully and correctly.

- Ensure that the samples collected are properly labeled and that proper chain-of-custody is maintained by the Sampling Team.

- Ensure that proper packaging and shipping requirements, as identified in the scope of work or Standard Operating Procedures are followed. This includes identification of and adherence to applicable U.S. Department of Transportation ("DOT") regulations regarding shipment of materials which may be classified as waste or containing hazardous constituents.

- Ensure that all field data collected is delivered to the Project Manager upon returning from the field.

- Assist the Project Manager in determining which samples collected will be analyzed.

- Notify the Project Manager of any waste materials generated as a result of field activities, which will require management.

4.3 *Sampling Team*

The Sampling Team is responsible for:

- Implementation of the project-specific scope of work and standard operating procedure specifications for monitoring well sampling.
- Proper use and maintenance of all field equipment and health and safety equipment in accordance with the applicable equipment manuals and standard operating procedures.
- Maintaining detailed field records in the project field book.
- Performance of field measurements.
- Completing the proper forms (i.e., ground water sample collection record) fully and correctly.
- Handling, labeling, storing, packaging, and documenting all samples collected.
- Maintaining proper chain-of-custody.
- Ensuring that all appropriate QA/QC procedures are addressed as stated in the project-specific scope of work.
- Following all health and safety requirements.
- Ensuring that no cross-contamination of samples or sample locations occurs due to negligence or unacceptable operating procedures.

5.0 SUPPORTING MATERIALS

The following subsections identify the major equipment and supplies recommended for performing field work. Section 5.5 lists additional equipment specific to this SOP.

5.1 Sampling Equipment/Supplies

- Aluminum foil
- Bailer (disposable)
- Bailer cord
- Bolt Cutter
- Camera/film
- Deionized water rinse bottle
- Depth to water meter
- Field book
- Five gallon bucket
- Folding ruler (6 foot)
- Garbage bags
- Ground water sampling form
- Interface probe
- Keys (As appropriate)
- Measuring tape
- Paper towels - chemical free
- Permanent marker
- Plastic sheets
- Project-specific health and safety plan
- Project-specific scope of work
- Sample containers label
- Site plan map
- Spray paint - pink
- Tape measure
- Writing instrument (water-proof ink)
- Wristwatch
- Zip-lock bags

5.2 Decontamination Equipment

- Alconox or Liquinox detergent

- Bucket
- Scrub brush
- Steam cleaner
- Solvent rinse bottle
- Plastic sheets

5.3 *Shipping Equipment*

- Bubble pack
- Chain-of-custody forms
- Chain-of-custody seals
- Cooler/crate
- Ice/cold packs
- Packing tape (clear)
- Rubber bands
- Styrofoam pellet packaging
- Zip-lock bags

5.4 *Health and Safety Equipment (as determined to be necessary by the HASP)*

- Eye Wash
- First aid kit
- Goggles/safety glasses
- Hard hat
- Monitoring equipment (as needed)
- Respirator/cartridges (as needed)
- Sampling gloves (chemically resistant/compatible)
- Steel toe/shank safety shoes
- Tyvek® or splash/chemical resistant garments (as needed)
- Weather gear (as necessary)

5.5 *SOP Specific Equipment*

The list below identifies the types of equipment which may be used for a range of ground water sampling applications. From this list, a project-specific equipment list will be selected based upon project objectives, the depth-to-ground water, purge volumes, analytical parameters and well construction. The types of sampling equipment are as follows:

5.5.1 Purging/Sample Collection

- Bailers
- Bladder pump
- Centrifugal pump
- Peristaltic pump
- Road box wrench
- Submersible pump

5.5.2 Sample Preparation/Field Measurement

- Disposal 45-μm filters
- Disposable plastic jars
- DO meter
- Eh meter
- Filtration apparatus
- Flow-through cell
- pH meter
- Specific Conductance meter
- Thermometer
- Turbidity meter

6.0 GROUND WATER SAMPLING METHODS AND PROTOCOLS

This section outlines the methods and protocols to be employed for ground water sampling activities.

6.1 General Procedures

The general procedures to be followed include purging the well prior to sample collection to ensure that stagnant water (in contact with atmosphere O_2) is removed from the well and a representative sample is obtained from the aquifer for chemical analysis. A number of field measurements are to be recorded in the field during the sampling program (depth-to-water, temperature, pH, specific conductance, Eh, DO, etc.).

The protective well casing should be locked. If the lock can not be opened (due to corrosion, lost key, etc.) bolt cutters should be used to remove the lock so that the well will not be damaged, and a new lock installed upon completion of sampling, to maintain monitoring well integrity. Replacement of a lock should be recorded in the field book. Flush-mounted well casings (road-box casings) may require a socket wrench or manufacturer-supplied wrench in order to gain access.

6.2 Specific Procedures

This subsection outlines the specific ground water sampling procedures to be employed.

6.2.1 Water Level Measurement

In some instances it may be appropriate to create a clean surface onto which the sampling equipment can be positioned, prior to initiating sampling. Cut a slit in one side of the plastic sheet and slip it over and around the well. This clean working area should be a minimum of sixteen (16) ft^2 (4' x 4'). Care must be taken not to kick, transfer, drop, or in any way let soil or other materials fall onto this sheet unless it comes from inside the well. Do not place meters, tools, equipment, etc., on the sheet unless they have been cleaned first.

Water level measurements will be recorded using an electronic device, referred to as a "depth-to-water meter". This device will be used in all wells because a clearly audible sound cannot be produced with a standard weighted tape. If separate phase product is, or may be present, in the well, an interface probe should be utilized. This device is capable of differentiating between the surfaces (i.e., product surface vs. water surface) and therefore, can provide information to determine the thickness of the floating product.

1. Well Security - Unlock and/or open the monitoring well. Enter a description of condition of the security system and protective casing on the Ground Water Sample Collection Record shown in **Figure 1**.

2. Measuring Point - The measuring point for all water level measurements will be the well rim (top edge of the well pipe, not the protective casing) for all wells and will be the same point (typically notched to ensure the same spot) used during subsequent sampling efforts.

3. Depth to Water Measurement - Lower the clean depth-to-water meter probe into the monitoring well. Care must be taken to assure that the probe hangs freely in the monitoring well and is not adhering to the wall of the riser pipe. The water level measuring tape will be lowered into the well until the audible sound of the unit is detected. At this time, the precise measurement should be determined (to one-hundredth of a foot) by repeatedly raising and lowering the tape to converge on the exact measurement. The water level measurement should be entered on the Ground Water Sample Collection Record.

4. Total Well Depth Measurement - Continue to lower the probe into the monitoring well until it strikes the bottom. An accurate measurement should be determined (to one-tenth of a foot) by repeatedly raising and lowering the tape to converge on the measurement. The total depth measurement should be entered on the ground water sample collection record. Total depth measurements cannot be measured for wells with installed pumps, therefore in such a case the total depth as recorded during monitoring well installation can be utilized.

5. Decontamination - The depth-to-water meter will be decontaminated immediately after use, by placing a clean towel around the tape, and allowing the tape to pass through as it is reeled up out of the well. Therefore, only that portion of the tape which enters the well will be cleaned. It is important that the measuring tape, or probe, is never placed directly on the ground surface.

6.2.2 Purge Volume Computation

To ensure a representative sample from the ground water aquifer, all monitoring wells must be purged prior to sample collection. Unless the project-specific scope of work dictates otherwise, three (3) volumes of water will be purged from the well prior to sampling, if recharge rates allow. Otherwise, the well will be purged until dry. The volume of water present in each well can be computed based on the length of water column (total well depth minus depth-to-water) and well casing diameter. Typically 2-inch diameter

pipe is used for monitoring wells, which results in a standard calculation of water column x 0.163 = well volume in gallons. For different sized pipe, the water volume can be computed using **Figure 2**.

6.2.3 Well Purging Methods

Purging must be performed for all ground water monitoring wells prior to sample collection in order to remove stagnant water from within the well casing and ensure that a representative sample is obtained. The following sections explain the proper procedures for purging and collecting water samples from monitoring wells.

Three general types of equipment are used for well purging: bailers, surface pumps, or down well submersible pumps.

In all cases, it may be appropriate for pH and/or specific conductance to be monitored during purging in order to determine stabilization of field measurements (i.e., pH, specific conductance, temperature). Field parameter values will be entered on the Ground Water Sample Collection Record along with the corresponding purge volume.

Manual Bailing

Bailers are constructed using a variety of materials; generally, plastic (PVC or polyethylene), stainless steel or Teflon. Care must be taken to select a specific type of bailer that best meets the projects specific needs. Teflon bailers are generally most "inert" and are recommended. Each well will most likely have been fitted previously with a dedicated (used for one well only) bailer for purging. If not, the option to assign dedicated purging bailers should be considered for future sampling events. This bailer may also be appropriate for sample collection, or a different bailer may be utilized for sample collection.

1. Obtain a clean/decontaminated bailer and a spool of polypropylene bailer cord or stainless steel, Teflon coated bailer cord. Using the cord at the end of the spool, tie a bowline knot or equivalent through the bailer loop. Test the knot for security and the bailer itself to ensure that all parts are intact prior to inserting the bailer into the well. Bailer rope should not touch the ground surface at any time during the purging or sample collection routine.

2. Raise the bailer by grasping a section of cord using each hand alternately in a "rocking" action. This method requires that the sampler's hands be kept approximately two to three feet apart and that the bailer rope is alternately looped onto or off each hand as the bailer is raised and lowered.

3. Bailed ground water is poured from the bailer into a graduated bucket to measure the purged water volume.

4. For slowly recharging wells, the bailer is generally lowered to the bottom of the monitoring well and withdrawn slowly through the entire water column. Rapidly recharging wells should be purged by varying the level of bailer insertion to ensure that all stagnant water is removed.

Surface Pumping

Ground water withdrawal using pumps located at the ground surface is commonly performed with peristaltic or centrifugal pumps.

All applications of surface pumping will be governed by the depth-to-ground water surface. Peristaltic and centrifugal pumps are limited to conditions where ground water needs only be raised through approximately 20 feet of vertical distance. The lift potential of a surface pumping system will depend upon the net positive suction head of the pump and the friction losses associated with the particular suction line, as well as the relative percentage of suspended particulate.

Surface pumping can be used for many applications of well purging and ground water sample collection.

- Peristaltic Pump

  Peristaltic pumps provide a low rate of flow typically in the range of 0.02 - 0.2 gallons/min. (75 - 750 ml/min). For this reason, peristaltic pumps are not particularly effective for well purging. Peristaltic pumps are suitable for purging situations where disturbance of the water column must be kept minimal for particularly sensitive analyses. Peristaltic pumps are most often used in conjunction with field filtering of samples and therefore can be used to obtain water samples for direct filtration at the well head.

- Centrifugal Pump

  Centrifugal pumps are designed to provide a high rate of pumping, in the range of 10 - 40 gallons per minute (gpm), depending on pump capacity. Discharge rates can also be regulated somewhat, provided the pump has an adjustable throttle.

It is recommended that if samples cannot be obtained before passing through the pump,

they should be obtained by using a bailer once the purging criteria has been satisfied. Collecting samples from the pump discharge is not recommended due to the high agitation produced by this sample delivery system.

1. Place the suction/discharge line in the peristaltic pump. Silicon tubing is recommended to be used through the pump head due to its ease of decontamination. The suction line must be long enough to extend to the static ground water surface and reach further should drawdown occur during pumping.

2. Start the pump and direct the discharge into a graduated bucket of known capacity (typically 5 gallons).

3. Measure the pumping rate in gallons per minute by recording the time required to fill a selected volume of a bucket. Flow measurement should be performed at least three (3) times to obtain an average rate.

4. The pumping shall be monitored to assure continuous discharge. If drawdown causes the discharge to stop, the suction line will be lowered very slowly further down into the well until pumping restarts.

5. It may be appropriate for measurements of pH, specific conductance and temperature to be made at timed intervals during well purging, and these measurements recorded on the Ground Water Sample Collection Record.

Down-well Submersible Pumps

Submersible pumps provide an effective means for well purging and in some cases sample collection. Submersible pumps are particularly useful for situations where the depth-to-water table is greater than twenty (20) to thirty (30) feet, and the depth or diameter of the well require that a large volume of water be removed during purging. There are a number of varieties of down-well submersible pumps; bladder pumps, electric centrifugal submersibles, etc.

As with other pump-type purge/sample collection methods that produce highly agitated samples, submersible pumps will only be used for the collection of samples for analyses of VOC's if they are low (or adjustable) pump rate bladder pumps.

1. Establish direct connection to the top of the monitoring well if possible, using pipe connections, extensions, and elbows, with Teflon tape wrapping on all threaded connections.

2. Prime the pump by adding tap water to the pump housing until the housing begins to overflow.

3. Start the pump and direct the discharge into a graduated bucket or a bucket of known capacity (typically 5 gallons).

4. Start the pump and measure the pumping rate in gallons per minute by recording the time required to fill the graduated bucket. Flow measurement should be checked periodically to determine if pumping rates are continuous, fluctuating, or diminishing. If discharge stops, the pump will be throttled back to determine if pumping will restart at a lower rate. If pumping does not restart, the pump should be shut off to allow the well to recharge.

5. It may be appropriate for measurements of pH, specific conductance and temperature to be made at timed intervals during well purging. All readings should be entered on the Ground Water Sample Collection Record.

6.2.4 Sample Collection Procedures

A sample should be collected from a well that has been pumped dry as soon as sufficient water volume is available. Water samples should be obtained from midpoint or lower within the water column. A sample should be collected from a well that does not go dry (i.e., instant recharge) immediately upon completion of purging requirements (e.g., three well volumes).

Some properties or constituents in ground water may change dramatically within a few moments or hours after sample collection. Immediate analysis in the field using portable meters is required if dependable results for the parameter are to be obtained. These constituents include pH, temperature, specific conductance, turbidity, eH and dissolved oxygen (DO). Under pumping scenarios, it may be advisable to employ a flow-through-cell to ensure representative results.

Some metal constituents (e.g., Fe and Mn) will precipitate out due to the exposure to atmospheric oxygen. Preservation of these samples with the addition of acid (preventing precipitation) to the sample container is recommended (in general, sufficient acid should be added so that the resultant pH is 3.0 or less). Typically the lab will provide sample containers prepared with preservative, which do not need to be tested for resulting pH.

If a filtered sample is to be collected, a pre-cleaned, disposable, laboratory supplied container should be obtained and the water poured from the bailer to the container. A peristaltic pump and a new 0.45-μm filter should be used to filter the water to the

laboratory supplied sample containers. Filters should be disposable, and not reused. All other samples should be collected directly into laboratory supplied containers.

Manual Bailing

Samples collected by bailing will be poured directly into sample containers from bailers that contain fresh ground water. During sample collection, bailers must not be allowed to contact the sample containers to prevent possible inadvertent contamination from the exterior of the bailer.

Peristaltic Pump

1. Each sample bottle shall be filled directly from the discharge line of the peristaltic pump. Care will be taken to keep the pump discharge line from contacting the samples bottles. A 0.45-μm filter may be attached to the end of the discharge line for ground water samples requiring filtration prior to placement in sample containers.

2. At each monitoring point when use of the peristaltic pump is complete, all tubing must be properly decontaminated. The peristaltic pump tubing will be retained in a clean zip-lock plastic bag.

Centrifugal Pump

1. Lower a new suction line into the well. The suction line will have a total length of enough to extend to the water table and account for a minimum of five feet of drawdown. Drawdown may exceed the depth where pumping will terminate as a result of a limitation derived from suction line conditions and the lift potential of the pump. All threaded connections should be wrapped with Teflon tape.

2. Run the pump as described above.

3. At each monitoring well, when use of a centrifugal pump is complete, all section line tubing should be decontaminated or disposed of properly.

Submersible Pump

1. Slowly lower the submersible pump into the monitoring well while noting any roughness or restrictions within the riser.

2. Count the graduations on the pump discharge line and stop lowering when the stainless steel portion is below the uppermost section of the static water column

within the monitoring well. Secure the discharge line and power cord to the sell casing.

3. Connect the power cord to the power source (e.g., rechargeable battery pack, auto battery, generator, etc.) and turn the pump on (forward mode). When running, the pump can usually be heard by listening near the well head.

4. Voltage and amperage meter readings on the pump discharge must be checked continuously. The voltage reading will decline slowly during the course of a field day representing the use of power from the battery. Amperage readings will vary depending upon the depth-to-water table. Amperage readings greater than 10 amps usually indicate high solids content in the ground water which may cause pump clogging and serious damage. If a steady increase in amperage is observed, the pump should be shut off, allowed to stop, switched to the reverse mode, stopped again, and then placed in forward mode. If high amperage readings persist, the pump should be withdrawn and checked using the large upright cylinder and tap water. Ground water condition such as high solids may require that an alternate purge/sample method be used.

5. Drawdown must also be monitored continuously by remaining near the well at all times and listening to the pump. When drawdown occurs, a metallic rotary sound will be heard as the pump intake becomes exposed and ceases to discharge water, but continues to run. The pump should be lowered immediately to continue pumping water within the uppermost section of the static water column. NOTE: The submersible pump cannot be allowed to run while not pumping for more than a few seconds or the pump motor will burn out.

6. If drawdown continues to the extent that the well is pumped dry, the pump should be shut off to allow the well to recharge. This on/off cycle may need to be repeated several times in order to purge the well properly.

7. It may be appropriate that measurements of the pumping rate, pH, and specific conductance be recorded periodically during well purging. All readings and respective purge volumes should be entered on the Ground Water Sample Collection Record.

8. While pumping is ongoing and when sample bottles are prepared, bottles will be filled directly from the discharge line of the pump. Care should be taken not to touch sample bottles to the discharge line.

9. When use of the submersible pump is complete at each monitoring well, the pump,

discharge line and power cord shall be decontaminated according to the procedures contained in the SOP for Decontamination.

6.2.5 Sample Preparation and Preservation

Prior to sample transport or shipment, ground water samples may require filtration and/or preservation dependent on the specific type of analysis required.

Specific preservation techniques are described in the EPA document, *Handbook for Sampling and Sample Preservation of Water and Wastewater (EPA-600/4-82-029)*. A project-specific scope of work will be prepared outlining the necessary procedures, and shall be utilized during the field effort. In addition, sample bottles containing appropriate preservative will topically be provided by the lab, and bottles labeled accordingly.

Ground water samples collected for dissolved metals analyses may need to be filtered prior to being placed in sample containers. Ground water filtration will be performed using a peristaltic pump and 0.45-μm filter membrane or direct in-line filtering from well discharge if appropriate. Alternatively, ground water samples can also be filtered by attaching a filter directly to the pump discharge line. The filters to be utilized are disposable and should be used for one sample only.

The filtration of ground water samples shall be performed either directly from the monitoring well or from intermediate, disposable sample containers provided by the laboratory. In either case, fresh ground water should be filtered and discharged from the filtration apparatus directly into sample containers. For most dissolved metal analyses, pH adjustment of the sample is also required. This is generally accomplished using laboratory supplied nitric acid.

Other preservatives may be required depending on the specific analyses to be performed. Information regarding proper sample preservation would be provided in the project-specific scope of work. In those cases, the laboratory typically prepares the sample bottles to include the required instructions.

Volatile organic compound (VOC) analysis requires that non-agitated water be collected into vials with Teflon lined septum lids. It is important that these vials be completely filled with zero headspace (i.e., no air bubbles) to preclude VOC's from volatilizing out of the water and into the air.

6.3 Sample Handling

Samples collected for laboratory analysis will be placed in pre-cleaned, laboratory supplied

containers (jars or bottles) of the appropriate size, according to the analyses to be performed. Each label should be completed as follows:

- Station Location - Description of the place where the sample was taken;
- Date - A six digit number indicating the year, month and day of collection;
- Time - A four digit number indicating the military time of collection;
- Sample Number - A unique identification number which may contain the above information, but which distinguishes samples, among those collected from the same site at the same time;
- Preservative - Type, if any;
- Sampler - Name of team member collecting the sample;
- Remarks - Any pertinent observations or further sample description.

The container should then be capped and labeled (see Section 7.0) and the label should be placed such that the sample container could not be opened without breaking the seal of the label.

All observations (visual description, odor, sample time and date, etc.) should be fully recorded on the appropriate form or in the field book.

Quality control samples (blanks, duplicates, etc.) are labeled as above, and are <u>not</u> identified as quality control samples on the labels. Identify all QC samples in the field notebook.

Once labeled, samples should be placed in a cooler packed with ice, to ensure a constant temperature at or near 4° C, pending submittal to the laboratory for analyses. Once each sample has been collected, containerized and labeled, it is entered on the chain-of-custody form (**Figure 4**). One chain-of-custody form may be used for as many samples as will fit on the form, but all samples sharing a single chain-of-custody form must be packaged and hipped together. The sampler must complete all of the heading information on the form accurately and legibly. For each sample, the following information is entered:

- Sample Number (this identification number must be identical to the identification number on the sample label),
- Date and time of sample collection,
- Type and quantity of sample,
- Number of containers per sample, and
- Analyses to be performed.

Quality control samples (blanks and duplicates) are entered as above, but not identified as quality control samples on the chain-of-custody record. Identify all QC samples in the field notebook.

The method of shipment, courier name(s), and other pertinent information are entered in the "Remarks" box. A copy of the shipper's waybill or air bill must be retained by the last custodian prior to shipment.

Once they have been properly labeled and logged, samples are packaged for shipment and sent to the laboratory with a separate chain-of-custody record sealed into each package. The entire contents of each package must be recorded on the enclosed chain-of-custody record(s); and the samples identified on each chain-of-custody record must be only those contained in the package represented by that record.

If chain-of-custody tape is to be employed, then before each package is sealed, two pieces of chain-of-custody tape are selected and their serial numbers entered in the signature box of the appropriate chain-of-custody form(s), along with the relinquishing person's signature. Once all of the contents (including the chain-of-custody record) are inside the package, it is closed (sealed). The chain-of-custody tape then is affixed to opposite ends of the lid, so that the lid cannot be opened without breaking the chain-of-custody tape. Each chain-of-custody tape is signed and dated by the person sealing the package. Cellophane

tape should be affixed over each chain-of-custody seal to protect it from weathering and abrasion. At this stage, the package should be wrapped with clear fiber shipping tape to ensure that it will not open upon transport. The shipping tape should be placed over the chain-of-custody tape so that the package cannot be opened without tearing it.

6.4 Waste Management Practices

All waste materials generated as a result of field activities (e.g., purge water) must be managed in accordance with the project-specific Investigation-Derived Waste Plan and/or with DEI SOP#8-A.

6.5 Sampling Location I.D.

At the completion of sampling, each sample location should be staked, marked, or noted for easy identification pending elevation and location surveying, to accurately determine the sampling location's position on site plan maps or its elevation for preparation of cross-sections, ground water contours, etc.

7.0 DOCUMENTATION

The following forms should be utilized to ensure that the specific activities performed are appropriately documented:

- Ground water Sample Collection Record (**Figure 1**)
- Sample Labels (**Figure 3**)
- Chain-of-Custody Forms (**Figure 4**)
- Shipping Receipts

Sample labels shall be completed at the time each sample is collected and will include the information listed below. A sample label is shown in **Figure 3**.

- Client or project name,
- Sample I.D. (number),
- Designation (sampling point identification),
- Analysis,
- Preservation,
- Sample collection date and time,
- Sampler's name

A chain-of-custody form (**Figure 4**) is a record of sample collection and transfer of custody. The above information must also be entered on the chain-of-custody. Additionally, in accordance with 40 CFR 261.4(d), the following information must accompany the samples:

- Sample collector's name, company, mailing address and telephone number,
- Analytical laboratory's name, mailing address and telephone number,
- Quantity of each sample,
- Date of shipment,
- Description of sample.

The chain-of-custody forms provide specific locations for entering the above information.

A field book will be maintained as an overall log of all events which occur throughout the project, including conditions encountered, samples collected, deviations from the scope of work, unusual circumstances, etc.

All documents are to be retained in the appropriate project files indefinitely. It is important that all field documentation be as complete as possible to ensure traceability.

8.0 REFERENCES

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United States Code of Federal Regulations, Chapter 40 Section 261.4(d).

FIGURE 1

GROUND WATER SAMPLE COLLECTION RECORD

SAMPLE POINT ID MW-3

GROUNDWATER SAMPLING FIELD AND DATA SUMMARY

SITE IDENTIFICATION

COMPANY: ABC, Inc
FACILITY/SITE: ABC Site
ADDRESS: Oak Street
CONTACT: John Doe
PHONE:

FIELD PROCEDURES

PURGE DATE: 28-Jan-03
PURGE TIME START: 11:30 a.m.
ELAPSED PURGE TIME 30 minutes
WATER VOLUME IN CASING (GAL): 3.8
WATER VOLUME REMOVED (GAL): 11.4

SAMPLE DATE: 28-Jan-03
SAMPLE TIME: 12:00 p.m.
FILTRATION TIME: None
WELL PURGED DRY (Y/N):
PURGED WATER APPEARANCE: Turbid, Sulfur Smell

INITIAL CALIBRATION TIME OF PH/SC METER: 8:00 a.m. (office)
FIELD MEASUREMENT TME: 12.05 p.m.
FINAL CALIBRATION CHECK: SC _____ pH _____ TIME _____

NEW ROPE USED: PURGING (Y/N); SAMPLING (Y/N)
ROPE MATERIAL: Nylon

FIELD MEASURMENTS

WELL ELEVATION (ft/msl.)		pH	6.15	units
DEPTH OF GROUDNWATER (ft.)	39.50	SPECIFIC CONDUCTANCE	1460	
GROUNDWATER ELEVATION (ft/msl.)		SAMPLE TEMPERATURE	47.6	F
WELL DEPTH (ft.)	63.4	DTW-RECHARGE (DATE:)		
STICK-UP (ft.)		DISSOLVED O2 64.5 %	7.65	mg/L

FIELD COMMENTS

WELL INSPECTION - PROTECTIVE CASTING: Good
LOCK/CAP Good
WELL ANULUS: Good
EXTERNAL WELL ID 2 inches

SAMPLE APPEARANCE. - CLARITY (CLEAR/SL. TURBID/V. TURBID)
COLOR (YELLOW/BROWN/RUST/GREY/WHITE/CLEAR)
ODOR (SULFUR/LFG/MUSTY/SOLVENT/NONE) OTHER.

WEATHER APPEARANCE:

SKY Cloudy
TEMP 20 F
GROUND
HUMIDITY %
WIND
P'ptn. Last 24 hrs 0 inches

SAMPLE COLLECTED BY: John Doe
COMPANY: Deuchler Environmental
CLIENT REPRESENTATIVES: None
REGULATORY REPRESENTATIVES: None
COMMENTS:

Deuchler Environmental, Inc.
Consulting Engineers
230 Woodlawn Avenue
Aurora, Illinois 60506

FIGURE 2

PURGE VOLUME COMPUTATION

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume Gal/Linear Ft.	Weight of Water: Lbs/Lineal Ft.
1 1/4"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.20
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5
8"	8.625"	7.981"	2.6	21.65
12"	12.750"	11.938"	5.81	48.44

Volume of Open Borehole and Annulus Between Casing and Hole

Hole Diameter	Volume/ Lineal Ft. of Hole Gal.	Cu.Ft.	Nominal Casing Diameter	Volume/ Lineal Ft. of Annulus Gal.	Cu.Ft.	Lbs Sand/ Lineal Ft. of Annulus	Lbs 1/2" Pellets Per Lineal Ft. of Annulus
7 1/4"	2.14	.29	1 1/4"	2.03	0.27	27	21
7 1/4"	2.14	.29	2"	1.91	0.26	26	20
7 3/4"	2.45	.33	2"	2.22	0.30	30	23
[illegible] 1/4"	2.78	.37	2"	2.55	0.34	34	26
[illegible] 1/4"	4.29	.57	2"	4.06	0.54	54	41
8 1/4"	2.78	.37	3"	2.28	0.30	30	23
10 1/4"	4.29	.57	3"	3.79	0.51	51	38
12 1/4"	6.13	.82	3"	5.62	0.75	75	57
8 1/4"	2.78	.37	4"	1.95	0.26	26	20
10 1/4"	4.29	.57	4"	3.46	0.46	46	35
12 1/4"	6.13	.82	4"	5.30	0.71	71	54
12 1/4"	6.13	.82	6"	4.33	0.58	58	44

Miscellaneous Data

1 Cu. Ft. = 7.5 gal. (approx.)
1 Gallon = .134 Cu. Ft. (approx.)
1 Cu. Yd. = 202 gal. (approx.)
1 Gallon = .005 Cu. Yd. (approx.)
1 Gallon of Water = 8.34 lbs. (approx.)
1 Cu. Ft. of Fresh Water = 62.4 lbs. (approx.)

PSI = .434 x the height of the water column in feet
Feet of Head = PSI x 2.304
1 Barrel = 42 gallons (approx.)
1 Sack of Sand = 1 Cu. Ft. and approx. 100 lbs.
1 Sack of Cement = 1 Cu. Ft. and approx. 96 lbs.
1 Pail of Bentonite Pellets = 50 lbs. (approx.)

FIGURE 3

SAMPLE CONTAINER LABEL

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID. _____
Date Collected: _____ Time: _____
Collected by: _____
Analysis: _____

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____
Client Sample ID: _____
Date Collected. _____ Time: _____
Collected by: _____
Analysis: _____

CUSTODY SEAL

Date _____

Signature _____

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water

Client

Sample Description

Sampled by: Date

Time:

Lab ID#

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by. Date:

Time

Lab ID#

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water

Client:

Sample Description:

Sampled by Date:

Time.

Lab ID#

First Environmental Laboratories, Inc.

FIGURE 4

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY RECORD

Page____ of _ pgs

F[illegible] E[illegible]ronmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ e-mail: _____

Send Report To: _____ Via: Fax ☐ e-mail ☐

Sampled By: _____

Project I.D.: _____

P.O. #.: _____

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6ºC Yes__ No.__ _____ºC
Received within 6 hrs. of collection: _____
Ice Present. Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature: _____ºC
5035 Vials Frozen: Yes__ No__
Freezer Temperature: _____ºC

Containers Received Preserved: ☐ Yes ☐ No

Notes and Special Instructions: _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 4/06

DEUCHLER ENVIRONMENTAL, INC.

Consulting Engineers

230 Woodlawn Avenue • Aurora, Illinois 60506 • (630) 897-8380 • Fax (630) 897-5696

Standard Operating Procedures for

The Management of Investigation Derived Wastes

SOP #8-A

Version 2.0

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09-27-06

Philippe Moreau, P.E. — Date
DEI President and Principal Engineer

9/26/06

Marc R. Fisher — Date
DEI Environmental Manager

9/26/06

Carrie Carter — Date
DEI Project Manager

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Figure 1: Example Container Labels
Figure 2: Chain-of-Custody Record
Figure 3: Sample Waste Manifest

1.0 GENERAL APPLICABILITY

This Standard Operating Procedure ("SOP") establishes the methods used by Deuchler Environmental, Inc. ("DEI") personnel for managing waste materials generated during performance of stipulated site assessment and investigatory field activities. Investigation-Derived Wastes ("IDW") includes any materials that are generated that must be disposed in accordance to the hazards posed by said materials. Waste materials that are typically generated as part of site assessment activities include, but are not limited to:

- Waste soil from sampling activities, trenching, test pit excavation, Underground Storage Tank ("UST") system removal, etc.;
- Drill cuttings from boring activities;
- Liquid wastes including decontamination water and ground water from monitoring well development, purging and sampling activities;
- Disposable sampling materials including bailers, gloves, Tyvek® or other personnel protective clothing, plastic boot covers, plastic sampling sleeves, plastic bags, plastic soil sampling syringes; and
- Other waste materials generated as part of site investigations and assessments.

2.0 DEFINITIONS

2.1 Decontamination: Process utilized to ensure that all equipment and materials used in a site investigation have been adequately cleaned to ensure that they will not contaminate future samples or needlessly or excessively expose personnel to contamination.

2.2 Field Book: Bound, hard cover book assigned to individual field personnel for use in documenting all field activities.

2.3 Investigation Derived Waste ("IDW"): Waste materials generated during performance of environmental site investigations and assessments.

2.4 Personal Protective Equipment ("PPE"): Clothing and/or equipment utilized to shield or isolate individuals from chemical, physical, or biological hazards.

2.5 Solvent: A substance (typically liquid) capable of dissolving or dispersing one or more other substances.

2.6 TSD: Temporary Storage or Disposal Facility under the Resource Conservation and Recovery Act ("RCRA").

2.7 Waste Manifest: The transportation of hazardous wastes (and "Special Waste" in Illinois) to off-site municipal landfill or TSD facilities is to be accompanied by a document published by the Illinois Environmental Protection Agency ("Illinois EPA") called the "Uniform Hazardous Waste Manifest" (Illinois EPA Form 8700-22). This is the mandatory format for shipping-papers that must accompany most waste shipments (please refer to **Figure 3** for an example of the waste manifest). In its simplest form, the manifest is a four-part shipping document which serves to track the wastes to ensure delivery to the designated appropriate disposal facility. The manifest serves as both the shipping document and waste tracking documentation.

State hazardous waste management agencies are allowed to require the use of state-supplied manifest forms. Typically, requirements to use a state-supplied manifest form are accompanied by additional parts of the manifest, as well as by requirements for the generator and/or the designated facility to mail signed manifest parts or copies to the state regulatory agency.

If the state in which the designated facility is located (the consignment state) supplies the manifest and requires its use, then that state's manifest form <u>must be used</u>. If the consignment state does not supply the manifest, but the state in which

the generator is located (generator state) supplies the manifest and requires its use, then the generator state's manifest must be used. If neither the consignment state nor generator state supplies the manifest, then any manifest with sufficient parts or copies meeting the mandatory format of Illinois EPA Form 8700-22 can be used.

The Uniform Hazardous Waste Manifest must consist of sufficient copies (sometimes referred to as parts) to provide the generator, each transporter, and the designated facility with one copy each for their records and another copy to be returned to the generator by the designated facility, acknowledging acceptance of the waste shipment. State-supplied manifests typically have at least two additional copies: one to be mailed to the state regulatory agency by the generator and another to be mailed to the state regulatory agency by the designated facility. Generators required to use state-supplied forms will typically be informed of same by their state regulatory agency and/or their designated TSD facility. The instruction for state-supplied manifests should be carefully read to ensure compliance with the requirements to provide copies to the state regulatory agency. Such instructions usually include directives to provide additional information in the shaded areas of the manifests.

3.0 HEALTH AND SAFETY CONSIDERATIONS

For any field project, a project-specific Health and Safety Plan ("HASP") will be prepared by the DEI Health and Safety Officer before field work commences. This plan must be distributed to, and signed by, the Field Manager and each member of the DEI field team, and must be adhered to as field activities are performed. In addition, the Field Manager must maintain a copy in his/her possession and make it available on-site for review at any time during the field activities.

Waste management procedures may involve chemical exposure hazards associated with the medium being managed and may involve physical hazards associated with the equipment. Care should be taken to avoid injury during all field activities and the proper personal protective equipment should be worn during all decontamination activities.

It is recommended that in addition to the required OSHA 40-hour hazardous waste site worker certification, each of the team members be trained in basic first aid, including CPR and a first aid kit should be provided for all field work site visits.

4.0 RESPONSIBILITIES

All field personnel performing waste management activities for DEI projects must be properly trained in associated techniques, decontamination, health and safety and project quality assurance/quality control ("QA/QC") procedures and must be familiar with this SOP. Specific training and/or orientation should be provided for each project to ensure that personnel understand the objectives and special circumstances or requirements of that project.

4.1 Project Manager

It is the Project Managers responsibility to:

- Ensure that a properly designed scope of work ("SOW") is prepared prior to any field activities. The SOW should identify any specific waste management procedures, necessary sampling frequency (if any), sample type (grab vs. composite), parameters, and analytical procedures.

- Ensure that waste management is considered, addressed and properly executed, and that all health and safety considerations are addressed.

- Designate a Field Manager to oversee all field activities, and assign specific duties to members of the Sampling Team.

- Ensure that all personnel performing field activities have been properly trained in waste management procedures, including specific requirements of the project SOW and applicable SOP's.

- Determine which samples (if any) will be analyzed for which constituents, utilizing the project-specific SOW.

- Review all data generated in the field and ensure that all necessary forms (if any) are completed and filed in the proper project file.

4.2 Field Manager

It is the Field Manager's responsibility to:

- Ensure that all necessary field equipment, including waste management equipment (e.g., drums, plastic sheeting, etc.) and health and safety equipment are in good working order, and are transported to the field.

- Coordinate subcontractors: drum delivery, waste haulers, landfill operators, etc.
- Ensure that all members of the Sample Team adhere to the requirements in the Health and Safety Plan.
- Select specific samples to be collected (if any) in accordance with the project-specific SOW.
- Ensure that the decontamination specifications defined in the project-specific SOW and the relevant SOP's are followed, including QA/QC.
- Maintain detailed field records in his/her field book.
- Ensure that the proper forms (if any) are completed fully and correctly.
- Ensure that any samples collected are properly labeled and that proper chain-of-custody is maintained by the Sampling Team.
- Ensure that proper packaging and shipping requirements, as identified in the SOW or SOP's are followed. This includes identification of and adherence to applicable U.S. Department of Transportation ("USDOT") regulations regarding shipment of materials which may be classified as waste or containing hazardous constituents.
- Ensure that all field data collected is delivered to the Project Manager upon returning from the field.
- Assist the Project Manager in determining which samples collected will be analyzed.
- Notify the Project Manager of any waste materials generated as a result of field activities, which will require management.

4.3 Sampling Team

The Sampling Team is responsible for:

- Enactment of the project-specific SOW and SOP specifications for waste management, including proper containerization or storage of waste materials generated, sample collection and Field Manager/Project Manager notification.
- Proper use and maintenance of all field equipment and health and safety equipment in accordance with the applicable equipment manuals and SOP's.

- Maintaining detailed field records in the project field book.
- Ensuring that subcontractors follow proper procedures.
- Selection of samples and performance of field measurements.
- Completing the proper forms (e.g., waste manifests) fully and correctly.
- Handling, labeling, storing, packaging, and documenting any samples collected.
- Maintaining proper chain-of-custody.
- Ensuring that all appropriate QA/QC procedures are addressed as stated in the project-specific SOW.
- Following all health and safety requirements.

4.4 Subcontractors

It is the responsibility of any subcontractors to perform the services stated in their contracts and outlined in the Project HASP.

5.0 SUPPORTING MATERIALS

The following subsections identify the major equipment and supplies recommended for waste management.

5.1 Sampling Equipment/Supplies

- Sample log sheets
- Permanent marker
- Camera/film
- Deionized water rinse bottle
- Project-specific health and safety plan
- Field book
- Project-specific SOW
- Five gallon bucket
- Sample containers/labels
- Garbage bags
- Writing instrument (water-proof ink)
- Paper towels - chemical free
- Plastic sheets
- Watch or other time-keeping device

5.2 Decontamination Equipment

- Alconox or Liquinox detergent
- Steam cleaner
- Bucket
- Solvent rinse bottle
- Scrub brush
- Plastic sheets

5.3 Shipping Equipment

- Bubble pack
- Packing tape (clear)
- Chain-of-custody forms
- Rubber bands
- Chain-of-custody seals
- Styrofoam pellet packaging
- Containers (i.e. 55-gallon drums, totes, etc.)

- Waste manifests
- Cooler/crate
- Zip-lock bags
- Ice/cold packs

5.4 Health and Safety Equipment (as determined to be necessary by the HASP)

- Eye wash
- Sampling gloves
- First aid kit
- Steel toe/shank safety shoes
- Goggles/safety glasses
- Tyvek® or splash/chemical resistant garments (as needed)
- Monitoring equipment (as needed)
- Weather gear
- Respirator/cartridges (as needed)

6.0 IDW MANAGEMENT METHODS AND PROTOCOLS

This Section of the SOP pertains to the specific procedures and protocols to be used in the management of investigation-derived wastes

6.1 General Procedures

Waste management is performed to meet all applicable regulatory and health and safety requirements and to ensure ethical environmental consulting practices. It is important during any field activity to identify potential waste materials for proper management to ensure that the liability involved with handling such waste materials is minimized.

Waste generated through on-site activities must be stored in a secure location, under the control of the operator or site owner. Wastes generated off-site (in most cases liquid wastes from monitoring wells) are addressed in 40 CFR 262.34 stating that the generator may accumulate up to 55 gallons of hazardous waste (or 1 quart of acutely hazardous waste) in containers at the point of generation which is under the control of the operator generating the waste, for up to 90 days.

6.2 Specific Procedures

During field activities, any materials which could potentially be classified as hazardous wastes (e.g., drill cuttings, excavated soil, decontamination water, cleaning water, well development/purge water, etc.) should be containerized pending a determination of hazardous characteristics or chemical constituents.

A waste disposal, recycling or treatment facility should be selected and contacted prior to the initiation of field work to determine the facilities requirements for accepting the wastes generated. This typically includes waste characterization analyses, disposal application permits, fees, etc. Additionally, if the facility does not have a Generator Identification Number that can be used for the disposal of the waste and for manifesting purposes then the client must obtain one from the appropriate regulatory agency.

The nature of the waste material that will be generated should be determined to the practical extent possible prior to the initiation of field activities. The waste classification, quantities, handling, storage, staging, transportation and disposal methods should all be characterized ahead of time to help insure that all waste generated is properly disposed and that adequate worker safety precautions are adhered to.

If it is determined that the waste(s) generated during site investigation activities is required to be handled, transported and disposed as a special or hazardous waste, then the proper

manifests should be completed as discussed below.

6.3 Waste Manifesting

The Uniform Hazardous Waste Manifest format consists of three sections on a single page with six copies per manifest. The copies of the manifest are as follows:

- White: Copy to be sent to the Generator by the TSD or landfill after completion
- Yellow: Copy to be sent to the Illinois EPA by the TSD or landfill (for RCRA hazardous or PCB waste only)
- Pink: TSD or landfill copy
- Goldenrod: Transporter's copy
- Green: Copy to be sent to the Illinois EPA by the generator (for RCRA hazardous or PCB waste only)
- Blue: Generator's copy

The form can be completed by hand but it is recommended that it be typewritten because any handwritten information may be illegible on the last few copies of the form. The USDOT regulations on shipping papers (49 CFR 172.201) require all copies to be legible and printed (either manually or mechanically).

6.3.1 Generator, Transporter and Facility Information

The upper section of the manifest consists of Items 1- 10. These items serve to identify all the parties to the shipment: the generator, the transporter(s) and the designated storage or disposal facility. There are spaces for each party's name and Illinois EPA Identification Number, as well as the generator's mailing address (where the manifests will be kept) and emergency telephone numbers. There is also a space for the designated facility's site address. Certain areas of the manifest format are shaded. The United States Environmental Protection Agency ("USEPA") regulations do not require that any of the items in the shaded area (Items A-K) be completed. States can require the completion of some or all of items A-K, under state regulatory authority. Many of these items, particularly the transporter's telephone number (Items C & F) and the designated facility's telephone number (Item H) should be completed regardless, as a matter of good practice.

The last five digits of Item 1, following the generator's 12-digit USEPA Identification Number, are to be a unique five-digit number assigned to the manifest by the generator. The number must be unique, so the five-digits ("00000" or "00001") are not be reused. The regulations formerly required that a sequential manifest document number be assigned. As a matter of routine, and to assist in record keeping, many generators use the first two digits of the five-digit document number to identify the year of the shipment, with the last three digits being sequential numbers (e.g. 05001, 05002, 05003, etc.). Completed manifests

(those with a signed copy returned by the TSD facility) can then be filed according to the year of waste disposal.
The final point with respect to the upper third of the manifest is Item 2. Unless continuation sheets (Illinois EPA Form 8700-22A) are used, this should be completed as "Page 1 of 1".

6.3.2 *USDOT Shipping Information*

The middle section, consisting of Items 11-15, integrates the USDOT Hazardous Material shipping paper requirements into the manifest form. The USDOT shipping description(s) for the waste(s) to be shipped is to be entered in Item 11 a-d, as necessary. Unless specifically authorized or required, the shipping description may not contain any code or abbreviation.

Item 12 requires the entry of the number of containers holding each of the wastes listed on the form, as well as the type of container(s) used. Mandatory abbreviations are given for the various types of containers. These abbreviations are:

DM	=	Metal drums, barrels, kegs
DW	=	Wooden drums, barrels, kegs
DF	=	Fiberboard or plastic drums, barrels, kegs
TP	=	Tanks portable
TT	=	Cargo tanks (tank trucks)
TC	=	Tank cars
DT	=	Dump truck
CY	=	Cylinders
CM	=	Metal boxes, cartons, cases (including roll-offs)
CW	=	Wooden boxes, cartons, cases
CF	=	Fiber or plastic boxes, cartons, cases
BA	=	Burlap, cloth, paper or plastic bags

Item 13 describes the numerical quantity of waste to be stored or disposed and Item 14 describes the units associated with the quantities listed in Item 13. The units are in weight or volume as follows:

G	=	Gallons (liquids only)
P	=	Pounds
T	=	Tons (2,000 lbs.)
Y	=	Cubic yards
L	=	Liters (liquids only)
K	=	Kilograms
M	=	Metric tons (1,000 kg)

N = Cubic meters

Certain information on the form can be completed by the Generator to pass along additional information and special instructions to the transporters and to the TSD/landfill. These items (Item I - RCRA Hazardous Waste Number, Item J - Additional Descriptions for Materials Listed Above, and Item K - Handling Codes for Wastes Listed Above) are required to be completed in the State of Illinois. Item 15 - Special Handling Instructions and Additional Information allow the manifest to transmit additional desirable information and special instructions. Examples of such information may include:

- Identification of the person to whom the manifest copies should be returned.
- Identification of the generator's contact person or contractor, as well as appropriate 24 hour telephone numbers, for emergency purposes or for further information. The appropriate Guide Number from the USDOT Emergency Response Guidebook could also be specified.
- Instructions to return the shipment to the generator if it or any part is rejected by the designated facility.
- Identification of an alternate designated facility, site address and USEPA Identification Number, in the event an emergency prevents delivery of the waste to the primary designated facility.
- Identification of the common names for the waste being shipped, along with any waste product codes assigned by the TSD or landfill, contract numbers, or scheduling numbers, sometimes called work order numbers.
- Identification of appropriate Purchase Orders for the treatment/disposal of the waste shipment or other special billing instructions.
- Verification as to how the transport vehicle was placarded after loading or that the appropriate placards were offered to the transporter.
- Specification of the method of treatment or disposal to be used by the designated facility for the shipment, as well as any special precautions or other instructions.
- Land Disposal Restriction ("LDR") information, as per 40 CFR Part 268, although typically the amount of required information for most LDR notifications will require the use of a separate form. Many TSD's and landfills require the use of LDR forms of their own design, in order to simplify their record keeping.

6.3.3 Signatures

The lower portion of the manifest, Items 16-20, is where the parties to the generation, transportation, and receipt (TSD or landfill) of the waste sign the manifest by hand, acknowledging or certifying specific conditions. All parties are to print or type their name, sign their name, and date their signature.

In Item 16, the generator, typically represented by an employee of the generator in a responsible position, is certifying two statements. First, a certification is made that the shipment is properly described, packaged, marked, labeled and is ready for transportation in accordance with applicable DOT (state and federal) regulations. Second, a certification is made that the generator is complying with waste minimization requirements and that the selected method of treatment or disposal minimizes present and future threats to public health and environmental quality. Employees of the generator that sign the manifest are allowed to write the words "On behalf of" in the signature block prior to signing their names. This is allowed so as to address the concerns of employees regarding personal liabilities for any environmental or public health problems resulting from the waste shipment and disposal.

In Item 17, the transporter(s) must acknowledge receipt of the wastes described by the manifest. This is done by entering the name of the person accepting the waste, typically the driver. The transporter's signature is then placed on the manifest, as well as the date of acceptance. Illinois EPA Manifest Form 8700-22 allows for the use of two transporter companies. If a second transporter is used, then the first transporter must obtain the name signature and date of acceptance from the second transporter. Of course, if two transporters are used, Item 7 - Transporter 2 Company Name and USEPA ID Number - must be completed as well.

Items 19 and 20 are for use of the designated storage or disposal facility owner or operator. If there are any significant discrepancies between the shipment as received and the shipment as described on the manifest, then the authorized representative of the designated facility's owner or operator is to note the details in Item 19. Significant discrepancies include any differences in the container count, as well as variations of more than 10% in weight for bulk shipments. Significant discrepancies can also exist with respect to the type of waste received, when it differs from the type of waste described on the manifest. Significant discrepancies can result in rejected shipments, which are then returned to the generator, or sent to an alternate designated facility selected by the generator.

If the waste shipment is accepted, or is accepted except as noted in Item 19, the name of the person accepting the waste on behalf of the designated facility must be entered in Item 20, along with their signature and date of acceptance. The certification in Item 20 only

acknowledges receipt of the manifested shipment, except as noted in the discrepancy indication space (Item 19). It is not certification that the wastes have been or will be properly managed, treated or disposed by any particular technology.

7.0 DOCUMENTATION

The following forms will be utilized to ensure that the specific activities performed are appropriately documented:

- Sample Labels
- Chain-of-Custody Forms
- Shipping Receipts
- Waste Manifests

Sample labels shall be completed at the time each sample is collected and will include the information listed below. A sample label is shown in **Figure 1**.

- Client or project name,
- Sample I.D. (number),
- Designation (sampling point identification),
- Analysis,
- Preservation,
- Sample collection date and time,
- Sampler's name

A chain-of-custody form (**Figure 2**) is a record of sample collection and transfer of custody. The information listed above must also be entered on the chain-of-custody. In addition, in accordance with 40 CFR 261.4(d), the following information must accompany samples:

- Sample collector's name, company, mailing address and telephone number,
- Analytical laboratory's name, mailing address and telephone number,
- Quantity of each sample,
- Date of shipment,
- Description of sample.

The chain-of-custody forms provide specific locations for entering the above information.

A field book will be maintained as an overall log of all events which occur throughout the project, including conditions encountered, samples collected, deviations from the SOW, unusual circumstances, etc.

All documents are to be retained in the appropriate project files indefinitely. It is important that all field documentation be as complete as possible to ensure traceability.

8.0 REFERENCES

"Compendium of Superfund Field Operation Methods." United States Environmental Protection Agency. EPA/540/P-87/001. December 1987.

United States Code of Federal Regulations, Chapter 40 Section 262, Standards Applicable to Generators of Hazardous Waste.

United States Code of Federal Regulations, Chapter 49 Sections 171 to 177, Transportation.

FIGURE 1

SAMPLE CONTAINER LABEL

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____

Client Sample ID: _____

Date Collected: _____ Time: _____

Collected by: _____

Analysis: _____

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Client: _____

Client Sample ID: _____

Date Collected: _____ Time: _____

Collected by: _____

Analysis: _____

CUSTODY SEAL

Date _____

Signature _____

First Environmental Laboratories, Inc.

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description:

Sampled by

Date:

Time:

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description:

Sampled by

Date:

Time:

Lab ID#

CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description:

Sampled by:

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

FIGURE 2

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY RECORD

Page____ of _ ...gs

F. Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: _____

Street Address: _____

City: _____ State. _____ Zip. _____

Phone: _____ Fax: _____ e-mail: _____

Send Report To. _____ Via: Fax ☐ e-mail ☐

Sampled By. _____

Project I.D.: _____

P.O. #.: _____

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6ºC Yes__ No __ _____ºC
Received within 6 hrs. of collection:_____
Ice Present Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature:_____ºC
5035 Vials Frozen: Yes__ No__
Freezer Temperature:_____ºC

Containers Received Preserved: ☐ Yes ☐ No

Notes and Special Instructions: _____

Relinquished By: _____ Date/Time _____ Received By. _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

FIGURE 3

WASTE MANIFEST

STATE OF ILLINOIS

P.O BOX 19276 SPRINGFIELD, ILLINOIS 62794-9276 (217) 782-6761

State Form LPC 62 8/81 IL532-0610

FOR SHIPMENT OF HAZARDOUS AND SPECIAL WASTE

PLEASE TYPE (Form designed for use on elite (12-pitch) typewriter.) **EPA Form 8700-22 (Rev. 6-89)** Form Approved OMB No 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No | 2 Page 1 of

Information in the shaded areas is not required by Federal law, but is required by Illinois law.

3 Generator's Name and Mailing Address | Location If Different

A. Illinois Manifest Document Number IL9678098 FEE PAID IF APPLICABLE

B. Generator's IL ID Number

4 *24 HOUR EMERGENCY AND SPILL ASSISTANCE NUMBERS*

C. Transporter's ID Number

5 Transporter 1 Company Name | 6 US EPA ID Number

D. Transporter's Phone ( )

7 Transporter 2 Company Name | 8 US EPA ID Number

E. Transporter's ID Number

9 Designated Facility Name and Site Address | 10 US EPA ID Number

F. Transporter's Phone ( )

G. Facility's IL ID Number

H. Facility's Phone ( )

GENERATOR

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12 Containers No	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a					EPA HW Number
b.					EPA HW Number
c					EPA HW Number
d.					EPA HW Number

J. Additional Description for Materials Listed Above

K. Handling Codes for Wastes Listed Above In Item # 14

15 Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; **OR,** if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Date Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19

Printed/Typed Name | Signature | Date Month Day Year

This Agency is authorized to require, pursuant to Illinois Revised Statute, 1989, Chapter 111 1/2, Section 1004 and 1021, that this information be submitted to the Agency Failure to provide this information may result in a civil penalty against the owner or operator not to exceed $25,000 per day of violation Falsification of this information may result in a fine up to $50,000 per day of violation and imprisonment up to 5 years This form has been approved by the Forms Management Center

The Illinois Uniform Manifest must be used for all shipments of special waste (hazardous and nonhazardous) stored, disposed of, treated or reclaimed in Illinois; and for all shipments originating in Illinois and destined for states that do not print and supply the form. Potentially Infectious Medical Waste (PIMW) requires a PIMW manifest. For shipments not originating in Illinois, if the generator's state requires copies of the manifest, a photocopy of Copy 1 should be used.

INSTRUCTIONS TO GENERATORS *(Please type)*

1. Enter generator s USEPA twelve digit identification number* and the unique five digit document number assigned to this Manifest (e.g 00001) by the generator
2. Enter total number of pages comprising this Manifest.
3. Enter generator's name and mailing address If location of waste generation is different from mailing address, enter location to the right of mailing address
4. Enter telephone number where an authorized agent of the generator, who has knowledge of the waste, may be reached in the event of an emergency

B Enter the generator's Illinois EPA ten digit identification number

5, 6, C, D For the first transporter who will transport the waste, enter the company name, USEPA ID number*, Illinois EPA four digit Special Waste Hauling (SWH) Permit number or the Uniform Program I D. number issued by the participating state, and telephone number where an authorized agent of the transporter may be reached in the event of an emergency.

7, 8, E, F. If applicable, enter the information requested for the second transporter who will transport the waste

9, 10, G, H For the facility designated to receive the waste, enter company name, address, USEPA ID Number*, Illinois EPA ten digit identification number, and telephone number where an authorized agent of the receiving facility may be reached

11. Enter the US DOT Proper Shipping Name, Hazard Class, and ID number (NA/UN number) for each waste as identified in 49 CFR 171 through 177 For wastes not regulated as Hazardous Materials by DOT, enter a description of the waste and the generic name of the waste, plus the phrase "not hazardous by DOT".

***REQUIRED ONLY FOR HAZARDOUS WASTE**

12 Enter the number of containers for each waste and the appropriate abbreviations for the type of container

CM = Metal boxes or roll offs	DM = Metal drums
CW = Wooden boxes	DW = Wooden drums
CF = Fiberboard or plastic bags	DF = Fiberboard or plastic drums
BA = Burlap cloth, paper or plastic bags.	
CY = Cylinders	TT = Tank Trucks
DT = Dump trucks	TP = Tanks portable
TC = Tank cars	

13 Enter the total quantity of each waste.

14 Enter unit of measure from list below:

G = Gallons	P = Pounds
T = Tons	Y = Cubic Yards
L = Liters	K = Kilograms
M = Metric tons	N = Cubic meters

I. Enter the EPA 4 digit Hazardous Waste Number; if waste is a mixture of listed and characteristic wastes, the listed waste must be entered - additional numbers should be listed in Section J.

J, K If needed, enter additional description or information/instructions for the material listed in Item 11.

15. If needed, indicate special transportation, treatment, storage, or disposal information, or Bill of Lading information. For international shipments generators must enter the point of departure (City and State) for shipments destined for treatment, storage, or disposal outside the jurisdiction of the United States in this space

16. The generator must read, sign (by hand), and date the certification statement. If a mode other than highway is used, the word "highway" should be lined out and the appropriate mode (rail, water, or air) inserted in the space below. If another mode in addition to highway is used, enter the appropriate additional mode.

GENERATOR: RETAIN COPY 6. MAIL COPY 5 TO IEPA WITHIN 2 DAYS OF THE SHIPMENT IF WASTE IS RCRA HAZARDOUS OR PCB WASTE.

INSTRUCTIONS TO TRANSPORTER: 17, 18 The person accepting the waste on behalf of the transporter must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt ***Upon delivery of waste to facility,*** *retain Copy 4 and leave remaining copies with the facility owner/operator*

INSTRUCTIONS TO OWNERS AND OPERATORS OF TREATMENT, STORAGE, OR DISPOSAL FACILITIES:

19 The authorized representative of the designated (or alternate) facility's owner or operator must note in Item 19 any significant discrepancy (as defined in 35 Ill Adm Code 725 172) between the waste described on the Manifest and the waste actually received at the facility Reference the discrepancy by line A, B, C, or D.

20. Print or type name of the person accepting the waste on behalf of the owner or operator of the facility. That person must acknowledge acceptance of the waste by signing and entering the date of receipt

RETAIN COPY 3, SEND COPY 1 TO THE GENERATOR, AND SEND COPY 2 TO ILLINOIS EPA WITHIN 30 DAYS OF THE DELIVERY IF WASTE IS RCRA HAZARDOUS OR PCB WASTE

Public reporting burden for this collection of information is estimated to average: 37 minutes for generators, 15 minutes for transporters, and 10 minutes for treatment, storage and disposal facilities This includes time for reviewing instructions, gathering data, and completing and reviewing the form. Send comments regarding the burden estimate, including suggestions for reducing this burden to: Chief, Information Policy Branch, PM-223, U S. Environmental Protection Agency, 401 M Street SW., Washington, D C. 20480; and the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

G

APPENDIX G – LABORATORY QA/QC PLAN

First Environmental Laboratories, Inc.

QUALITY ASSURANCE MANUAL

Effective Date Start: 02/14/06
Effective Date End:

Quality Assurance Program Plan

for

First Environmental Laboratories, Inc.

1600 Shore Road
Naperville Illinois 60563
Phone 630-778-1200
Fax 630-778-1233

Stan Zaworski – Laboratory Director (Owner) — Date 02/14/06

Reviewed by Lorrie Franklin - Director of Data Quality (Owner) — Date 02/14/06

Willian H. Mottashed – VP Operation (Owner) — Date 02/14/06

Scott Gerrick – VP Marketing (Owner) — Date 02/14/06

Neal Cleghorn – Technical Director — Date 02/14/06

Effective Date (Beginning) 02/14/06 (End) _____

This QAPP is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes.

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Management Requirements

3. Laboratory Organization

3.1. Introduction

Although this Quality Assurance plan is enforced under the guidance and supervision of the Director of Data Quality, the primary responsibility for data integrity and quality rests with each and every employee involved in the generation of analytical data.

3.2. Ensuring the Integrity and Confidentiality of Data

3.2.1. Our laboratory has managerial and technical personnel with the authority and resources needed to identify the occurrence of departures from the quality system or from the Standard Operating Procedures (SOPs) and to initiate actions to prevent or minimize departures.

3.2.2. If internal pressures, such as, turn-around-time, client demands, management demands, or performance demands, or external pressures, such as commercial or financial, are identified as adversely affecting the quality of data, then appropriate action is taken to remedy the situation.

3.2.3. Owners, managers and employee of *First Environmental Laboratories, Inc.* must be free and clear of organizational and personal conflict of interest. The laboratory and laboratory personnel actively avoid involvement in activities that could be construed as a conflict of interest, and thereby diminish confidence in its competence, impartiality, judgment or operational integrity.

3.2.4. First Environmental Laboratories, Inc. conducts initial and annual training to ensure communication of our Code of Ethics. Details regarding the training program are found in SOP #127, titled "Data Integrity & Ethics".

3.2.5. Confidentiality

3.2.5.1. All information and records pertaining to client samples and analyses conducted on client samples are confidential.

3.2.5.2. Data and information pertaining to data produced for a client will not be released to any other source by telephone, telefacsimile or other electronic means without the express permission of the client. When feasible, permission will be obtained in writing. If not feasible, the date verbal permission was obtained and the initials or signature of the person obtaining permission will be noted on the data file.

3.2.5.3. Facsimiles and E-mail documents will contain the following qualifier:

"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

3.3. Laboratory Organization & Responsibilities:

3.3.1. Laboratory Director:

- Ensures compliance with the current NELAC Standard.
- Oversees all analytical and operational activities of the laboratory including but not limited to the following:
  - sample acceptance, receipt, log-in, and storage,
  - production,
  - quality control activities, and
  - supervision of laboratory personnel.
- Designates laboratory supervisors, the quality assurance officer, and the technical director.
- Nominates deputies in case of absence of quality assurance officer or technical director.
- Ensures that the Quality System is documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned.
- Implements and enforces adherence to company policies and procedures.
- Approves all documents prepared to support and guide laboratory operations.

3.3.2. Director of Data Quality:

- Ensures compliance with the current NELAC Standard.
- Ensures that all personnel are properly trained in quality assurance policies and procedures, and that all quality assurance objectives are being met.
- Coordinates training of analysts and ensures appropriate documentation of training is maintained.
- Conducts an objective internal audit of Quality Systems and technical operation annually without outside influence.
- Coordinates QA/QC procedures and analytical data review procedures.
- Evaluates data objectively and performs assessment without outside managerial influence.
- Notifies laboratory management of deficiencies in the quality system.

- Revises procedures and updates quality manual as required.
- Pursues and maintains appropriate certifications and contracts.
- Approves Standard Operating Procedures (SOPs).
- Coordinates document control of all documents supporting laboratory operations.
- Possesses general knowledge of the analytical methods performed by the laboratory and quality systems.

3.3.3. Technical Director:

- Ensures compliance with the current NELAC Standard.
- Oversees function of LIMS and internal computer networks.
- Monitors standards of performance in Quality Control & Quality Assurance.
- Monitors validity of the analyses performed and data generated to assure reliable data.
- Coordinates technical operations of laboratory including development of new capabilities.
- Certifies that personnel with appropriate educational and/or technical background perform all tests.
- Oversees provision of resources needed to ensure requirements of quality system are met.

3.3.4. Project Manager:

- Interfaces with client to define Data Quality Objectives (DQO) for a given project. This includes accreditation status, analytical methods, detection limit requirements, QA/QC requirements, turn-around time, and deliverables.
- Accepts / coordinates requests from clients for sampling supplies, delivery and pickup.
- Coordinates lab activities to ensure that the client defined DQOs are being met.
- Reviews all data generated by the lab and assembles final report for the client. All questions related to the final report are directed to the Project Manager.
- Forwards reports to client in desired format via e-mail or facsimile.
- Prepares invoices for projects.
- Coordinates requests for QA packages and/or electronic deliverables
- Fields all questions from client relating to the project.

3.3.5. Senior Analyst:

A senior analyst has the following additional responsibilities. All the responsibilities detailed for an Analyst also apply.

- Responsible for scheduling instrument/method validation and maintenance of periodic studies, e.g., MDL studies, per method requirements.

- Trains new analysts, analyst-in-training and technicians in their area of analytical responsibility. The training effort is coordinated with the Director of Quality Assurance and/or the Technical Director.
- Performs SOP review whenever a new analyst is trained to perform the analysis.
- Performs method reviews whenever a revised method is issued by regulatory source.
- Reviews analytical data produced by analyst-in-training or technician.

3.3.6. Analyst:

- Schedules sample analyses to meet all holding times and due dates
- Responsible for the analysis of samples in accordance with approved methods and SOPs, the QAP and/or client defined protocols.
- Reviews analytical data and ensures all Quality Control indicators are within acceptance criteria. Performs and documents corrective action when necessary. Informs Project Manager of any out of control situation. Flags data appropriately using current laboratory guidelines.
- Enters data in LIMS
- Maintains appropriate log books for accuracy and completeness.
- Performs routine periodic maintenance on instrumentation.
- QA Support
  - Ensures the procedures used in the laboratory comply with SOP.
  - Maintains control charts as required by specific method SOPs
  - Prepares data packages as required to meet project requirements.

3.3.7. Analyst-in-training:

An Analyst-in-training analyst has the following responsibilities. All the responsibilities detailed for an Analyst apply.

- Responsible for working closely with the senior analyst to ensure that data quality is not compromised during training.
- Responsible for ensuring that all analytical data is reviewed by an analyst or supervisor authorized to perform data review.

3.3.9. Laboratory Assistants

- Maintains inventory and stock of sampling supplies.
- Fulfills requests for sampling supplies per client's specifications.
- Distributes laboratory supplies received from various vendors.
- Cleans laboratory glassware in accordance with established procedures.
- Provides courier services to clients requesting sample pickup or delivery of sampling supplies.

- Assists with filing.
- Manages sample storage and disposal for routine samples.

3.3.10. Administrative Assistants :

- Receives all samples, inspects and documents condition of shipping and sample containers.
- Verifies chain of custody against samples and/or associated paperwork. Records any discrepancies and notifies Project Manager of same for communication to client.
- Logs samples into the Laboratory Information Management System.
- Places samples in secured refrigerated area for storage.
- Mails completed reports and invoices.
- Files completed reports.
- Responsible for UPS/Federal Express.

3.3.10. Information Technology Specialists:

- Customizes and maintains the Laboratory Information Management System (LIMS).
- Ensures that appropriate hardware exists to enable effective use of the LIMS at all levels of laboratory operations.
- Implements and maintains any software required for the production of analytical data and reports. This includes programs or routines for electronic data deliverables.
- Implements and maintains the laboratory's internal computer networking hardware and software.
- Implements and maintains the laboratory's external internet presence (web site) and communications (e-mail).
- Maintains documentation in support of the activities listed above.

3.3.11. Marketing Director:

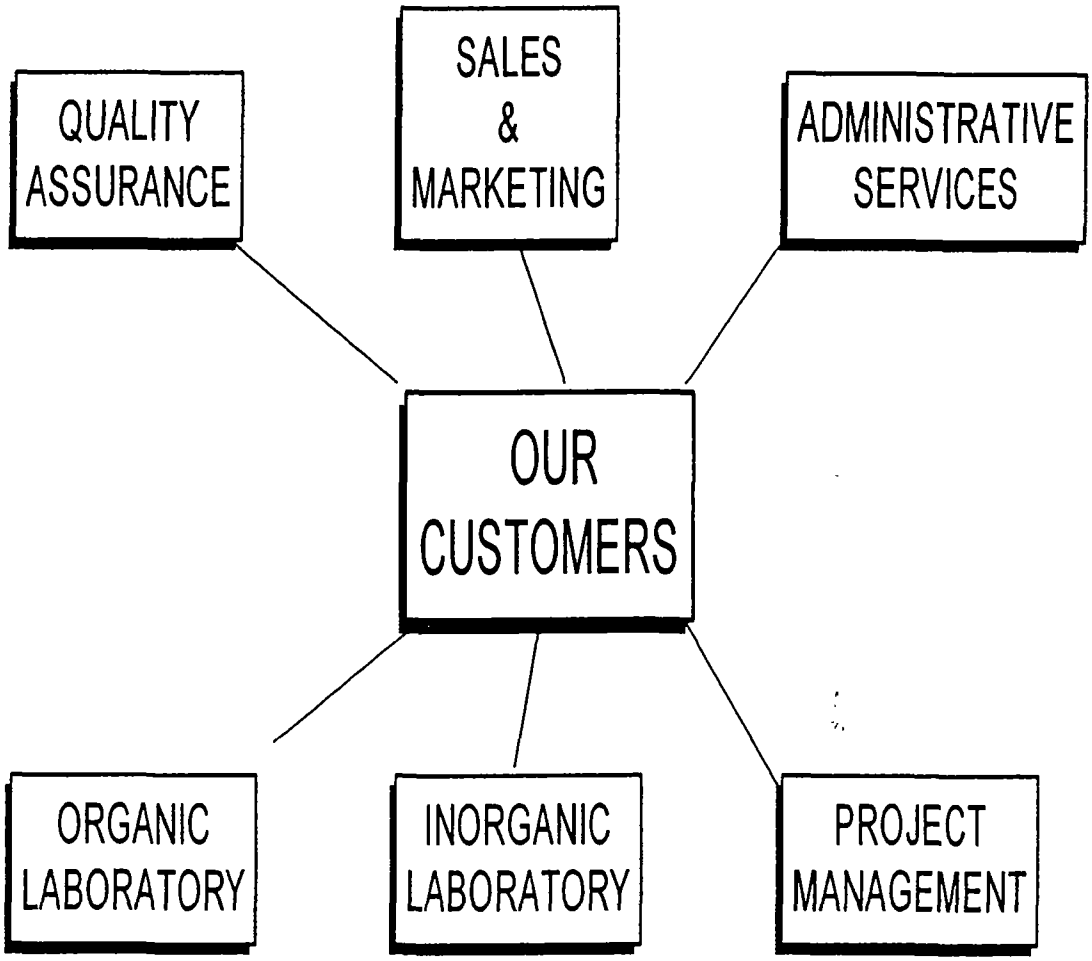
- Identifies potential clients and initiates contact.
- Maintains relationship with current clients.
- Coordinates sample bottle deliveries and sample pickup.

3.2. Key Staff / Area of Responsibility

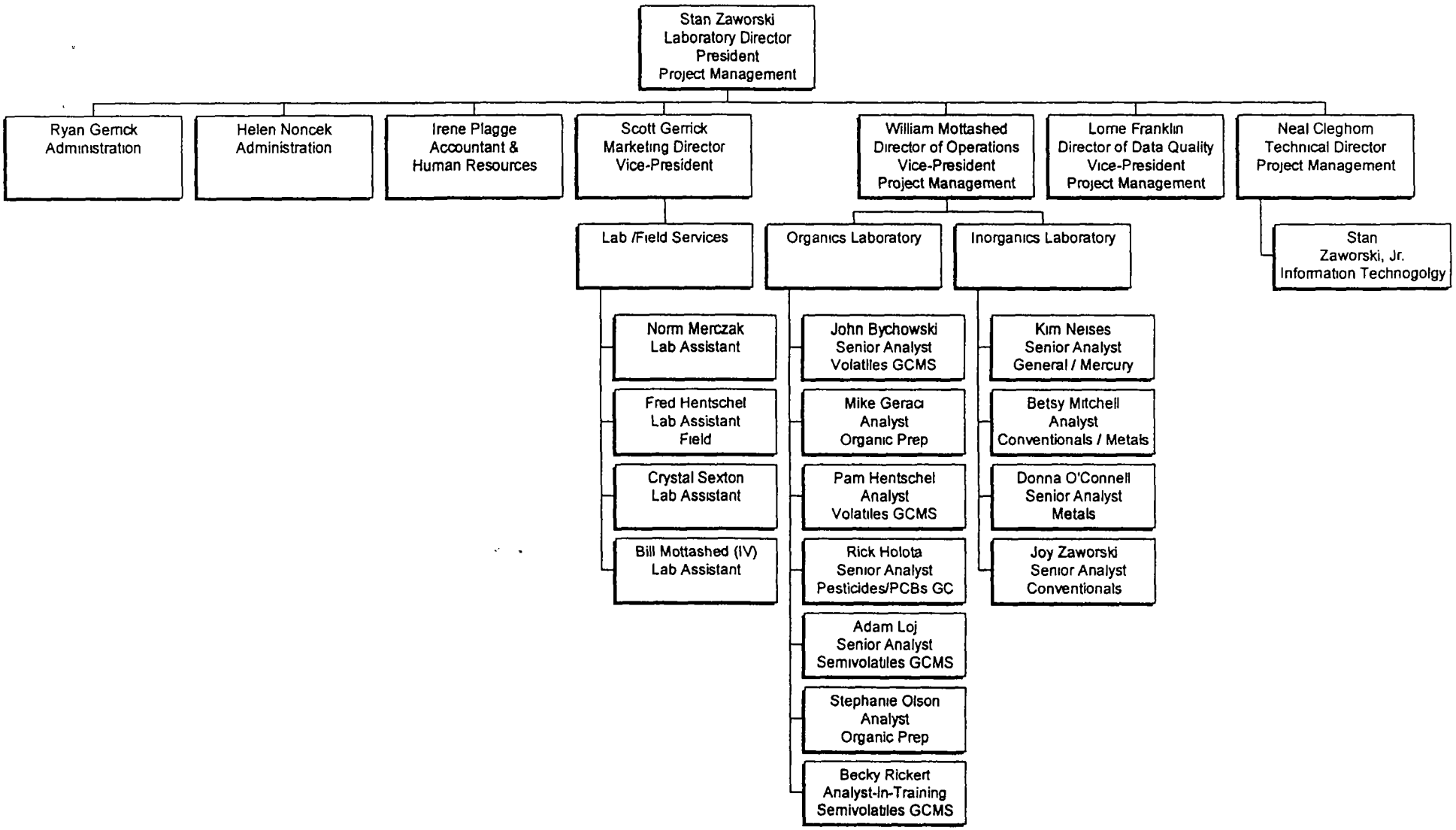
Key Staff	Area of Responsibility
Stan Zaworski	Laboratory Director / Project Manager
Lorrie Franklin	Director of Data Quality
Neal Cleghorn	Technical Director / Project Manager
Bill Mottashed	Project Manager
John Bychowski	Senior Analyst – Organics, volatiles
Pam Kyncl-Hentschel	Analyst - Organics, volatiles
Becky Rickert	Analyst – Analyst (in training) – Organics, semi-volatiles
Adam Loj	Senior Analyst – Organics, semi- volatiles
Rick Holota	Senior Analyst – Organics, pesticides/PCBs
Kim Nieses	Senior Analyst - Inorganics, general/mercury
Stephanie Olson	Senior Analyst - Organics, extractions / Inorganics, general
Mike Geraci	Organics, extractions
Donna O'Connell	Senior Analyst – Inorganics, metals
Betsy Ann Mitchell	Analyst - Inorganics, conventionals & metals
Joy Zaworski	Senior Analyst – Inorganics, conventionals
Fred Hentschel	Laboratory Assistant/Field
Norm Merczak	Laboratory Assistant
Crystal Sexton	Laboratory Assistant
Bill Mottashed (IV)	Laboratory Assistant
Helen Noncek	Administrative Assistant
Irene Plagge	Administrative Assistant
Ryan Gerrick	Administrative Assistant
Stan Zaworski, Jr.	Information Technology Specialist
Scott Gerrick	Marketing Director

First Environmental Laboratories, Inc.

MANAGING FOR OUR CUSTOMERS



First Environmental Laboratories, Inc. Organizational Chart



4. Quality Systems Program Description

4.1. Introduction

Quality Systems include all Quality Assurance (QA) policies and Quality Control (QC) procedures developed and followed by our laboratory to ensure and document the quality of the analytical data. Data integrity and ethics is inherent to the success of our business and adherence to the established procedures is vital.

4.2. Quality Systems

Many QA/QC policies and procedures are documented in this manual. These policies and procedures were developed to meet Quality Systems of 2003 National Environmental Laboratory Accreditation Conference (NELAC) Standard, dated June 5, 2003 and implemented July 1, 2005. If the test method or regulatgory program specifies more stringent standards or requirements, they will be met. If it is not clear which requirements are more stringent, the method or regulatory program requirements will be met. This manual is organized consistent with the organization of NELAC Quality Systems, Chapter 5. It is a living document and will be revised periodically to meet the current standard.

First Environmental Laboratories, Inc. is an independent environmental laboratory dedicated to providing industry, government, and consultants with timely and accurate chemical analyses. A wide variety of sample matrices can be analyzed in support of various federal, state, and local regulations, while providing a level of customer service unequaled in our industry.

First Environmental Laboratories, Inc. is accredited by Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) in accordance with the NELAC standards. Our objective is to establish and implement a NELAC compliant Quality Systems Program that ensures all personnel involved in the generation of analytical data are trained to produce data of known and consistently high quality. Adherence to this program will ensure our data is accurate and complete, and consistently meets criteria as defined by our clients and/or the regulatory agencies.

The responsibility for the successful implementation of this program lies with each employee, and all levels of management strictly enforce its implementation.

The program utilizes the following internal documents:

- Quality Assurance Manual (QAM)
- Standard Operating Procedures (SOP)
- Chemical Hygiene and Safety Plan (CHSP)

These documents detail the policies and procedures developed by *First Environmental Laboratories, Inc.* to ensure the production of high quality, legally defensible data. All laboratory personnel are required to understand and implement the policies and procedures described in these documents. The laboratory director must approve departures from documented policies and procedures.

Periodic review of our QAM, SOPs, and supporting documents ensures continuous improvement of the laboratory and continued compliance with the effective NELAC Standard.

4.2. Data Integrity Systems

The laboratory has developed a Code of Ethics and a Data Integrity and Ethics training program. The data integrity system includes:

- Initial and refresher data integrity training,
- signed data integrity documentation for all lab employees,
- periodic monitoring of data integrity, and
- data integrity procedures documentation.

A mechanism exists for confidential reporting of data integrity issues in the laboratory. Management is committed to fostering a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern.

The procedures and documentation, and overall effectiveness of the program are reviewed and if needed, updated, by management annually.

5. Document Control

5.1. Introduction

Document control procedures are established to ensure that a historical record of all SOPs, manuals, or documents is maintained. The record needs to clearly indicate the time period during which the procedure or document was in force. Proper maintenance of the historical records and the record keeping procedures used by the laboratory ensures the ability to legally defend the data.

5.2. Document Approval and Issue

5.2.1. All documents issued to personnel in the laboratory as part of the quality system are reviewed and approved for use by authorized personnel prior to issue.

5.2.2. A log is retained that provides a record of document distribution. The Director of Data Quality coordinates the distribution and collection of controlled documents. Document control ensures that pertinent issue of appropriate documents is available at the point of use. Documents are periodically reviewed and revised to ensure continuing compliance with the regulatory and accreditation sources. Document control ensures that obsolete documents are removed from all points of use. A hardcopy and electronic copy of obsolete revisions of a document is maintained as a part of the permanent historical record.

5.2.3. Documents are uniquely identified including revision number, date of issue, page number and total number of pages, implementation / end use date, and signature of person(s) responsible for document approval.

5.3. Document Changes

5.3.1. Changes to documents shall be reviewed and approved by the same function originally responsible for document preparation and approval. Designated representatives will have access to the historical record in order to assess the change prior to approval.

5.3.2. A log is retained that provides a record of document revision.

5.3.3. Changes to documents may be made by hand pending the re-issue of the document. The change will be clearly marked, initialed and dated by the Director of Data Quality or designated representative. Re-issuance of a revised document will occur within a reasonable time frame.

5.4. SOPs.

Each SOP contains the following information within the header:

Filename: \\madre\company\word files\sop\conv\ammonia.doc
Revision No.: 2 Date of Last Revision: 6/13/96
Page 2 of 2

Each SOP contains the following information on the last page:

Approvals

Reviewed for Technical Accuracy by: _____

Reviewed for Quality Assurance Compliance by: _____

Implementation Date: _____

End Use Date: _____

SOPs are maintained to accurately reflect all phases of current laboratory activities.

5.5. Quality Assurance Program Plan

The Quality Assurance Program Plan (QAPP) is reviewed for compliance with part 186, Accreditation of Laboratories for Drinking Water, Wastewater and Hazardous Waste Analyses, annually. The title page lists the effective date (beginning & end).

5.6. Other Manuals & Documents

The laboratory maintains an archive of all obsolete or replaced procedures, documents, or records, for a minimum of ten years.

5.7. Electronic Copies of Documents

All documents are prepared and maintained electronically. Revisions to SOPs and the QAM are made by copying the document to a new file prior to beginning the revision. Obsolete documents are moved to subdirectories labeled "obsolete".

6. Project Review & Management

6.1. Introduction

Thorough project review prior to sample receipt is inherent to the success of the laboratory. Procedures for subcontracting samples, and purchasing supplies and services are developed to ensure that the client requirements are met. Procedures for resolving client concerns and complaints are established to ensure client satisfaction. In the event that work does not conform with client requirements and/or internal procedures, action will be taken to investigate and resolve the issue in a timely manner.

6.2. Review of Requests and Contracts

6.2.1. Contracts may be any written or oral agreement to provide a client with environmental testing services.

6.2.2. Project Managers have the responsibility of working with the client to define Data Quality Objectives (DQO) including: appropriate analytical method to meet client needs, detection limit requirements, QA/QC requirements, deliverables, accreditation status, turn-around time and subcontracted analyses. The Project Manager informs the client of any potential conflict, lack of accreditation status, subcontracted analytes, or inability to complete the work in accordance with the request. Issues are resolved before samples are received.

6.2.3. Routine requests for analytical services are documented using an internal workorder. See Attachment 3 located at the end of this section.

6.2.4. Contracts requiring acceptance signatures are reviewed by.the Project Manager and if necessary, the Director of Data Quality and accounting representative prior to signing. The contract will be acceptable both to the laboratory and the client.

6.2.5. Appropriate notations are made to the bid/contract or internal workorder documenting decisions. The client is informed of deviations from the contract.

6.2.6. In the event that a contract changes after work commences, changes will be documented and communicated to affected personnel.

6.2.7. Suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation must be reported to the client.

6.2.8. Non-routine requests for analyses of unusual matrices, non-routine analytes, non-routine reporting limits are carefully assessed prior to accepting samples for analysis.

Appropriate data qualifiers are used to flag data and the data flags are defined in the case narrative. Non-routine requests for analytical services are documented using an internal assessment form. See Attachment 4 to this section.

6.3. Subcontracting of Analyses

6.3.1. The following analytes are routinely subcontracted.

% Sulfur	Ethylene Glycol
%Chlorine	Herbicides
Alcohols	MBAS
Asbestos Bulk (PLM)	Microbiological Testing
Asbestos Water (TEM)	Radiologicals
BTU	TOX
Dioxin & Furans	TPH (IR)
EOX	

6.3.2. The above list appears in *First Environmental's* Service Brochure. Subcontracted analytes are identified when verbal or written quotations are provided.

6.3.3. Samples are subcontracted to a NELAC certified laboratory. Subcontracted laboratories are expected to adhere to the requirements of their respective accreditations/certifications and the method. Additionally, subcontracted laboratories are expected to meet project specific requirements as established by *First Environmental Laboratories, Inc.*

6.3.4. The laboratory is responsible to the client for the subcontractor's work, except in the case where the client or a regulatory authority specifies which subcontractor is to be used.

6.3.5. A master list of laboratories that receive subcontracted analyses is maintained. Copies of applicable accreditations/certifications are on file for reference.

6.3.6. The final Analytical Report identifies subcontracted analytes by flagging the analyte with an "S" and defining the flag in a case narrative accompanying the Analytical Report.

6.3.7. The final Analytical Report identifies non-NELAP accredited subcontracted analytes by flagging the analyte with an "S" and "N" and defining the flag in a case narrative accompanying the Analytical Report.

6.4. Purchasing Supplies and Services

6.4.1. The laboratory uses various support services such as instrument manufacturer's technical services, general scientific supply houses, specialty chemical supply houses, specialty gas suppliers, and other laboratories.

6.4.2. The laboratory uses only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's ability to continue to produce quality data and provide the highest level of service to our clients.

6.4.3. A vendor master list is maintained and utilized.

6.4.4. Similarly, an item master list for routinely purchased supplies is maintained and utilized. Items on the master list, such as, standards, reagents, sample bottles, and other consumables known to possibly affect the quality of the data have been carefully chosen to meet the specification defined in the methods. The historical successful performance of the method confirms the adequacy of the purchased supplies. The use of the master lists ensures continuity of consumable supplies. Changes are initiated with the approval of either the Laboratory Director, Director of Quality or the Technical Director. Any change relating to a critical consumable, e.g., standards, reagents or sample bottles is carefully monitored to ensure that the quality systems are not compromised.

6.4.5. Laboratory personnel are also responsible for monitoring and maintaining an adequate inventory of consumables, reagents and standards necessary to perform requested tests.

6.4.6. Consumables, reagents and standards received by the laboratory are distributed to appropriate laboratory personnel. Laboratory personnel are responsible for inspecting, properly labeling, and storing all consumables, reagents and standards.

6.4.7. Sample bottles are monitored for cleanliness on a semi-annual basis. Container blanks are analyzed for Volatile, Semi-volatile, Pesticide/PCBs, metals, and cyanide. The analysis is performed at the time WP performance samples are analyzed. The data is filed with the WP results.

6.4.8. If an item is rejected, the purchasing coordinator is notified. Depending on the scope of the problem, the purchasing coordinator will contact the appropriate manager or director, such as the Technical Director, Director of Quality Assurance, or Laboratory Director, to obtain assistance in resolving the issue. Documentation regarding actions taken and resolution of the problem will be maintained.

6.5. Client Concerns / Complaints

6.5.1. Issues raised by auditors, employees, or clients will be discussed and resolved at the weekly meeting held with all staff.

6.5.2. If an issue requires investigation, the laboratory director will assign the task to a Senior Analyst, Project Manager, the Director of Data Quality or the Technical Director. The level of documentation associated with this investigation will be appropriate to the seriousness of the issue. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned.

6.5.3. The Laboratory Director, Project Manager assigned to client, and Director of Data Quality will determine when a complaint justifies written documentation. The form titled, Resolution of Complaint / Concern will be used to document the complaint / concern and the steps taken to resolve the issue. See pages 6 & 7 of this section.

6.5.4. All documentation relating to the issue, the actions taken, and final resolution will be retained as part of the record. The Laboratory Director will review all documentation and approve the final actions taken to resolve the issue. The need for follow-up will be evaluated and if necessary assigned.

6.5.5. If a complaint raises doubt concerning the laboratory's compliance with documented policies and procedures, or with the requirements of accreditation the laboratory will audit the area(s) in question.

6.5.6. Clients always have the right to inspect the work performed, including the supporting quality assurance data and documentation of quality assurance activities. They also have the right to inspect corrective action documentation relating to the resolution of a complaint or concern.

6.6. Control of Nonconforming Environmental Testing

6.6.1. Nonconformance of work with established procedures or agreed requirements of the client will be investigated immediately upon identification.

6.6.2. The laboratory director will assign the task to a Senior Analyst, Project Manager, or Director of Data Quality, or Technical Director. The level of action resulting from this investigation will be appropriate to the significance of the issue. If necessary, work will be halted until the issue is resolved. Test reports may be withheld until the issue is resolved. Previously released data will be assessed for impact and, where necessary, the client will be notified and work recalled. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned. If work is halted, the Laboratory Director is responsible for authorizing the resumption of work.

6.6.3. Where the evaluation indicates that the nonconforming work could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures the laboratory will audit the area(s) in question.

6.7. Accreditation Status

If accreditation status changes for either the primary laboratory (First Environmental Laboratories, Inc.) or the subcontract laboratory during the course of a project and the change affects the contract, the laboratory is responsible for notifiying the client of any suspensions, revocations, or voluntary withdrawal of accreditation.

6.8. References

SOP #122 titled, "Subcontracting"

FIRST ENVIRONMENTAL LABORATORIES, Inc.

RESOLUTION OF COMPLAINT / CONCERN

Initiation Date of Investigation:_____

Client & Contact:_____

Project Manager (First Environmental):_____

Applicable Project ID / Sample No.:_____

Provide details regarding the issue below:

_____

_____

_____

_____

_____

_____

Provide a description of the investigation, including the identity of those involved in the investigation, below:

_____

_____

_____

_____

_____

Describe the final actions taken below:

_____

_____

_____

_____

_____

_____

_____

Date Accepted:_____

Signature Laboratory Director:_____

Signature Project Manager:_____

Signature (Director of Quality Assurance):_____

Note: A copy of this form should be retained in the appropriate project file and in the QA file as part of the historical record.

Section No. 6
Revision No.2
Date 01/23/06
Attachment 3

WORK ORDER

(rev. 09/02)

CLIENT_____ (NEW / CURRENT) DATE_____

_____ DUE DATE_____

_____ FOLLOW - UP DATE_____

CONTACT_____ PHONE_____ FAX_____

PROJECT NAME_____ FEL PROJECT MANAGER_____

NO. OF SAMPLES:_____ MATRIX _____ PROGRAM: UST RCRA NPDES SDWA OTHER _____

Conventionals

12	Acidity	18	NO2/NO3
12	Alkalinity	48	TKN
12	Alk, Carb.	24	N, Ammonia
12	Alk, Bicarb	12	Odor
18	Ash	36	O & G
24	BOD	48	O&G soil
50	Bromide	18	PO4, ortho
75	CEC	24	P, Tot.
24	COD	12	Paint filter
12	Chloride	6	pH
18	Chlorine	12	pH Soil
40	Coli., Tot.	30	Phenols
40	Coli., Fecal	60	React CN/S
12	Color	12	TDS
6	Conduct.	12	TS
12	Corrosivity	12	TSS
60	CN, Amen.	12	Solids, Sett
30	CN, React.	18	Solids, Vol.
30	CN, Tot.	18	Sulfate
12	Density	30	Sulf. React
30	Flash Point	18	Sulfide
18	Fluoride	30	TOC
36	Hdns (calc)	60	TOC-Soil
12	Hdns (titr)	120	TOX
60	MBAS	12	Turbidity

100/Hr Field Sampling/Analysis

Metals

12	Aluminum	30	Mercury
12	Boron	12	Nickel
12	Antimony	12	Potassium
12	Arsenic	12	Selenium
12	Barium	18	Silica
12	Beryllium	12	Silver
12	Cadmium	12	Sodium
12	Calcium	12	Thallium
12	Chromium	12	Vanadium
18	Chrom., Hex.	12	Zinc
12	Cobalt	294	HSL (CLP)
12	Copper	174	PP Metals
12	Iron	114	SDWA Metals
12	Lead	114	RCRA Metals
12	Magnesium	12	Metals Prep
12	Manganese		

Misc. Analyses

30	Asbestos	**Radiologicals:**	
100	BTU	100	Gross Alpha
150	EOX	100	Gross Beta
150	TPH (IR)	170	Total Radium
12	BS&W	225	Radium 226
48	Polar/Non O & G	225	Radium 228
100	Karl Fischer	350	226/228
48	Chrome +6 - soil	120	Tritium
30	Soluble Sulfate	250	Strontium 90
24	Soluble Chloride		

GC/MS

180	VOA
60	BTEX
90	BTEX+MTBE
90	1-5 VOC cmpds
300	BNA
150	PNA
150	BN Only
150	Acid Only

GC

180	Pest/PCB
120	Pests
120	PCBs
90	PCBs Oil
90	PCB Wipe
280	Herbs
120	Alcohols + 10 each add cmpd.
100	TPH (GC)

RCRA Analyses

12	Corrosivity
30	Ignitability
60	Reactivity
180	TCLP VOA
300	TCLP BNA
120	TCLP Pests
280	TCLP Herbs
126	TCLP Metals (Includes digestion)
100	TCLP Prep
150	ZHE Prep
1126	Full TCLP (all of the above)
856	Full TCLP (No Pest/Herbs)
630	F-list compounds

PRICING

Unit Price _____
Surcharge _____
Discount _____
Net _____
# of Samples _____
Job Charges _____

TOTAL _____

\bigmama\company\qa\qapp\qapp2006\workworder.doc

FIRST ENVIRONMENTAL LABORATORIES, INC.

New Work - Assessment

See 6.2.8. of QAM

Matrix:_____

Analyte(s):_____

Method & Reference:_____

Reporting Limit:_____

Is an MDL available for the analyte(s)? yes ☐ no ☐
If no, what will define the lower reporting limit and how will the data be flagged?

_____

Is a calibration curve available for the analyte? yes ☐ no ☐
If no, what will define the upper level of the analysis and how will the data be flagged?

_____

Is the analyte NELAC certified? yes ☐ no ☐
If no, how will the data be flagged?

Does analyte need to be added to our scope of accreditation? yes ☐ no ☐

Does an SOP or bench reference need to be prepared? yes ☐ no ☐

Describe the scope of work (no. of samples, duration...)

_____

_____

Signature Director of Data Quality_____

Signature Laboratory Director _____

Date_____

FIRST ENVIRONMENTAL LABORATORIES, INC.

Additional Notes:

7. Corrective Action

7.1. Introduction

An integral part of our Quality Assurance Program includes a mechanism for identifying and correcting quality problems when they occur and documenting the action taken, thereby eliminating a re-occurrence of the problem in the future.

7.2. Corrective Action Investigation

7.2.1. When a problem cannot be solved by immediate corrective action, a more detailed process is necessary. The need for a more detailed corrective action investigation may be identified from repeated QCI failures, control charts, system audits, or performance audits. The magnitude and risk of the problem determines the immediacy and scope of corrective action investigation. Critical to its success and effectiveness is the involvement of the analyst, supervisor (if applicable) and/or Project Manager, and Director of Data Quality. The following lists the steps involved in this detailed process.

- Identifying a problem.
- Assigning a person responsible for the investigation.
- Uncovering the cause of the problem.
- Correcting the problem.
- Monitoring the effectiveness of the corrective action.
- Documenting the corrective action taken. A copy of the forms used to document corrective action is included at the end of this section. The form needs to be signed by the Director of Quality Assurance and if applicable, the supervisor.

Pages 4 &5 and 6&7 of this SOP are forms for documenting corrective action.

7.2.2. Any analyst or member of management recognizing that an issue warrants investigation may initiate corrective action. The Director of Data Quality will coordinate corrective action investigation. Appropriate personnel will be involved in the investigation as determined by the Director of Data Quality.

7.3. Follow-up to Corrective Action Investigation

7.3.1. Corrective action reports should be reviewed for thoroughness, including documentation of the problem, the investigative steps taken to discover the root cause of the problem, the corrective actions taken, and proof of the effectiveness of the actions taken. Additionally, details regarding the analyte/project affected, the dates the investigation was initiated and resolved, and the signatures of the parties involved in the investigation will be noted on the corrective action report.

7.3.2. If an audits finding or the findings of a corrective action investigation cast doubt on the correctness or validity of data reported, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

7.3.3. The Director of Data Quality is responsible for ensuring that corrective action has actually been performed.

7.3.4. The Director of Data Quality will monitor audits and their findings for the presence of reoccurring problems or patterns.

7.3.5. If it is suspected that the laboratory is not in compliance with it's own policies and procedures or with the NELAC standard, the Director of Data Quality will schedule an internal audit of the appropriate areas.

7.4. Technical Corrective Action (Quality Control Indicators)

7.4.1. Throughout this manual, specific indicators are described that help the analysts assess whether a situation is in control. When any of these quality control indicators are outside the acceptable limits, immediate corrective action is required prior to proceeding with the analysis. The corrective action associated with a failed quality control indicator may be a simple process, such as re-preparing a reagent or standard that has deteriorated and documenting such in the lab book or it may be much more complex. If necessary, samples are reanalyzed. Appropriate documentation of actions taken at the bench during analysis are made in the analytical log book.

7.4.2. The individual method SOPs each have a QC table that details the frequency of analysis, acceptance criteria, initial corrective action for QCI failure, data flagging instructions associated with each QCI. The SOPs titled, "Inorganic QC" (#107) and "Organic QC" (#110) also provide details guiding the appropriate steps to follow in the event a QCI has failed. Corrective action may be multi-tiered proceeding from the simplest procedure to more complex procedures.

7.4.3. The analyst is responsible for assessing QCIs and compliance with method requirements.

7.4.4. The analyst is responsible for initiating corrective action when a QCI does not meet method specified acceptance criteria.

7.4.5. If the corrective action procedures recommended within the method and supporting Inorganic and Organic QC SOPs do not resolve the problem, then the analyst

will seek the guidance of the area supervisor and/or Director of Data Quality. A more formal corrective action investigation may need to occur in order to resolve the problem.

7.4.6. If any QCI does not meet acceptance criteria, a case narrative will be placed in the project file for the affected samples. The Project Manager is responsible for providing appropriate qualifying information in the case narrative included in the final Analytical Report.

7.4.7. If a problem is observed to be recurring, the Analyst and/or Project Manager(s) are responsible for informing the Director of Data Quality. The Director of Data Quality will initiate a corrective action investigation.

7.5. Departures from Documented Policies and Procedures

7.5.1. The Laboratory Director must approve departures from documented policies and procedures.

7.5.2. The departure must be documented in the project file. The Project Manager will cite the departure from documented policies and procedures in the case narrative accompanying the final Analytical Report when appropriate.

7.5.3. Any analyst or member of management recognizing that a departure from the quality systems or from standard operating procedures has occurred may initiate corrective action.

7.6. References

SOP #121 titled, "Audit"
SOP #107 titled, "Inorganic QC"
SOP #110 titled, "Organic QC"

Source of PE sample: _____

True Value: _____

Observed Value: _____

Acceptance Criterion Applied: _____

Date Accepted:_____

Signature (Director of Quality Assurance):_____
Lorrie Franklin

FIRST ENVIRONMENTAL LABORATORIES, Inc.

CORRECTIVE ACTION

Date:_____

Performed by:_____

File ID:_____

Failed Analyte(s) Under Investigation:_____

This form documents discrepancies or departures from documented policies and procedures, and corrective action taken during the course of sample analysis and reporting, and follow-up to questions from clients regarding data. *(Copy Project File and, if Project Manager deems appropriate, copy Director of Quality Assurance Director of Quality Assurance will copy CAR file and enter in on- going QMR file).*

Summary of issue and associated CAR:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Signature (Director of Data Quality or Project Manager)

Note: signature denotes acceptance of CAR / exceptional permission of departure from documented policies and procedures. (Reverse side available for additional notes)

Section No. 7
Revision No. 2
Date: 01/23/06
Attachment 6

List of Personnel (does not include part time)	Signature	Initials
Name		
Bychowski,. John	John T. Bychowski	JTB
~~Ciske~~, Becky RICKERT	Becky Rickert	BAR
Cleghorn, Neal	Neal C Cleghorn	NC
Franklin, Lorrie	Lorrie Franklin	LF
Gerrick, Ryan	Ryan Gerrick	RSG
Gerrick, Scott		
Geraci, Mike	Mike Geraci	MJG
Hentschel, Pam	Pamela J. Hentschel	PJKH
Holota, Rick	Rick A. Holota	RAH
Loj, Adam	Adam Loj	AL
Mitchell, Betsy	Betsy A. Mitchell	BAM
Mottashed, Bill Sr.	W. Mottashed	WM
~~Niece~~, Kim Neises	Kim Neises	KN
Noncek, Helen	Helen Noncek	HN
O'Connell, Donna	Donna O'Connell	DOC
~~Stephanie Olson~~		SH
Plagge, Irene	Irene R. Plagge	IRP
Zaworski, Stan (Sr.)	Stan Zaworski	SZ
Zaworski, Joy	Joy Zaworski	JZ
~~Stan Zaworski (Jr.)~~		SH
Olson, Stephanie	Stephanie Olson	SLO
Zaworski, Stan Jr.	Stan Zaworski Jr	SJZ

8. Preventive Action / Maintenance

8.1. Introduction

The purpose of preventive action is to identify potential areas for improvement prior to a problem or non-conformance actually occurring. A system of continuous improvement ensures that preventive action is incorporated into daily operations. Instrument and equipment maintenance is a key component of preventive action.

8.2. Equipment Maintenance

Proper maintenance of instruments and equipment used to perform analytical procedures is critical to *First Environmental Laboratories'* ability to produce data of the highest quality. Improperly maintained equipment can lead to costly repairs and increased instrument down time. All equipment is properly cleaned, maintained and operated by authorized and trained analysts. The exact requirements are dependent upon the instrument or piece of equipment, and may range from simple cleaning procedures to more complex routines.

8.3. Establishing Maintenance Requirements

8.3.1. The instrument and equipment manuals are reviewed for specific information regarding the manufacturer's recommended maintenance procedures.

8.3.2. The frequency for performing preventive maintenance is determined. The requirements may be yearly, monthly, weekly, or daily. Forms are prepared to document routine and non-routine maintenance procedures.

2.1.3. The location of manufacturer's instructions is referenced if kept separate from the forms used to document these requirements.

8.4. Documentation and Record Keeping

8.4.1. Bound maintenance logbooks are established for instruments and pieces of equipment and its software whose improper functioning could impair **First Environmental Laboratories'** ability to produce data of the highest quality.
Rule of Thumb: If the instrument or piece of equipment requires periodic calibration, then a bound maintenance logbook will be established.

8.4.2. The logbooks are assigned a tracking number and the binder is labeled with the name / number of the logbook, the beginning date of use, and the ending date of use.

8.4.3. The record keeping form(s) must include the following:

- name of the instrument or item of equipment,
- manufacturer's name, model no. and serial number or other unique identification,
- date received,
- date placed in service,
- date taken out of service,
- current location (where appropriate),
- condition received, e.g., new, used, reconditioned,
- maintenance requirements,
- documentation of routine maintenance performed,
- documentation of non-routine maintenance performed,
- dates and results of calibrations and/or verifications and date of the next calibration, and/or verification, where applicable, and
- a copy of manufacturer's instructions or reference to their location

8.4.4. A separate file may be retained that includes:

- operating instructions,
- warranties,
- paperwork related to service provided by a third party,
- maintenance contracts / service agreements.

8.4.5. Also included is information pertaining to a maintenance contract (if applicable) including:

- company carrying the contract
- contract no. / purchase order no.
- cost of contract
- start and end date of contract
- service personnel
- telephone number for contacting service personnel
- copy of the service agreement

8.4.6. The documentation for a malfunctioning instrument or piece of equipment should clearly state the following:

- the problem
- the corrective action taken
- whether or not the problem was resolved
- down time resulting from the problem
- the cost associated with resolving the problem
- analyst's initials
- date

8.4.7. The following forms are included in this section as examples:

- Maintenance Record - Routine (Monthly and Weekly Requirements)
- Maintenance Record - Routine (Daily)
- Maintenance Record - Non-Routine

8.5. Identification of Malfunctioning Instruments / Equipment

8.5.1. If any instrument or piece of equipment is shown to be defective, the unit will be taken out of service. It will be clearly identified and if possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily.

8.5.2. The Quality Assurance officer will determine the effect the malfunctioning unit may have had on data previously released. If it is determined that reported data was affected, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

8.5. "Loaner" or Temporary Instrument / Equipment

In the event the laboratory uses instrumentation or equipment outside its permanent control, a "loaner" or temporary replacement, the laboratory will ensure that the revelant requirement of the NELAC standard and of the analytical procedure are met.

8.7. References

SOP #108 titled, " Instrument / Equipment Maintenance & Record Keeping".

First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:_____

Serial No.:_____**Date of Purchase**_____

Date Placed in Service_____**Date Taken Out of Service**_____

Location:_____**Condition: new** ☐ used ☐ refurbished ☐

Manufacturer's Instruction ***(note location):***_____

Initial / Date the appropriate box upon completing the requirement(s).

Monthly Maintenance

Requirements:_____

_____

_____

_____

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Weekly Maintenance Requirements:_____

_____

_____

_____

Month	Week 1	Week 2	Week 3	Week 4
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:_____

Serial No.:_____**Date of Purchase**_____

Date Placed in Service_____**Date Taken Out of Service**_____

Location:_____**Condition: new** ☐ used ☐ refurbished ☐

Manufacturer's Instruction ***(note location):***_____

Initial / Date the appropriate box upon completing the requirement(s).

Daily Maintenance Requirements:

_____
_____
_____
_____
_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

First Environmental Laboratories, Inc.

List of Maintenance Files

Filename	Logbook No.	Description
BOD incubator	422	BOD incubator
brinkmann		Brinkmann digital dispensette pipets – per area
burettes	421	burettes
chiller	432	chiller – Precision Scientific Controls
cod block dig	421	COD block digestor
conductivity portable	421	Portable conductivity meter for DI water monitoring
conductivity	421	conductivity meter - YSI 33- S-C-T
cyanide dist	421	cyanide distiller - Andrews Glass
do meter	422	D.O. Meter - YSI
east dist westco	421	EASYdist unit by Westco Scientific
eyewash stations	432	eye wash stations
fumehood	432	fumehood maintenance and monitoring log
hg analyzer	422	Hg analyzer - Bacharach
milton roy spec	421	spectrophotometer - Milton Roy 401
hot plt water bath	432	hotplates / waterbaths
icpmaint	436	TJA Trace 61E ICP – per instrument
icipmsmaint	536	PE Elan 9000
m skalar aquapro	433 historical record	Skalar AQUA^{Pro} ™
m skalar sansplus	434	Skalar Sans Plus ™ 1
M scalar sansplus 2004	475	Skalar Sans Plus ™ 2
mr ohaus as200s abal		analytical balance – per balance
mr top pan balances		top pan balance – per balance
muffle furnace	422	muffle furnace - Lindberg/Blue M 51700/51800
oven 45EG 1	422	gravity oven - 45EG Precision Scientific (#1)
oven 45EG 2	422	gravity oven - 45EG Precision Scientific (#2)
oven 1305U	422	gravity oven - 1305U VWR Brand
pensky marten fp	422	flash point tester - Pensky Martens
ph ise meter	421	pH / ISE meter - Orion 710A

First Environmental Laboratories, Inc.

List of Maintenance Files

Filename	Logbook No.	Description
BOD incubator	422	BOD incubator
brinkmann		Brinkmann digital dispensette pipets – per area
burettes	421	burettes
chiller	432	chiller – Precision Scientific Controls
cod block dig	421	COD block digestor
conductivity portable	421	Portable conductivity meter for DI water monitoring
conductivity	421	conductivity meter - YSI 33- S-C-T
cyanide dist	421	cyanide distiller - Andrews Glass
do meter	422	D.O. Meter - YSI
east dist westco	421	EASYdist unit by Westco Scientific
eyewash stations	432	eye wash stations
fumehood	432	fumehood maintenance and monitoring log
hg analyzer	422	Hg analyzer - Bacharach
milton roy spec	421	spectrophotometer - Milton Roy 401
hot plt water bath	432	hotplates / waterbaths
icpmaint	436	TJA Trace 61E ICP – per instrument
icipmsmaint	536	PE Elan 9000
m skalar aquapro	433 historical record	Skalar AQUA$^{Pro\ TM}$
m skalar sansplus	434	Skalar Sans Plus ^{TM} 1
M scalar sansplus 2004	475	Skalar Sans Plus ^{TM} 2
mr ohaus as200s abal		analytical balance – per balance
mr top pan balances		top pan balance – per balance
muffle furnace	422	muffle furnace - Lindberg/Blue M 51700/51800
oven 45EG 1	422	gravity oven - 45EG Precision Scientific (#1)
oven 45EG 2	422	gravity oven - 45EG Precision Scientific (#2)
oven 1305U	422	gravity oven - 1305U VWR Brand
pensky marten fp	422	flash point tester - Pensky Martens
ph ise meter	421	pH / ISE meter - Orion 710A

Filename	Logbook No.	Description
ref frez incu	454	refrigerators, freezers, incubators
tclp extractors	432	TCLP Extractors
turbidimeter	historical record	turbidimeter - HACH 2100A out of service 2005
turbidimeter	421	turbidimeter - HACH 2100N
logbook	427	VOA GCMS – instrument "A"
logbook	428	VOA GCMS – instrument "H"
logbook	429	VOA GCMS – instrument "C"
logbook	430	VOA GCMS – instrument "F"
logbook	424	SVOA GCMS – instrument "B"
logbook	425	SVOA GCMS – instrument "E"
logbook	426	SVOA GCMS – instrument "G"
logbook	423	Pesticides / PCBs - instrument "D"
logbook	537	Pesticides / PCBs - instrument "J"

9. Control of Records

9.1. Introduction

The record system is designed to produce unequivocal, accurate records that document all laboratory activities. It must allow historical reconstruction of all laboratory activities that produced the analytical data. The off site facility used for records storage has an established retrieval system. The facility is secure and it takes measures to prevent damage or deterioration and to prevent loss, including fire, theft, vermin and electronic or magnetic sources. Procedures exist to ensure that electronic records are secure and back-up routines are utilized. All records are retained in confidence to the client.

9.2. Technical Records

9.2.1. The laboratory records provide an audit trail and are designed to enable accurate reconstruction of the procedures / test methods.

9.2.2. The records include the identity of personnel responsible for performing each of the procedures / test method and checking of results. All data and calculations are recorded at the time they are made and are identifiable to the specific procedure / method.

9.3. Record Keeping Practices

9.3.1. All generated data, except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent ink. Observations, data, and calculations are recorded at the time they are made.

9.3.2. Corrections to entries are made by striking the entry with a single line. All corrections are initialed and dated by the person making the correction. The correct value should appear alongside the original entry. In the event that the cause for the correction is not obvious, the reason for the correction will be documented.

9.3.3. Obliterating, erasing, or whiting out the original entry is prohibited.

9.3.4. The records allow historical reconstruction of all lab activities that produced the data and can be understood. This includes sample receipt, preparation, analysis, data reduction, and QC activities supporting the analysis procedures. The information will be such that the factors affecting the uncertainty of the test are identifiable and the test conditions could be reproduced.

9.3.5. The records will be sufficient to establish an audit trail including calibration records and training records.

9.3.6. Laboratory personnel signature or initials must be on all records including sampled by, prepared by, reviewed by. The reason for the signature or initials will be clearly indicated in the record.

9.4. Records Management & Storage

9.4.1. Archived information is protected against fire, theft loss, environmental deterioration, vermin and, in the case of electronic records, electronic or magnetic source.

9.4.2. The laboratory allows the Agency (IEPA) access to archived information.

9.4.3. Records that are stored only on electronic media are supported by the hardware and software necessary for their retrieval.

9.4.4. Records that are stored or generated by computers have hardcopy or write protected backup copies. If a document revision is required, a new electronic version will be created. The original electronic document will be archived. A revision number and date is assigned to differentiate the two documents. The original file is not overwritten. The individual making the change should be identified on the document.

9.4.5. Records are retrievable for inspection and verification purposes.

9.4.6. Access to archived information is documented with an access log.

9.4.7. In the event that records have met the established retention time, the records will be destroyed prior to disposal.

9.5. Laboratory Sample Tracking

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained. This includes documentation of the following:

- sample preservation / container;
- compliance with holding times;
- sample identification, receipt, acceptance, rejection and log in;
- sample storage and disposal;
- sample transmittal forms.

9.6. Laboratory Support Activities

A record of the following supporting activities is retained:

- All original raw data for calibration, sample analysis, and quality control measures;

- results of secondary data review;
- copies of final reports;
- archived SOPs detailing the methods used to perform analyses;
- correspondence relating to specific projects;
- all corrective action reports, audits and audit responses; and
- proficiency test results.

9.7. Analytical Records

9.7.1. Analytical Reports

Each sample submission results in the creation of a project file for retention of all correspondence related to the project and a copy of the final analytical report and invoice. Reports are archived by year and by client. Analytical records are stored off site, except for the current year and the previous year. The storage facility uses a bar coding system for the storage and retrieval of archival records.

9.7.2. Raw Data

9.7.2.1. All original raw data for calibrations, samples and QC measures is retained. Data is archived by analyte group, e.g., semi-volatiles, volatiles, metals, automated wet chemistry, and non-automated wet chemistry. Raw data files are stored off site, except for the current year and the previous six months. The storage facility uses a bar coding system for the storage and retrieval of archival records.

9.7.2.2. All raw data associated with sample analyses include the following information:

- laboratory sample identification code;
- date of analysis;
- instrumentation identification and instrument operating conditions or reference to such information;
- analysis type;
- calculations;
- analyst's and technician's initials or signature;
- sample preparation;
- sample analysis;
- standard and reagent receipt, preparation and use;
- calibration criteria;
- quality control protocols and assessment; and
- method performance criteria.

9.7.2.3. Appropriate information (as detailed above) must also be included on calibration curves, strip charts, computer data files, analytical labbooks, and run logs.

9.7.3. Analytical Reports Retention

9.7.3.1. All analytical reports pertaining to environmental analyses that are associated with the laboratory's accreditation are retained for a minimum of ten years unless otherwise designated for a longer period of time in another regulation.

9.7.3.2. All analytical reports pertaining to drinking water analyses are retained for a minimum of ten years.

9.8. QA/QC Records

9.8.1. Performance Evaluation (PE) Sample Records

The receipt of PE sample(s) generates a project file. The project file contains all instructions pertaining to the analysis and reporting of the PE sample, the reported results, the final results report sent by the PE provider, and any associated corrective action reports.

9.8.2. QA/QC Records Retention

All records pertaining to the analysis of PE samples are retained for ten years.

9.8.3. Standards and Reagents

9.8.3.1 Standards logs are maintained documenting the preparation of working standards, including preparation date, concentrations and preparer's initials.

- Organics: All purchased stocks, prepared intermediate, and working standards must be entered in standards log. The number assigned the standard is listed on the standard. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.
- Inorganics: All purchased stocks, prepared stocks, and prepared intermediate standards must be entered in the standards log. The number assigned the standard is listed on the standard. The date of preparation, date of expiration, and preparer's initials should be listed on the sample container. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.

9.8.3.2. Standards and reagents are labeled with date of receipt, date of opening, expiration date, and storage requirements.

9.8 3.3. Certificates of analysis providing traceability to national standards are retained.

9.8.3.4. All records pertaining to all suppliers from whom the laboratory obtains support services or supplies required for analyses are retained for ten years.

9.9. Lab Notebooks / Log Books

9.9.1. Laboratory notebooks, instrument logbooks, and standards logbooks are assigned a unique number. A record of the assigned logbook numbers, including description of use and date, is retained.

9.9.2. All laboratory notebooks, instrument logbooks, and standards logbooks are retained for ten years.

9.10. Corrective Action Reports, Audits, and Audit Responses

All records pertaining to corrective action reports, audits and audit responses are retained for ten years.

9.11. Administrative Records

9.11.1. Training Records

9.11.1.1. A copy of each analyst's resume and where applicable, diploma, is retained on file. A summary of each analyst's education, experience, and training is also retained.

9.11.1.2. Analytical training frequently requires the analysis of a series of performance evaluation samples to fulfill "Initial Demonstration of Capability". The results of IDC studies are retained on file. Each analyst has established a training file for the retention of information associated with analytical training.

All records pertaining to training are retained for a minimum of ten years.

9.11.2. Signatories

A record of signatures of all employees responsible for accepting samples, performing analyses, and data is retained.

9.12. Transfer of Records

In the event the laboratory transfers ownership, records would be transferred to the new owner. Clients would be notified and provided the option of having records transferred per their instruction. In the event the laboratory goes out of business, clients would be notified and records transferred to originating source where ever possible.

9.13. Electronic Data Management

The laboratory maintains a Laboratory Information Management System (LIMS) that is a Microsoft SQL Server based database. The LIMS is accessible throughout the lab through the local computer network. The LIMS is used to track vital information concerning samples, provide a means for data entry and generate analytical reports for our clients.

9.13.1 The LIMS software is documented through the User and Administrator Reference Manuals that were supplied with the commercially created LIMS.

9.13.2 Procedures have been established to protect the integrity of the LIMS data. See SOP #115 Electronic Data Management for more details.

9.13.3 Computer and automated equipment is maintained to ensure proper functioning and provided with the environmental and operating conditions necessary to maintain the integrity of calibration and test data. A maintenance logbook is kept to document this requirement.

9.13.4 Access to the laboratory's LIMS is restricted by user name and password to authorized employees. Permissions within the LIMS for various functions are assigned by the system administrator. Changes to archived LIMS data are not permissible.

9.13.5 Any modifications made to the LIMS must be tested and documented. This documentation is kept in a logbook.

9.13.6 The laboratory will take steps to ensure that data has been regularly backed-up. The disaster recovery procedures will allow the laboratory to recover data in event of an emergency.

9.14. References

SOP #115 titled, "Electronic Data Management".

SOP #124 titled, "LIMS Raw Data Backup".

10. Audits & Managerial Reviews

10.1. Introduction

10.1.1. Quality audits are considered an essential part of a quality assurance program. An audit may be a performance audit that quantitatively evaluates the results of analyses or it may be a system audit that qualitatively evaluates the degree of adherence to the documented quality assurance program and Standard Operating Procedures (SOPs).

10.1.2. The Director of Data Quality will put in writing any findings from audits conducted at the lab. These will not be limited to his own audits, but will include the audits from clients and regulatory agencies. These will be shared with management and all staff, so that appropriate corrective action can be taken if necessary. Follow-up to audits verify that corrective action has actually occurred and serves the intended purpose.

10.2. Performance Audits

A performance audit is a planned independent check of the operation of a measurement system to obtain a quantitative measure of the quality of the data generated. This involves the use of standard reference samples, which are certified as to their chemical composition. Two types of reference samples (performance evaluation samples) may be used: single and double blind

10.2.1. A single blind sample is known by the analyst to be a performance evaluation (PE) sample. The true values are not known.

10.2.2. A double blind sample has the appearance of a regular sample. It's identity and it's values are not known to the analysts.

10.2.3. A performance audit may also include the review of acceptability and frequency of analysis of all quality control indicators and associated control charts.

10.2.4. Performance audits are conducted as part of analyst training.

10.2.5. Performance audits are conducted as part of verifying the adequacy of corrective actions taken in response to a failed performance evaluation sample analysis.

10.3. PE Providers and Programs

10.3.1. Water Supply (WS), Water Pollution (WP), SW (Solid Waste) Performance Samples.

First Environmental Laboratories routinely participated in WP, WS, and SW Performance Evaluation Programs, which consisted of the analysis of single-blind performance evaluation samples provided by the U.S. EPA. Upon discontinuation of the U.S. EPA program, First Environmental Laboratories enrolled in a program offered by an independent supplier of performance testing samples. Our current supplier, ERA, an accredited PT provider, provides Performance Testing (PT) samples for drinking water, wastewater, and solid waste fields. PT studies are conducted in accordance with the rules established by NELAC. PT samples are received biannually for each field of testing.

10.3.2. PE samples may be purchased on an "as needed" basis from a variety of providers to aid in analyst training, method or instrument validation, and Corrective Action Investigations.

10.4. NELAC Performance Testing (PT) Requirements

10.4.1. Initial accreditation requires the successful completion of two PT studies for each requested field of testing within the most recent three rounds attempted. The three rounds of testing need to have occurred within 18 months of the laboratory's application date. The PT studies will be at least 15 calendar days apart.

10.4.2. Continued accreditation requires maintaining a history of continued successful completion of two PT studies for each field of testing out of the most recent three.

10.4.3. Completion dates of successive PT studies for a given PT field of testing will be approximately six months apart. Failure to meet the semiannual schedule is regarded as a failed study.

10.4.4. PT samples will be obtained from an approved PT provider.

10.4.5. The laboratory will authorize the PT provider to release all accreditation and remediation results and acceptable / not acceptable status directly to the Primary Accrediting Authority, in addition to the laboratory.

10.4.6. PT samples are entered into the LIMS in the same manner as actual samples. PT samples are prepared as instructed by the PT provider. PT samples will be handled in the same manner as actual samples using the same staff, methods, sample preparation procedure, sample analysis procedures, calibration procedures, equipment and instrumentation, facilities, and frequency of analysis. Decisions to reanalyze a sample or analyze at a dilution should be based on the same factors used to make decisions to reanalyze routine environmental samples. Additionally, the type, composition, concentration, and frequency of quality control samples analyzed with the PT samples shall be the same as with routine environmental samples. Reporting of results is done through the LIMS in the same manner as actual samples.

10.4.7. The laboratory will not send any PT sample, or portion of a PT sample, to another laboratory for any analysis for which it seeks accreditation or continued accreditation.

10.4.8. The laboratory will not knowingly accept any PT sample or portion of a PT sample from another laboratory for any analysis for which the sending laboratory seeks accreditation or continued accreditation.

10.4.9. The laboratory management or staff will not attempt to obtain the assigned value of any PT sample from their PT provider.

10.4.10. The laboratory management or staff will not attempt to compare results of any PT sample with another laboratory.

10.4.11. All records associated with PT samples will be retained for 10 years. This includes a copy of the PT study report forms used by the laboratory to record PT results.

10.4.12. All records will be made available to the assessors of the Primary Accrediting Authority during on-site audits of the laboratory.

10.4.13. Whenever the result of the PT sample fail acceptance criteria, the laboratory will investigate the cause of the failure and perform appropriate corrective action. The corrective action taken will be appropriately documented. If required, a summary of the investigation and corrective action taken will be provided to the Primary Accrediting Authority.

10.4.14. Results for PT samples are carefully monitored. If it is suspected that the laboratory may be suspended due to failing two out of three analytes within the same field of testing, a proactive approach will be used to correct the problem and analyze remedial PT sample(s) prior to actually receiving notification of suspension.

10.5. System Audits

A system audit is an evaluation of the laboratory's quality assurance practices and procedures. It consists of an on-site review of the laboratory's quality assurance systems and physical facilities for sampling, calibration, and measurement. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to all staff and the management team. If appropriate, corrective action is initiated and documented.

A system audit may include any of the following:

- organization and management
- personnel
- training

- facilities
- equipment
- measurement traceability and calibration
- maintenance
- chain of custody procedures
- sample acceptance
- sample log-in and sample tracking
- storage conditions
- analytical procedures
- report format and contents
- subcontracting
- sample disposal
- document control
- review of past audits
- review of complaints
- electronic data management / LIMS system
- control charts
- SOP compliance

10.6. Method Audits

10.6.1. A method audit is a detailed evaluation of a specific method to verify compliance with the SOP / method source. A method audit may be performed as part of a system audit or as a follow-up to analyst training. It consists of a detailed review of method performance, SOP content, QCIs, control charts, and data handling. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to the analyst(s), supervisor(s), and the management team. If appropriate, corrective action is initiated and documented.

10.6.2. Method audits are also triggered when a new revision or edition of the method becomes available through the originating source. The new revision or edition is evaluated against the current SOP. Changes are identified and a recommendation is made regarding the status of the SOP. If needed, the SOP will be revised. Documentation is retained in the SOP file summarizing the review.

10.7. SOP Audit

SOPs will be audited for accuracy prior to training a new analyst. The content of the SOP is compared to the procedures actually performed. If needed, the SOP will be revised. Documentation of the review will be retained.

10.8. Sample Audit

10.8.1. A sample audit is a detailed evaluation of a specific project.
It consists of a detailed review of chain of custody record(s), sample acceptance compliance, case narrative / cover letter, Analytical Report, raw data, QCIs, and method compliance. The Director of Data Quality or a Project Manager can perform these audits. The results of these audits are reported to staff, as needed, and the management team. If appropriate, corrective action is initiated and documented.

10.8.2. A sample audit should also include review of chemical relationships. A list of most common relationships follows:

Cation-Anion balance: For complete mineral analysis: (Anions)=(Cations)
Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
(Cr total) = (Cr III) + (Cr VI)
(Total Kjeldahl N) = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration ≥ Dissolved Concentration

10.9. Internal Audit

10.9.1. A comprehensive internal audit will be conducted annually to verify that the laboratories' operations continue to comply with the requirements of the quality system. Where the results of the internal audit indicate that operations or procedures are not in

compliance, corrective action is taken. Where results of the internal audit indicate that the laboratory's test results are invalid, the laboratory takes immediate corrective action and immediately notifies, in writing, any clients whose data are affected. In the event that inappropriate actions violating the Code of Ethics is discovered, procedures for investigation outlined in the Data Integrity & Ethics SOP are followed.

10.9.2. Trained and qualified personnel who are, wherever resources permit, independent of the activity being audited will conduct the audit. The Director of Data Quality is responsible for coordinating the internal audit.

10.9.3. Attached to the Audit SOP (#121) is a checklist used to perform the annual internal audit. This checklist will be revised as necessary.

10.10. Managerial Review

10.10.1. Annually the Director of Quality Assurance will provide a "Quality Report to Management (QRM) . The outline for this report includes but is not limited to the following issues:

- Internal Audit Results
- External Audit Results
- Summary of PT Program
- Listing of CARs PT Samples
- Listing of CARs by Analyte
- Listing of CARs by Client
- Customer Complaints
- Review of Customer Requests for Additional Services
- Review of Employee Complaints / CAR
- Data Integrity & Ethics
- Regulatory Review
    - Leaking Underground Storage Tank Program
    - Site Remediation Program
    - Tiered Approach to Corrective Action Objectives
    - Ground Water Regulations
    - Safe Drinking Water Act Regulations
    - Wastewater Regulations
    - NELAC
- Method Review
    - EPA Wastewater Methods
    - Solid Waste Methods
    - Standard Methods
- Method Audits
- MDLs

- IDCs
- Review of Laboratory Sections / Instrumentation (old / new)
  - Metals
  - Conventionals
  - Wastewater
  - Pesticides/PCBs
  - Semi-volatiles
  - Volatiles
- LIMS / Computers / Software
- Subcontracting
- Training (Summary of Active Training)
- Document Review / Revision
  - QA Manual
  - CHP
  - Policy Manual
- SOP Revision
- Safety

10.10.2. The laboratory management team will review all audit findings and the associated corrective action response.

10.10.3. Following the annual internal audit, the management team will review and discuss the adequacy of the quality system, technical operations, and laboratory manuals, (e.g. Quality Assurance Manual, Chemical Hygiene Plan, and Statement of Qualifications), to ensure their continuing suitability and effectiveness.

10.10.4. The management team will also consider the results of external and/or performance audits, feedback from employees and clients, changes in volume or type of work, changes in personnel requirements, and any other relevant issues.

10.10.5. The management team shall also review the laboratories' overall performance with respect to maintaining data integrity. Vulnerabilities will be identified and actions taken to prevent potential issues from occurring.

10.10.6. If necessary, changes in the quality systems and/or technical operations and various manuals will be made to ensure continuous improvement of the laboratory.

10.10.7. A record will be maintained recording the results of the management team's annual review and discussion of the quality system, technical operations, and laboratory manuals. Final actions will be summarized and included in the record.

10.10.8. The management team will ensure that corrective actions resulting from annual review and discussion of the quality systems, technical operations, and laboratory manuals occur within an agreed upon time frame.

10.11. Quality Assurance Plan – Review

Annually, the Director of Quality Assurance will review the Quality Assurance Program Plan (QAPP) for compliance with the current rules for certification. The title page of the QAPP states the following:

"This QAPP is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes."

Obsolete versions of the QAPP are retained for reference for a minimum of ten years.

10.12. Quality Assurance Discussions.

Quality Assurance topics are incorporated into the weekly meeting held with all staff. Topics discussed and documented at the meeting could include:

- Results of performance evaluation samples
- Training issues
- Analytical methods
- Results of audits
- Certification issues
- Corrective action
- SOPs

10.13. References

SOP #121 titled, "Audit".
SOP #126 titled, "PT Program"

Technical Requirements

11. Personnel

11.1. Introduction

First Environmental Laboratories, Inc. staff members are of the highest quality. Personnel are qualified on the basis of education, training, experience and/or demonstrated skills appropriate to their function in the laboratory. The laboratory environment encourages growth of the individual through cross training and, where appropriate, continued education. Potential areas for growth are identified during annual reviews based on present and anticipated needs of the laboratory. Anticipated short term and long term needs are evaluated.

All personnel are responsible for complying with quality assurance and quality control requirements established by the Quality System that pertain to their function. And all personnel must demonstrate knowledge of our operations and their specific functions.

Demonstration of method performance and analyst's capability is a vital part of the formal quality control program supporting the quality of data produced by *First Environmental Laboratories.*

11.2. Analyst Training

11.2.1. Laboratory management is responsible for defining the minimal level of qualification, experience, and skills necessary for all positions in the laboratory and ensuring that sufficient personnel having necessary knowledge and skills are employed,

11.2.2. The Director of Data Quality will coordinate training and is responsible for developing a training plan outlining the stages of training.

11.2.3. An analyst who is known to be proficient and experienced at performing the analysis/instrument operation will coach analysts who are learning how to perform an analysis or operate an instrument.

11.2.4. The coach and/or Director of Data Quality is responsible for verifying the adequacy of the trainee's basic laboratory skill such as balance use, pipet use, and general chemical handling.

11.2.5. The coach (or trainer) will be responsible for reviewing all data produced by the new analyst until successful completion of initial demonstration of capability. Normally, an analyst new to a particular area of responsibility is designated as being an "analyst-in-training" for the first year. The analyst-in-training will continue to work closely with another analyst during this period.

11.2.6. When a work cell is employed, and the members of the cell change, the new employee(s) must work with experienced members of the work cell and demonstrate acceptable performance through acceptable continuing performance checks such as Procedure Blank and Laboratory Control Standard (LCS). Performance must be documented and the four preparation batches following the change in personnel must not result in the failure of any batch acceptance criteria or the demonstration of capability must be repeated. If the entire work cell changes, then the demonstration of capability must be repeated.

11.2.7. Results of the IDC are retained in the analysts' training file. A copy of the analysts diploma, if applicable, summary of experience and external training is also retained in the analysts' training file.

11.2.8. Each analytical area (metals, extractable, conventionals, wastewater, and volatiles) maintains a manual containing pertinent method SOPs and supporting SOPs. The analyst-in-training is responsible for reading and understanding all SOPs contained in the manual.

11.2.9. All employees receive a copy of the Quality Assurance Plan and Chemical Hygiene Plan upon hire and are responsible for reading and understanding these documents.

11.2.10. If outside training is incorporated into an analyst's training plan, appropriate documentation will be included in the analyst's training file.

11.2.11. Wherever appropriate, personnel will be cross-trained in order to provide a greater depth of knowledge to the anlayst and to provide a flexible pool of analysts capable of performing a variety of analyses.

11.3. Training Files

Each analyst maintains his or her personal training file. The file is reviewed annually by the QA Officer to ensure that documentation requirements are continuing to be met. Annual review is performed during the 1st quarter. A new analyst that is actively being trained will work closely with the QA officer to up date their training file as various stages of training are completed.

11.4. Initial Demonstration of Proficiency

Demonstrating proficiency at performing an analysis or a given suite of analyses will include the following:

10.4.1. Performing, calculating, and interpreting a Method Detection Limit (MDL) study.

11.4.2. Performing, calculating, and interpreting an Initial Demonstration of Capability (IDC) consisting of four replicate standards prepared at a known concentration.
Specifically,....
Perform Initial Demonstration of Capability (IDC) studies. The source for the IDC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the IDC should ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (or reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is not required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. **Criterion**: Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 18th Edition of Standard Methods (see last page of this SOP). An excel form is available for calculating and recording results of the IDC studies.

Table 1020:I Acceptance Limits for Duplicate Samples and Known Additions to Water and Wastewater (from Standard Methods, 18th Edition – Partial Excerpt)

Analysis	Recovery of Known Additions (%) *
Metals	80-120
Volatile Organics	70-130
Base/neutrals	70-130
Acids	60-140
Organochlorine Pesticides	50-140
Endosulfans	25-140
Endrin Aldehyde	25-140
Anions	80-120
Nutrients	80-120
Other Inorganics	80-120

Additions calculated as % of the known addition recovered

11.4.3. If data collected from four QCI samples, such as the LCS, is used to calculate the IDC, then the concentration guideline may be exceeded. If a QC sample is purchased, the concentration is usually determined by the supplier and the concentration guideline may

be exceeded. Evaluate the IDC carefully and determine whether the goal has been achieved. The goal is to document adequacy of training and the ability of the analyst to perform the method acceptably.

11.4.4. Successful analysis of blind performance evaluation sample(s). PE samples may be blind standards prepared by a different analyst or purchased from ERA or other supplier. In some cases, the IDC may also serve as the single blind PE.

11.4.5. Demonstrating knowledge of the method references and supporting SOPs and/or bench references.

11.5. Certification Statement (Demonstration of Capability)

11.4.1. The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and in the method / instrument validation file in order to document the initial validation effort.

11.4.2. If a work cell is employed, the performance of the group will be linked to the training record of the individual members of the work cell. The names of the analyst's making up the work cell will appear on the documentation form.

11.4.3. Certification Statement

Attach copy of IDC if applicable.
The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and/or in the method / instrument validation file in order to document the initial validation effort.

Date: Page 1 of 1
Laboratory Name: ***First Environmental Laboratories, Inc.***
Laboratory Address: 1600 Shore Rd. Suite D, Naperville IL 60563
Analyst(s) Name(s) or Work Cell ID:

Matrix: Aqueous ☐ Drinking Water ☐ Solids ☐ Chemical Waste ☐

Method Number	SOP#	Revision #	Class of Analytes or Measured

We, the undersigned, CERTIFY that:
1. The analysts identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.

2. The test method(s) was performed by the analyst(s) identified on this certification.
3. A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site.

4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory (1).

5. All raw data (including a copy of this certification form necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors.

_____ _____
Technical Director's Name and Title Signature
Date_____

_____ _____
Quality Assurance Officer's Name Signature
Date_____

(1)

- True: Consistent with supporting data.
- Accurate: Based on good laboratory practices consistent with sound scientific principles/practices.
- Complete: Includes the results of all supporting performance testing.
- Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

11.5. Continuing Demonstration of Proficiency

Analysts must have on file continued documentation certifying that they have read, understood and agreed to perform the most recent version of the method and standard operating procedures AND documentation of continued proficiency by at least one of the following once per year:

- acceptable performance of a blind sample;
- another demonstration of capability;
- successful analysis of a blind performance sample on a similar test method using the same technology (e.g., GCMS volatiles by purge and trap for Methods 524.2, 624 or 5035/8260) would only require documentation for one of the test methods;
- at least four consecutive laboratory control samples with acceptable levels of precision and accuracy;
- if none of the above can be performed, analysis of authentic samples with results statistically indistinguishable from those obtained by another trained analyst.

Analyst's Name_____

Area of Responsibility_____

As part of my responsibilities, I have routinely participated in the analysis of performance evaluation samples, such as, WP, WS and ERA or equivalent as detailed above.

I have read, understood and agree to perform the most recent version of the method and/or standard operating procedure(s).

Signature_____

Date:_____

11.7. Laboratory Management Responsibilities

Laboratory management is responsible for all activities ensuring the production of quality data and the continued health of the company, including the following:

- staffing;
- supervision of employees;
- training , initial and continued;
- documentation of all analytical and operational activities;
- sample management, including sample acceptance, login, storage, disposal, and tracking;
- analysis and reporting;
- report preparation;
- quality; and
- data integrity and ethics.

11.8. Data Integrity Training

Data integrity is inherently critical to the success of our laboratory. All Training is provided as part of new employee orientation and is reviewed annually with all employees. A signature attendance sheet and minutes are maintained to document annual training.

Training includes, but is not limited to the following:

- mission statement;
- ehics agreement;
- ethical behavior;
- unethical behavior;
- reporting and investigation of potentially unethical behavior;
- case narratives;
- consequences;
- initial training;
- annual refresher training; and
- documentation.

SOP #127 titled, "Data Integrity & Ethics" provide detailed discussion of each of the items listed above. It discusses the need for honesty and full disclosure in all analytical reporting, how and when to report data integrity issues, and record keeping. It also discusses the consequences associated with violating the Code of Ethics, including termination or civil/criminal prosecution.

Data integrity training communicates the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient.

11.9. References

SOP #106 titled, "IDC & IDMP"
SOP #109 titled"MDL"
SOP #117 titled "Training"
SOP #127 titled, "Data Integrity & Ethics"

12. Accomodation and Environmental Conditions

12.1. Introduction

12.1.1. *First Environmental Laboratories, Inc.* conducts metals, conventionals, GC, and GC/MS analyses on drinking water, aqueous, solid, and hazardous waste sample matrices.

12.1.2. The laboratory facilities and environmental conditions must accommodate instrumentation and analysis needs necessary to produce quality data. Environmental conditions includes electrical supply, lighting, temperature, humidity, water sources, sound and vibration levels, and dust.

12.1.3. The laboratory will ensure that environmental conditions do not invalidate test results or adversely affect the required quality of any measurement.

12.1.4. If the method requires monitoring of any environmental condition, the laboratory will meet and document adherence to the specified environmental condition. If the environmental condition jeopardizes the results of the test, the analysis will be stopped until the condition is corrected.

12.2. Facilities

12.2.1. Adequate workspace must be available to provide an unencumbered work area for the performance of the various analytical procedures. This includes sample receipt and log-in, sample storage, chemical and waste storage, and data handling and storage areas.

12.2.2. Access to the laboratory is always controlled. The extent of control is based on circumstances.

12.2.3. The laboratory is designed, operated and arranged to separate incompatible analyses minimizing the potential for sample contamination.

12.2.3.1. Volatile samples are stored in an area separated from other lab activities and samples.

12.2.3.2. Volatiles analyses are conducted in a separate lab dedicated to volatile analyses.

12.2.4. Adequate measures are taken to ensure good housekeeping in the laboratory. Poor housekeeping can have an adverse affect on the quality and reliability of data being produced.

- All passageways are kept clean and free from obstruction.
- Access to all exits and emergency equipment is unobstructed.
- All storage areas are kept neat and orderly.
- Floors are kept as clean and dry as possible.
- Work areas are cleaned regularly.
- All chemicals are properly labeled and stored.
- All glassware that contained hazardous chemicals is rinsed before being given to the glassware cleaning personnel.

13. Environmental Test and Calibration Methods, and Method Validation

13.1. Introduction

The laboratory uses appropriate methods and procedures for all environmental tests within its accreditation. These methods and procedures are documented in the laboratory Standard Operating Procedures (SOPs) and this Quality Assurance Manual. Each instrument method is validated prior to institution by performing a demonstration of capability.

13.2. Standard Operating Procedures

13.2.1. As a supplement to the methodology provided in the actual method references, First Environmental Laboratories, Inc. has established written Standard Operating Procedures that provide detailed instructions for analysis. All employees will follow the policies and procedures detailed in the SOPs and outlined in the QAP. Laboratory management must approve deviations from documented policies and procedures. The Project Manager will approve specialized project requirements that deviate from routine procedures on an individual basis. The SOP's contain detailed information regarding the following:

- Header Information (filename, SOP#, revision #, date, pagination)
- Title
- Scope and Application
- Summary of Method
- Matrices
- Sample Collection, Preservation, and Storage
- Equipment & Supplies
- Reagents and Standards
- Interferences
- Calibration and Standardization
- Procedures
- Quality Control
- Data Assessment and Acceptance Criteria for Quality Control Measures
- Corrective Action for Out-Of-Control Data
- Contingencies for Handling Out-Of-Control Or Unacceptable Data
- Data Analysis and Calculations
- Detection Limits & Reporting Limits
- Method Performance
- Tables, Diagrams, Flowcharts, & Validation Data

- Definitions
- Safety
- Pollution Prevention
- Waste Management
- References
- Approvals
- Implementation Date
- Ending Date

13.2.2. The SOPs also provide information regarding any modifications or clarifications to the approved test method.

13.2.3. In some cases, bench references have also been prepared to complement the SOP. A bench reference is designed to be used by an experienced analyst.

13.2.4. Additional non-method SOPs have been prepared to accurately specify protocols and procedures for all phases of laboratory activity including sample acceptance, login, handling, preparation, storage, and disposal. A complete listing of current SOPs is included as Attachment 5 to this section. Each SOP is assigned a unique numeric ID.

13.2.5. Laboratory personnel have access to all SOPs.

13.3. Approved Method References

The laboratory cites methods from the various references listed below. The most recent valid revision is used unless it is not appropriate. In the event that the client does not specify the method to be use, the laboratory uses methods for testing that are appropriate and meet the needs of the client. In some instances, the client may mandate or request the method to be used. If the requested method is not appropriate, the laboratory notifies the client.

The method references are available within the laboratory to all personnel. Methods cited by the laboratory are fully validated. Validation data and supporting documents, such as SOPs, are available for review.

The method used for analysis in listed on the Analytical Report.

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater,", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992.

"Standard Methods for the Examination of Water and Wastewater", 19th Edition, 1998.

"Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998.

"Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substances in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry," EPA-821-R-98-002, Feb. 1999.

ASTM Methods – various

13.4. Methods

List of Inorganic Metals Methods

Analyte	Wastewater & Drinking Water Method No. 600/R-94/111	Waste Method No SW-846	Wastewater & Drinking Water Method No. 600/R-94/111	Waste Method No SW-846
	ICP	ICP	ICP/MS	ICP/MS
Arsenic	200.7R4.4	6010B	200.8R5.4	6020
Aluminum	200.7R4.4	6010B	200.8R5.4	6020
Antimony	200.7R4.4	6010B	200.8R5.4	6020
Barium	200.7R4.4	6010B	200.8R5.4	6020
Beryllium	200.7R4.4	6010B	200.8R5.4	6020
Boron	200.7R4.4	6010B	200.8R5.4	6020
Cadmium	200.7R4.4	6010B	200.8R5.4	6020
Calcium	200.7R4.4	6010B	200.8R5.4	6020
Chromium	200.7R4.4	6010B	200.8R5.4	6020
Cobalt	200.7R4.4	6010B	200.8R5.4	6020
Copper	200.7R4.4	6010B	200.8R5.4	6020
Iron	200.7R4.4	6010B	200.8R5.4	6020
Lead	200.7R4.4	6010B	200.8R5.4	6020
Magnesium	200.7R4.4	6010B	200.8R5.4	6020
Manganese	200.7R4.4	6010B	200.8R5.4	6020
Mercury (CVAA)	245.1R3.0	7470B	NA	NA
Nickel	200.7R4.4	6010B	200.8R5.4	6020
Potassium	200.7R4.4	6010B	200.8R5.4	6020
Selenium	200.7R4.4	6010B	200.8R5.4	6020
Silver	200.7R4.4	6010B	200.8R5.4	6020
Sodium	200.7R4.4	6010B	200.8R5.4	6020
Thallium	200.7R4.4	6010B	200.8R5.4	6020
Zinc	200.7R4.4	6010B	200.8R5.4	6020
Metals Digestion Aqueous		3010B		3010B
Metals Digestion Non-Aqueous		3050B		3050B

Table 13 1

List of Inorganic Conventional Methods

Analyte and default unit (as it should appear on the report)	Drinking Water Method No. SM 18th Ed.	Wastewater Method No. 600/4-79-020	Waste Method No. SW-846
Acidity as $CaCO_3$ - mg/L	2310B	305.1	----
Alkalinity as $CaCO_3$ - mg/L	2320B	310.1	----
Ash - %	2540E	160.4	----
BOD - mg/L	5210B	405.1	----
Bottom, Sediment & Water, %	----	----	D-1796
Chloride, Automated - mg/L	4500Cl^--G	325.2	9251
Chloride, Titrimetric - mg/L	4500Cl^--C	325.3	----
Chlorine, free or residual - mg/L	4500Cl-G	----	----
Chlorine, total - mg/L	4500Cl-G	----	----
Chromium, hexavalent - mg/L	3500Cr-D	----	7196A
COD (low) - mg/L	5220D	410.4	----
COD (high) – mg/L	5220D	410.4	----
Color, APHA	2120B	----	----
Conductivity - umhos/cm	2510B	120.1	9050A
Cyanide, total – Automated – mg/L			335.4R1.0
Cyanide, total & ammenable	4500CN-B,C, D,E,G	335.2	9010B/9014
Cyanide, reactive - mg/kg	----	----	7.3.3.2.
Cyanide, weak acid dissociable – mg/L	4500CN-I	----	----
Density, g/cc	----	----	D854-92
Fluoride - mg/L	4500F-C	340.2	----
Flash Point - °F, open cup	--	----	1010M
Flash Point - °F, closed cup	----	----	1010
Ignitability of Solids			1030
Hardness - mg/L	2340C	130.2	----
Ammonia Nitrogen, Automated – mg/L	4500NH_3.G	350.1R2.0	----
Ammonia Nitrogen, probe mg/L	4500NH_3-D	350.2	----
Nitrite Nitrogen as N - mg/L	4500NO_2-B	354.1	----
Nitrate + Nitrite Nitrogen as N - mg/L	4500NO_3-E (modified)	353.3	----
Nitrate, Automated – mg/L	4500NO_3-F	353.2 R2.0	----
Nitrate, Cd reduction – mg/L	4500NO_3-E	353.3	----
Oil & Grease - mg/L	5520	1664A	9070A
Oil & Grease (sludge /sediment) – mg/kg	5520		9071B
Fractional Organic Carbon @ 440°, %	----	415.2	D2974-87

Analyte and default unit (as it should appear on the report)	Drinking Water Method No. SM 18th Ed.	Wastewater Method No. 600/4-79-020	Waste Method No. SW-846
Moisture, %	----	----	D4959-89
Paint Filter - free liquid present or absent	----	----	9095A
Phenol, Automated		420.4R1.0	9066
Phenol - mg/L	5530B,C	420.1	9065
Phosphorus, total - mg/L	4500P-B,E	365.2	----
Phosphate, ortho - mg/L	4500P-E	365.2	----
pH @ 25°C – units (aqueous)	4500H^+-B	150.1	9040B
pH @ 25°C, 1:10 – units (soil)	----	----	9045C
Settable Solids	2540F	160.4	----
Silica - mg/L	4500 -Si,D	370.1	-----
Specific Gravity	2710F	----	----
Sulfate, Automated - mg/L	4500SO_4 F	375.2R2.0	9036
Sulfate, turbidimetric - mg/L	4500SO_4 E modified	375.4	9038
Sulfide, total - mg/L	4500S_2^-C,D,F	376.2	----
Sulfide, total titrimetric, mg/L	----	----	9034
Sulfide, reactive mg/kg	----	----	7.3.4.2.
TDS - mg/L	2540C	160.1	----
TSS - mg/L	2540D	160.2	----
TS - mg/L	2540B	160.3	----
TOC – mg/L	5310C	----	9060
Turbidity - NTU	2130B	180.1	----

Table 13.2

of Performance Evaluation (PE) samples. Additional validation requirements may be established based on specific situational needs.

13.6.2. The ability to reliably produce quality data is dependent upon the maintenance and quality control monitoring routines established at the time the instrument or method is validated. For instrument and method validation to be complete, these routines must be established prior to analyzing samples submitted by clients.

13.6.3. It is understood that, in some cases, the routines initially established at the time the instrument or method is validated will need to be revised. Therefore, a follow-up date is established upon completing instrument or method validation. Follow-up includes assessing all aspects of instrument or method performance, flow of work through the lab, and the effectiveness of maintenance and quality control monitoring routines. The follow-up will also include an audit of an arbitrarily chosen set of data.

13.6.4. It is vital that the SOPs prepared to support instrument operation and method performance match procedures performed on an everyday basis. Each SOP will be reviewed for completeness and accuracy upon completion of the validation, and at the time follow-up is performed.

13.6.5. Demonstration of capability must be completed prior to the acceptance of samples and each time there is a change in instrument type, personnel, or method.

13.7. Control of Data

13.7.1. Data Review / Verification

13.7.1.1. Review of the analytical data based upon set acceptance/rejection criteria established by the analytical method is necessary to ensure the quality of the data. This process involves a critical review of the data set in order to detect questionable values. The analyst performs the initial and most critical review at the time the data is generated.

13.7.1.2. The analyst is provided with detailed method performance acceptance criteria for each analytical method. These criteria are outlined in the specific method SOPs. Data that fails to meet the criteria specified must be flagged appropriately, and the Project Manager notified. Specific information regarding the "out-of-control" QCI will be provided in the case narrative prepared by the Project Manager.

13.7.1.3. Analyst-in-Training are required to have their data reviewed by the senior anayst responsible for conducting the training or other qualified analyst. The training period normally consists of a year. When appropriate to the training effort, checklists are created to assist in the training process. These checklists are reviewed by the senior analyst the review of sample results.

13.7.2. Calculations and Data Transfers

13.7.2.1. Upon completion of data entry the Project Manager reviews the data verifying the accuracy of units of measure, reporting limits, significant figures, adherence to holding times, reasonableness, and completeness. Evaluative tools, such as anion/cation balance, may be utilized to assess the data. If a questionable value is found, the raw data is reviewed and the calculations checked. If necessary, the Project Manager may request re-analysis in order to verify the questionable data. After this review is completed, the Project Manager generates the final report and case narrative. The case narrative details any deviations from routine protocols that have occurred or failures to meet data quality objectives.

13.7.2.2. Another Project Manager performs secondary review of each report.

13.7.2.3. Periodically, each Project Manager arbitrarily chooses a project and performs a complete audit of the project.

13.7.3. Manual Calculations

Detailed formula for performing calculations are included in the method SOPs and QC SOPs.

13.7.4. Computerized Procedures & Calculations

13.7.4.1. Computer software used by the laboratory is documented and validated prior to use.

13.7.4.2. Electronic data is protected and secure.

13.7.4.3. Computers and automated equipment is maintained to ensure proper functioning.

13.8. References

SOP #106 titled, "IDC & IDMP"
SOP #115 titled, "Electronic Data Management"
SOP #125 titled, "Data Validation"

List of SOPs
R# = Revision #

QA	#	R#	Revised	
balance calibration	101	3	05/20/04	
calibration curves, inorganic	102	3	02/02/06	
coc	103	obsolete	02/03/06	
definitions	104	obsolete	02/03/06	
first flow	105	obsolete	02/03/06	
idc & idmp	106	4	01/24/06	
inorganic qa	107	obsolete	02/02/06	
maintenance	108	4	02/01/06	
mdl	109	2	01/27/06	
organics qa	110	obsolete	02/02/06	
pipet / syringe calibration	111	3	05/19/04	
statistical control	112	2	10/04/99	
thermometer	113	3	05/21/04	
calibration curves, organic	114	2	02/03/06	
electronic data management	115	4	02/14/06	
evidentiary COC	116	2	05/27/04	
training file doc prof	117	5	07/09/04	
measurement traceability...	118	1	08/31/99	
sample acceptance....	119	3	02/07/06	
sample login, entry, rept	120	1	09/21/99	obsolete
audit	121	1	09/23/99	
checklist to audit SOP	121	3	07/19/04	
subcontracting	122	2	02/01/06	
sampling instruction & mat.	123	3	02/03/06	
lims data backup	124	1	02/25/00	
data validation	125	2	04/17/01	
PT samples	126	2	05/06/04	
data integrity	127	2	02/07/06	
sop preparation	128	2	09/10/05	
QCI - Inorganics & Organics	129	1	02/02/06	

GCMS	#	R#	Revised
PNAs	201	2	11/29/99
semivolatiles	202	3	10/26/99
TPH	203	3	05/04/04
volatiles	204	6	01/20/05
524.2 VOA	205	4	04/14/04
TPH as Gasoline	206	1	03/25/03
Wood Samples	207	1	08/26/03

GC	#	R#	Revised
8011 edb	301	1	01/13/99
8081 pesticides	302	3	01/22/02
8082 pcb	303	1	07/20/99

Conventionals	#	R#	Revised
acidity	401	4	01/25/06
alkalinity	402	4	10/06/06
ammonia easy dist	403	5	01/18/06
ammonia, nesslerization	404	5	10/31/01
ammonia, skalar (automated)	405	3	03/22/05
chloride, skalar (automated)	406	3	03/25/05
chloride, titrimetric	407	4	06/16/05
chlorine	408	5	01/11/06
chrome+6	409	6	01/11/06
cod	410	5	01/26/06
conductivity	411	4	01/26/06
cyanide	412	6	01/27/06
fluoride	413	8	01/10/06
hardness	414	5	01/25/06
ammonia titrimetric	415	1	11/13/96
nitrate cdred	416	5	01/12/05
nitrate, skalar (automated)	417	3	03/22/05
nitrite	418	5	01/24/06
pH	419	4	10/30/01
phenol easy dist dc	420	4	02/06/06
phosphorus	421	5	01/19/06
reactivity s cn	422	2	11/13/01
silica	423	4	01/25/06

sulfate, skalar (automated)	424	2	10/21/01	
sulfate, turbidimetric	425	4	01/20/06	
sulfide colorimetric	426	5	11/13/01	
sulfide titrimetric	427	5	11/14/01	
turbidity	428	3	03/20/02	obsolete
turbidity (HACH 2100N)	428.1	1	09/20/05	
cyanide, skalar (auto.)	429	2	01/31/06	
phenol, skalar (auto.)	430	2	02/09/06	
color (only bench reference)	431	X	No SOP	
sulfide easy dist	432	2	11/13/01	
TOC Skalar	434	1	03/27/03	
ammonia probe	435	1	01/19/06	
Metals	**#**	**R#**	**Revised**	
cec (bench reference only)	501	X	04/01/95	
icproutine	502	5	03/26/03	
icpstd (standards list)	503	X	11/04/02	
mercury	504	6	10/28/02	
splp zhe	505	2	10/15/99	
tclp zhe	506	2	10/13/99	
Organic Prep	**#**	**R#**	**Revised**	
Sepfbna	601	6	01/20/06	
Sepf pest pcb	602	4	02/01/06	
Soxbna	603	5	02/01/06	
Sox pest pcb	604	3	02/01/06	
Wastewater	**#**	**R#**	**Revised**	
bod	701	6	01/31/06	
flammability	702	2	01/08/99	
flashpt	703	3	01/12/99	
oil & grease, hexane	704	4	03/24/03	
paintfilter	705	X	02/16/98	
specific gravity	706	X	11/05/03	
tds vds	707	4	04/13/04	
ts tvs	708	4	03/17/04	
tss vss	709	4	04/13/04	

Aspen LIMS	#	R#	Revised
Install a Workstation	801	1	02/03/05
Procedure for Entering %TS	802	2	01/05/06
Export Results GISKey EGS	803	1	09/12/05
LIMS Org Prep	804	1	01/11/06
LIMS VOC	805	1	Draft
Export Data "Foster" Format	806	1	01/25/06
Archive LIMS Data	807	1	Draft
LIMS Aspen Libraries	808	1	Draft
TACO Tables	809	1	Draft
Instrument Data Backup	810	1	05/10/04
LIMS Sample Login	811	1	02/03/06
LIMS Sample Worksheets	812	1	Obsolete
LIMS BOD	813	1	01/26/06
LIMS Manual WC	814	1	Draft
LIMS Organics Ext Worksheets	815	1	02/07/06
LIMS Metals Digestion	816	1	02/13/06
LIMS Data Entry	817	1	01/04/06
LIMS Data Reporting	818	1	02/10/06

Safety	#	R#	Revised
Sample disposal	901	3	10/01/01
Waste disposal	902	2	03/12/99

14. Equipment / Instrumentation

14.1. Introduction

The laboratory maintains supplies, equipment, instrumentation and software necessary for the correct performance of the environmental tests and procedures specified in our accreditation. The equipment and instrumentation used for testing is capable of achieving the accuracy required and complying with the specification of the environmental tests and procedure(s). Before being placed into service, instrumentation is validated in accordance with the guidance provided in Section 13. "Environmental Test and Calibration Methods, and Method Validation".

Calibration, the process of comparing one standard or piece of equipment against a standard or piece of equipment of higher accuracy, is vital to the quality of the end product. The degree of accuracy of the data generated is directly related to the accuracy of the standard or equipment.

14.2. Support Equipment

14.2.1. Support equipment includes balances, ovens, refrigerators, freezers, incubators, water baths, thermometers, pipets, and deionzied water sources.

14.2.2. All support equipment is maintained in working order and records are maintained.

14.2.3. All support equipment is calibrated or verified annually using NIST traceable references.

14.2.4. Balance calibration verification is performed daily and records maintained.

14.2.5. Temperature verification for ovens, refrigerators, freezers, incubations and water baths is performed daily and records maintained.

14.3. Instrument Calibration

14.3.1. The details of initial instrument calibration procedures are provided in the method specific SOPs, and in SOP #102 titled, "Calibration Curves, Inorganic", and SOP #114 titled, "Calibration Curves, Organic".

14.3.2. Raw data records are retained and must provide sufficient detail to permit reconstruction of the initial instrument calibration.

14.3.3. A calibration curve or standard curve is a comparison of the instrument response versus the concentration of the substance being measured. Typically, when plotted, the curve approximates a straight line.

14.3.3.1. For inorganic analyses, the calculation of the correlation coefficient is a test to determine whether the calibration data can be represented as a straight line. The square of the correlation coefficient is a positive number that exists between zero and one. A correlation coefficient of 1.0000 for a set of data indicates a curve of best fit. An acceptable correlation coefficient is 0.9950 or greater. The frequency at which calibration curves are prepared is specified within the methods.

14.3.3.2. For organic analyses, an average response factor is used to define the relationship of response to concentration. The percent relative standard deviation (%RSD) of the response factors is calculated for each compound in the set of calibration standards. If the %RSD is less than 20 percent then the average response factor may be used for quantitation. Linearity through the origin is not explicit and is assumed using this means of quantification. The frequency at which calibration curves are prepared is specified within the methods.

14.3.4. Sample results must be quantitated from the initial instrument calibration.

14.3.5. Results of analysis must be reported within the concentration range established by the initial calibration.

14.3.5.1. The lowest standard is equal to the reporting limit.

14.3.5.2. Samples exceeding the high standard are diluted and reanalyzed within the range of the initial calibration.

14.3.5.3. If calibration is performed using a zero point and a single point calibration standard (such as ICP), then the performance at the low end and the high end of the instruments range will be demonstrated on a daily basis.

14.3.5.4. If reported results are outside the instrument's calibration range and appropriate standards within the calibration range have not been analyzed to demonstrate performance, then the data will be flagged appropriately or an explanation provided in the case narrative.

14.3.5. An independent reference sample is analyzed immediately following a calibration curve to verify the curve. This standard is referred to as the Initial Calibration Verification Standard (ICVS). The ICVS must be prepared from a source different than that used to prepare calibration standards. The ICVS can be obtained from an agency,

such as USEPA WP/WS, or an independent supplier of reference materials such as APG, NSI, or ERA.

14.3.6. A distinction is made between recalibration, when a new curve is prepared, and continuing calibration verification, when a pre-existing curve is verified at the beginning, end, or during an analytical run. Whenever a new curve is prepared, it must be verified with an Initial Calibration Verification Standard (ICVS). Whenever a pre-existing curve is used, it must be verified with a Continuing Calibration Verification Standard (CCVS).

14.3.6.1. The CCVS is also analyzed periodically during the analytical run and at the end of a run to verify that the instrument calibration has been maintained during the run.

14.3.6.2. The CCVS may be prepared from the same source used to prepare calibration standards or from a second source.

14.3.6.3. If the CCVS results are outside established acceptance criteria, corrective action must be performed. Corrective action may require the analysis of a new initial calibration curve.

14.3.6.4. Data associated with an unacceptable CCVS may be reported with the appropriate qualification as follows:

- When the recovery for the CCVS is high biased, the results for samples having a non-detect may be reported.
- When the recovery for the CCVS is low biased, the results for samples exceeding regulatory maximum limit or decision level may be reported.

14.4. Equipment/Instrumentation

Major instrumentation includes:

- (1) Agilent 5972 GC/MS with Varian Archon Purge & Trap Autosampler
- (1) Agilent 5973 GC/MS with EST Centurion & Dual EnCon Purge & Trap Autosampler
- (1) Agilent 5973 GC/MS with Varian Archon Purge & Trap Autosampler
- (1) Agilent 5972 GC/MS with dual EST EnCon & 8100 Purge & Trap Autosamplers
- (1) Agilent 5972 GC/MS with HP 7673 Autosampler

- (2) Agilent 5973 GC/MS with HP 7673 Autosampler
- (2) Agilent 6890 GC with Dual Electron Capture Detectors
- (9) Agilent ChemStations with Enviroquant Software
- Thermo-Jarrell Ash ICP 61E Trace Analyzer
- PE Elan 9000 ICP/MS
- Milton-Roy 401 Spectrophotometer
- Coleman 50B Mercury Analyzer System
- Branson 450 Sonic Disrupter
- Hach 2100N Turbidimeter
- YSI Model 33 Conductivity Meter
- YSI 51B Oxygen Meter
- Pensky-Martens Closed Cup Flash Point Tester
- Lab Crest Cyanide Midi Distillation System
- Orion 710A Ion Selective Electrode Meter
- Skalar SANPlus Analyzer (Cyanide, Phenol, TOC)
- Skalar SANPlus Analyzer ((Nitrate, Ammonia, Sulfate, Chloride)
- Westco Scientific EASYdist
- Sohxlet Extraction Apparatus

Support equipment includes:

- Drying Oven (4)
- Lindberg Blue M 794 Muffle Furnace

- Refrigerators, Freezers, and Incubators
- (4) Top Pan Balances
- (1) Analytical Balance
- Pipettes & Syringes
- Thermometers
- (3) DI Water Sources – General Lab
- Barnstead E Pure DI Water Source for Volatiles
- Glassware

14.5. References

SOP #101 titled, "Balance Calibration"
SOP ##108 titled, "Maintenance"
SOP #111 titled, "Pipet Calibration"
SOP #113 titled, "Thermometer"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"

15. Measurement Traceability

15.1. Introduction

15.1.1. All equipment having an effect on the accuracy and validity of the tests and procedures are calibrated prior to initial use and on a continuing basis over the entire range of use. The system is designed to be traceable to the International System of Units (SI) where applicable.

15.1.2. Requirements for calibration of reference standards, such as, Class S weights and NIST thermometers, are specified in the appropriate SOP. Reference standards will be calibrated before initial use and after adjustment. They will only be used for calibration purposes.

15.1.3. Internal reference standards are verified using certified reference materials.

15.1.4. Equipment used must be capable of providing the uncertainty of measurement needed per test specification.

15.2. Equipment Calibration

15.2.1. The accuracy of Grade S, Class 2 weights are certified by an independent source every five years. Balance calibration is performed annually by a contract calibration service, traceable to the appropriate National Institutes of Standards and Technology (NIST) calibration procedure over the entire range of use. Certificates of calibration are retained on file. On a monthly basis the analyst performs intermediate calibration for balances using Grade S, Class 2 weights. An assigned analyst performs daily balance calibration. See the Balance Calibration SOP for the detailed procedure.

15.2.2. The accuracy of NIST thermometer(s) are certified by an independent source every five years over the entire range of use. An analyst performs thermometer calibration against NIST thermometers annually. See the Thermometer Calibration SOP for the detailed procedure.

15.2.3. Autopipetors and re-pipetors are verified monthly. See the Pipet Calibration SOP for the detailed procedure.

15.2.4. The pH meter has an accuracy of at least $\pm$ 0.1 pH units and a scale readability of at least 0.1 pH units. The meter performs temperature measurement and compensation automatically. The meter is calibrated with two standardization buffers prior to each use. See the pH SOP for the detailed procedure.

15.2.5. The conductivity meter is calibrated prior to each use. See the Conductivity SOP for the detailed procedure.

15.2.6. The turbidity meter is calibrated prior to each use. See the Turbidity SOP for the detailed procedure.

15.2.7. Refrigeration units, freezers, ovens, and incubators are each assigned a unique identification. Each unit has one identifiable thermometer that is stored in the unit. The units temperature is monitored and documented on a daily basis. The following information is documented:

- thermometer identification
- refrigerator or freezer identification
- date and time
- temperature
- initials of person recording temperature
- expected temperature
- acceptance range

15.2.8. The conductivity of each deionized water unit is checked and documented daily. The conductivity shall be less than 2.0 uS @ 25°C. If the conductivity is greater than 2.0 uS @ 25°C, then the unit is labeled "unusable" and taken out of service until after the tank is changed by the supplier. The units also have a red light indicating that the conductivity is greater than 0.5 uS. If the red light is on, then the unit is labeled "unusable" and taken out of service until after the tank is changed by the supplier.
uS = micro Simens

15.2.9. If calibration and/or verification of performance for a given piece of equipment fails to meet any acceptance criterion, the item will be taken out of service. The equipment will be clearly identified as being "out of service," and if possible removed from the laboratory environment and stored in an assigned area until it has been repaired. The equipment will not be returned to use until calibration and/or verification demonstrates acceptable performance.

15.2.10. After determining that a piece of equipment has failed to meet a performance criterion, the laboratory will carefully examine the potential effect of this defect on previous calibrations and tests performed. If it is determined that previously reported data was affected, the Director of Quality Assurance and the Project Manager will be informed of the scope of the problem. The Director of Quality Assurance and the Project Manager will coordinate client notification and re-issuance of corrected Analytical Reports.

15.2.11. Equipment and instrumentation must consistently operate with in the specifications.

15.3. Standards & Reagents Tracking and Traceability

15.3.1. The degree of uncertainty in an analytical process is greater than or equal to the uncertainty in the applied standards. Chemical standards ordinarily are prepared by quantitatively combining constituents of known purity. The purity of the source of the material used for preparing the standards used for constructing the calibration curve standards and for preparing other quality control standards such as, matrix spikes and laboratory control standards, cannot be automatically assumed. Standards and reagents must meet the requirements of the test procedure.

15.3.2. Similarly, the stability of standards is also a prime requirement. Every standard will have an assigned expiration date indicating it's stable life expectancy and will not be used beyond such date.

15.3.3. All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better. Purchasing records, such as, purchase order and packing slips are retained.

15.3.4. Upon receipt, all standards and reagents will be labeled with the date of receipt, expiration date, and the initials of the person responsible for un-packing and accepting the materials. Care will be taken to note any specific storage requirements such as refrigeration.

15.3.5. The analyst opening the reagent or standard is responsible for ensuring that the purity meets the requirements of the test. All standards and reagents will be labeled with the date opened at the time they are initially utilized.

15.3.6. All prepared standards and reagents will be labeled with the standard identification and concentration, solvent, date prepared, expiration date, initials of analyst, and applicable safety information.

15.3.7. All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, <u>must</u> be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the appropriate Standards Tracking Log. This unique number should also be applied to the label.

15.3.8. All records received with standards such as Certificates of Analysis and Material Safety Data Sheets will be retained. All Certificates of Analysis will be labeled with the assigned standard number.

15.3.9. The assigned number for the source used to prepare the calibration curve, Initial Calibration Verification Standard (ICVS), Continuing Calibration Verification Standard (CCVS), Laboratory Control Standard (LCS), Matrix Spike (MS), Matrix Spike Duplicate (MSD), and surrogates must be referenced on the raw data.

15.3.10. Where available, the laboratory shall use calibration standards traceable to national standards. Evidence of correlation of results is obtained by participation in proficiency testing programs.

15.3.11. Where traceability to national standards of measurement is not available, the laboratory must provide satisfactory evidence of correlation of results by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis.

15.4. Laboratory Supplies

15.4.1. Glassware is cleaned to meet the sensitivity of the method. Routine procedures are established and visibly posted.

15.4.2. Non-routine cleaning procedures unique to a specific method are documented in the method SOP and bench references used by the analyst.

15.4.3. Volumetric glassware used to prepare standards and reagents is ASTM class A.

15.5. References

SOP #101 titled, Balance Calibration
SOP #102 titled, Inorganic Calibration Curves
SOP #111 titled, Pipet Calibration
SOP #113 titled, Thermometer Calibration
SOP #114 titled, Organic Calibration Curves
SOP #118 titled, Measurement Traceability and Calibration,

16. Sample Preservation and Containers

16.1. Introduction

Generally, the client performs sampling. In the event that sampling services are provided by First Environmental Laboratories they are performed in accordance with procedures detailed in the following documents:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

Special care is taken to ensure representative samples are obtained, and that cross contamination does not occur. Contamination is monitored through the use of trip blanks and field blanks.

16.2. Containers

To ensure that proper sample volumes are obtained, *First Environmental Laboratories, Inc.* provides our clients with clean, pre-labeled, pre-preserved sample containers. Sample containers, preservatives, and holding times are summarized in Table 6.1

Sample Bottle Preservatives and Holding Times (Table 6.1.)

METALS - AQUEOUS

Parameter	Container	Preservative	Holding Time
General, dissolved	Plastic	Filtered on site, HNO_3 to pH<2	6 months
General, total	Plastic	HNO_3 to pH<2	6 months
Chromium, hexavalent	Plastic	Cool 4° C	24 hours
Mercury	Plastic	HNO_3 to pH<2	28 days

CONVENTIONALS - AQUEOUS

Parameter	Container	Preservative	Holding Time
Acidity	Plastic	Cool 4° C	14 days
Alkalinity	Plastic	Cool 4° C	14 days
Ammonia	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
BOD	Plastic	Cool 4° C	48 hours
Bromide	Plastic	None	28 days
Chloride	Plastic	None	28 days
Chlorine	Plastic	Cool 4° C	Analyze Immediately
Chromium, +6	Plastic	Cool 4° C	24 hours
COD	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Color	Plastic	Cool 4° C	48 hours
Conductivity	Plastic	Cool 4° C	28 days
Cyanide, Total or Amenable	Plastic	NaOH to pH>12, Cool 4° C	14 days
Cyanide, Reactive,	Plastic Glass	NaOH to pH>12, Cool 4° C Cool 4° C	14 days
Fluoride	Plastic	None	28 days
Hardness, Total	Plastic	HNO_3 to pH<2	6 months
Nitrite	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (waste water, chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days

Parameter	Container	Preservative	Holding Time
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (chlorinated drinking water)	Plastic	Cool 4° C	14 days
Oil & Grease	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
pH	Plastic	None	Analyze Immediately
Phenols	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
Phosphorus, Ortho	Plastic	Cool 4° C	48 hours
Phosphorus, Total	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Silica	Plastic	Cool 4° C	28 days
Solids, Dissolved	Plastic	Cool 4° C	7 days
Solids, Suspended	Plastic	Cool 4° C	7 days
Solids, Total	Plastic	Cool 4° C	7 days
Solids, Settleable	Plastic	Cool 4° C	48 hours
Solids, Volatile	Plastic	Cool 4° C	7 days
Sulfate	Plastic	Cool 4° C	28 days
Sulfide	Plastic	ZnOAc + NaOH to pH>9, Cool 4° C	7 days
Sulfide, Reactive	Plastic	ZnOAc + NaOH to pH>9, Cool 4° C	7 days
Sulfite	Plastic	None	Analyze Immediately
Surfactants, MBAS	Plastic	Cool 4° C	48 hours
Turbidity	Plastic	Cool 4° C	48 hours

ORGANICS - AQUEOUS

All containers for organic sample analyses have Teflon lined lids.

Parameter	Container	Preservative	Holding Time
HPLC Pesticides (Aldicarb / Carbonfuran)	Glass vial	1.2 mL Chloroacetic acid / vial Cool 4° C	7 days extn. 40 days analysis
EDB/DBCP	Glass vial	Cool 4° C	28 days
Endothall	Glass	Cool 4° C	7 days extn.
Pesticides and PCBs	Glass	$Na_2S_2O_3$ if Cl_2 is present Cool 4° C	7 days extn. 40 days analysis
Petroleum Hydrocarbons, IR	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
Phenoxyacid Hebicides	Glass	$Na_2S_2O_3$ if Cl_2 is present Cool 4° C	7 days extn. 40 days analysis
Phthalate Esters	Glass	$Na_2S_2O_3$ if Cl_2 is present Cool 4° C	7 days extn. 40 days analysis
Polynuclear Aromatic Hydrocarbons	Glass 40 days analysis	$Na_2S_2O_3$ if Cl_2 is present	7 days extn. Cool 4° C
GC/MS Semivolatiles	Glass	$Na_2S_2O_3$ if Cl_2 is present Cool 4° C	7 days extn. 40 days analysis
Total Organic Carbon (TOC)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Total Organic Halogens (TOX)	Glass	$Na_2S_2O_3$ if Cl_2 is present H_2SO_4 to pH<2, Cool 4° C	28 days
Total Petroleum Hydrocarbons	Glass	Cool 4° C	7 days extn. 40 days analysis
Volatile Organics	Glass vial	$Na_2S_2O_3$ if Cl_2 is present HCl to pH<2	14 days
Voaltile Aromatic Organics	Glass vial	$Na_2S_2O_3$ if Cl_2 is present HCl to pH<2	14 days

SOILS & SEDIMENTS

All containers for organic sample analyses have Teflon lined lids.

Parameter	Container	Preservative	Holding Time
Pesticides and PCBs	Glass	Cool 4° C	14 days extn. 40 days analysis
Polynuclear Aromatic Hydrocarbons	Glass	Cool 4° C	14 days extn. 40 days analysis
GC/MS Semivolatiles	Glass	Cool 4° C	14 days extn. 40 days analysis
Total Petroleum Hydrocarbons	Glass	Cool 4° C	14 days extn. 40 days analysis
Volatile Organics	Per Method 5035 Requirements		14 days
General, total	Glass	Cool 4° C	6 months
Chromium, hexavalent	Glass	Cool 4° C	30 days
Mercury	Glass	Cool 4° C	28 days

16.3. References

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

17. Sample Acceptance, Log-in, Storage, Disposal, and Tracking

17.1. Sample Acceptance Policy

Certification requires the laboratory to establish a written acceptance policy that clearly outlines the circumstances under which samples will be accepted. This policy must be made available to all sample collection personnel. A copy of the laboratories' sample acceptance policy is included in First Environmental Laboratories' Service Brochure that is provided to new clients. A copy of the policy will be included along with the chain of custody forms and sample instructions provided with sample bottles. Clients are encouraged to use sampling materials provided by the laboratory.

17.2. Chain of Custody Procedures

17.2.1. Chain of Custody Record

An essential part of any sampling or analytical event is assuring the integrity of the sample from collection to data reporting. The chain of custody provides documentation and traceability of sample possession and handling. Samples are physical evidence and should be handled according to the procedural safeguards outlined in the SOP titled, Sample Acceptance Policy, Receipt, Log-in and Storage, (#119). Any analytical data can potentially be used for purposes of litigation and strict adherence to chain of custody procedures is necessary. Evidentiary chain of custody procedures, which may be required for specific projects at the request of the client, are provided in the SOP titled, Evidentiary Chain of Custody Procedures, (SOP #116).

The chain of custody record contains the following information:

- company's name, address, and phone number, and facsimile number
- contact name
- sampler or collector's name
- project identity / location
- identity of person receiving report
- date / time of sample collection
- sample identification, description, or location
- matrix type
- analyses required or reference to quote/order detailing required analyses
- condition of sample shipper and containers upon receipt
- preservation type
- temperature of cooler upon receipt
- date and time of sample receipt
- signatures of persons involved in the chain of possession
- comments / special instructions

- lab identity (a unique laboratory sample number entered by laboratory personnel)

17.2.2. Initiation of the Chain of Custody (COC)

17.2.2.1. Chain of custody forms will be provided with all sample containers.

17.2.2.2. The chain of custody is initiated in the field by sample collection personnel. The sample collector is responsible for the care and custody of the samples until properly dispatched to the receiving laboratory or turned over to the laboratory. The sample collector must assure that each container is in his/her physical possession or view at all times, or locked in such a place and manner to preclude tampering.

17.2.2.3. If samples are received but the chain of custody is lacking, the person delivering the samples will fill out a chain of custody form. If a third party courier without a COC delivers the samples, the client will be notified immediately. A faxed, signed form from the client is sufficient to allow receipt and analysis by the lab. Clients should be encouraged to use the proper procedures and forms.

17.2.2.4. Deviation from acceptable protocols will be cited in the Analytical Report.

17.2.3. Maintaining Chain-of-Custody

17.2.3.1. Samples awaiting analysis are refrigerated if necessary.

17.2.3.2. If a sample needs to be shipped to a subcontracted laboratory, a purchase order/ chain of custody form will be completed. Pertinent information regarding sample analysis particular to the project such as, method and detection limit requirements will be provided to the subcontracting laboratory. The client must be informed regarding analyses performed externally.

17.2.3.3. In order to satisfy the custodial and evidentiary requirements of sample handling procedures, the following will be adhered to at all times:

- Samples will be stored in a secure area

- Access to the laboratory will be through a monitored reception area. Other access doors to the laboratory will be kept locked.

- Visitors are escorted while in the laboratory. All visitors sign the "Visitor Log."

- After a sample has been removed from storage by the analyst, the analyst is responsible for the custody of the sample. Each analyst should return the sample to the storage area before the end of the working day.

17.2.3.4. The chain of custody record is used to document return of samples to clients.

17.3. Sample Receipt by Laboratory

17.3.1. Laboratory custody of the sample begins at sample receipt. Samples may be delivered by the following methods:

- Field samplers provided by *First Environmental Laboratories, Inc.*
- Field samplers provided by the client
- *First Environmental Laboratories, Inc.* couriers
- Private courier service
- US mail
- The client or an agent of the client.

17.3.2. Independent couriers are not required to sign the chain of custody form. Ideally, the chain of custody should be kept in the sealed sample cooler. The receipt from the courier or the transportation bill should be kept with the chain of custody record retained by the laboratory. Normally, samples will be received by the office manager or Project Manager. The employee receiving the samples is responsible for signing the delivery forms for the carrier. The shipping containers are then taken to the log-in area for completion of the receiving process, which entails unpacking the shipping container and cross checking the chain of custody against the quote/order on file for the project.

17.3.3. Samples received after normal working hours or on weekends, which are not immediately unpacked, will be placed in cold storage.

17.4. Sample Log-in

17.4.1. Thermal Preservation

Samples are examined for proper thermal preservation.

17.4.2. Chemical Preservation and Sample Volume / Damage Inspection

17.4.2.1. Samples are examined for proper containers having appropriate chemical preservation and adequate sample volumes upon receipt. If necessary, a representative portion of sample is split into appropriately preserved containers. The person performing the task documents the action taken and indicates their initials and the date.

17.4.2.2. Samples are visually inspected for damage and indications of potential contamination.

17.4.3. Holding Times

17.4.3.1. Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

17.4.3.2. Log-in personnel will notify laboratory personnel when samples are received requiring analyses that are known to have "short" holding times.

17.4.4. Verification

The sample container identification is compared to the chain of custody and the chain of custody is in turn compared to the quote/order. Any discrepancies found are noted and the Project Manager notified. If discrepancies are found, the client will be contacted for clarification.

17.4.5. Laboratory Identification

17.4.5.1. A unique five digit code is assigned to each sample which is the batch I.D.. A three digit number follows the batch ID indicating the sample within the batch. A two digit number and alpha letter designates the bottle type, i.e., 4 oz jar. (Example: 6-0532-001-01C). Container associations are pre-determined within the test groups built in theLIMS. The laboratory sample ID is written on the chain of custody record in the column labeled, "Lab I.D." The laboratory Bottle labels are printed and placed on the appropriate bottles.:

17.4.5.2. Each container is assigned a unique Lab I.D. code. A durable label and indelible ink are used to ensure sample labeling integrity.

17.4.5.3. The Lab I.D. code is used to identify all samples, subsamples, extracts and digests. The Lab I.D. code/container code is entered into the laboratory records and is used to link the sample with all activities related to sample analysis.

17.4.5.4. At the end of each day a Login Report is printed. The title of the report is, "Login Report – Samples Logged In: XX/XX/XX (date). This report summarizes the lab number (or Lab I.D.), Client Name, Project I.D., Sample Description, Type, Received Date/Time, Due Date, and Initials (of person making entries) are entered in the sample logbook in numerical order. The sample logbook provides a link between each client sample description and the assigned Lab I.D. code.

17.4.6. Documentation

17.4.6.1. The form titled, Sample Acceptance & Log-in Record, is completed during log-in. (See Page 12 of this SOP.) This form is used to document failures to meet sample acceptance criteria. The form is retained in the project file. A copy of the laboratories'

sample acceptance policy is included with the chain of custody forms and sample instructions provided with sample bottles.(See Page 11 of this SOP) If sample acceptance criteria have not been met, decisions to proceed with analysis will be documented. Documentation includes lab I.D. Clients having patterns of failure to comply with sample acceptance criteria will be contacted and notified verbally of the observed problems. A corrective action form will be filed to document the effort made by the laboratory to correct the problem. If the situation does not improve and a pattern of failure to comply with sample acceptance criteria remains, the Director of Quality Assurance will send written notification and seek written acknowledgment from the client.

17.4.6.2. A project file folder is prepared for each sample group submission. The tab of the project file is labeled with the client name, sample number(s), and due date. If the sample(s) require RUSH analysis, the tab is also stamped "RUSH." The front of the project file is preprinted to allow entry of the due date, Project Manager I.D., checkboxes for analyte groups, reviewed by, date reported, date faxed, date invoiced.

17.4.6.3. The chain of custody form, accompanying freight bills, quote/order form and log sheets are placed in the project file, which is then forwarded to the Analysis Control Area.

17.4.6.4. The assigned Project Manager reviews the project within 24 hours of log-in completion. The Project Manager initials the file folder upon completing the review.

17.4.6.5. Whenever there is a problem or question associated with sample acceptance, the Project Manager will be notified. The Project Manager is responsible for resolving the problem, documenting resolution of the problem and documenting the decision to proceed with analysis. Depending on the nature of the issue, problem resolution will be documented on either the COC, Sample Acceptance & Log-in Record or on a Phone Log.

17.4.6.6. The COC is part of the final report delivered to the client. Where appropriate the Project Manager will cite deviations from acceptable protocols and qualify analytical data in the final Analytical Report.

17.4.6.7. If samples do not meet acceptance criteria and samples are ultimately rejected, all correspondence and records of conversations concerning the final disposition of rejected samples will be retained.

Note: At some point in the future, the COC form may be revised to include the statements listed on the Sample Acceptance & Log-in Record negating the need to utilize this separate form. This form could continue to be utilized as a phone log when necessary.

17.5. Sample Storage

17.5.1. Samples must be stored in a manner that avoids deterioration, contamination, or damage during storage, handling, preparation, and analysis.

17.5.2. Samples are stored away from all standards, reagents, food and other potentially contaminating sources. Highly contaminated samples must be segregated from other "clean" samples to prevent cross contamination.

17.5.3. Sample extracts, leachates and digests are stored in an area separate from samples.

17.5.4. Samples are stored in accordance with the thermal preservation requirements established in the methods.

17.5.5. The refrigerators used for sample storage are monitored on a daily basis. The temperature of each unit is maintained within $\pm 2^{\circ}C$ of the specified preservation temperature unless method specific criteria exist. For samples with a specified storage temperature of $4^{\circ}C$, the temperature is maintained between the freezing point of water to $6^{\circ}C$.

17.5.6. Samples requiring evidentiary chain of custody procedures will be stored in a refrigeration unit that can be secured.

17.5.7. When obtaining a sample aliquot from a submitted sample, laboratory personnel will ensure that the sample is homogenous prior to taking the sample aliquot.

17.6. Sample Disposal

17.6.1. General

Thirty days after completion of the final report, samples will be disposed in an appropriate manner.

17.6.2. Hazardous

17.6.2.1. If a sample is determined to be hazardous during the course of analysis the Project Manager and other analysts are notified. A notation is made on the file folder indicating the hazardous constituent and it's concentration. The sample is flagged with a piece of red tape. The identity and concentration of the hazardous constituent is noted on the red tape. The red tape is used to segregate that sample at the time of routine disposal. When the sample is segregated from other samples for appropriate disposal, it is entered into the "Log for Hazardous Samples Awaiting Disposal." The log details the sample ID,

date of storage, physical description, quantity, hazard concentration, method of disposal, and date of final disposal.

17.6.2.2. An attempt is made to return hazardous samples to the originating source. If the sample cannot be returned to the client, then the sample is stored until appropriate disposal arrangements are made.

17.7. Measurement, Calibration, Sample and Data Tracking

17.7.1. The ability to track samples and to link the raw data and final reports unequivocally to the sample is necessary. Also, in the event that the data is used in litigation, the laboratory must be able to recreate the analytical scenario. The procedures and practices routinely used by the laboratory are documented in the Quality Assurance Program Plan (QAPP) and in the SOPs to ensure that the data is accurate and complete, of consistently high quality, and is legally defensible.

17.7.2. Tracking samples and information pertaining to the analysis of a specific sample is performed in either of two ways:

17.7.3. Information can be tracked using the unique 8 digit code assigned to the sample upon receipt. This code is added to the chain of custody by laboratory personnel in the column labeled "Lab I.D." Examples of the types of information that can be tracked using this code are raw data, report, and/or invoice.

17.7.4. Information can also be tracked using the date of sample receipt, extraction, or analysis.

17.8. References

SOP #119 titled, "Sample Acceptance Policy, Receipt, Log-in and Storage"

SOP #116 titled, "Evidentiary Chain of Custody" (#116)

SOP #123 titled, "Sampling Instructions & Materials"

Attachment 5: Chain of Custody Record

Sampling Instructions

- The sampling containers provided to you may contain small amounts of required preservative. The preservatives in common use are: 1 + 1 sulfuric acid, 1 + 2.5 nitric acid, 1 + 1 hydrochloric acid, and sodium hydroxide pellets. These preservatives are strong acids and bases, and can cause burns. Use caution at all times. Material Safety Data Sheets are available upon request. Information can also be obtained form Chemtrec @ 800-424-9300.
  (Note: 1 + 2.5 translates to 1 part acid to 2.5 parts deionized water).

- Do not rinse the sample containers prior to use.

- Fill plastic and glass containers to approximately one inch from the top and cap tightly.

- Aqueous Samples Requiring Volatile Analysis: Fill volatile vials full (reverse meniscus) and carefully slide the septum onto the vial. Screw on the cap and check the vial for air bubbles. A properly filled vial will contain no air bubbles.

- Soil Samples: 4 oz. jars are used for the collection of soil samples. Special procedures and sampling materials are required for the collection of volatile samples.

- The temperature within the cooler must be maintained at 4°C during transit to the laboratory. Please ensure that appropriate quantities of ice are enclosed within the cooler to maintain this temperature.

- Please complete the enclosed chain of custody. This is an integral component of documentation supporting any analysis performed for regulatory compliance.

- If required, seal the cooler with the a custody seal. The custody seal demonstrates to laboratory personnel the maintenance of sample integrity during sample transportation to the laboratory.

- Although each sampling event is unique, remember to get as representative of a sample as possible. This might mean running the water for two minutes; mixing the sample prior to filling the containers; etc.

If you have any questions, please feel free to contact the lab at (630) 778-1200. We have established a 24 hour pager - (630)569-7507 for your convenience during off hours.

Sample Acceptance Policy

The regulations guiding laboratory certification requires that our laboratory have a written sample acceptance policy available to sample collectors. Exceptions will be noted on the chain of custody and/or in the Analytical Report.

The sample collector must document the following information on the Chain of Custody:

- company's name, address, and phone., FAX No.
- contact name
- sampler or collector's name
- project identity / location
- identity of person receiving report
- date / time of sample collection
- sample identification, description, or location
- matrix type
- analyses required or reference to quote/order detailing required analyses
- signatures of persons involved in the chain of possession, including collector's
- comments / special instructions

Laboratory personnel must document the following on the Chain of Custody and/or Sample Acceptance :Log-in Record during sample login.

- adequacy of documentation provided by the sample collector (see above)
- condition of sample shipper and containers upon receipt
- preservation type
- temperature of cooler upon receipt
- date and time of sample receipt
- signatures of persons involved in the chain of possession, including receiving personnel
- lab identity (a 5 digit sample number entered by laboratory personnel)

Sample bottles provided by the laboratory are pre-labeled with water resistant labels that are color coded to indicate the type of preservative present in the container.

Red = Nitric Acid
Yellow = Sulfuric Acid Blue = Sodium Hydroxide
Teal = No Treat

Sample bottles need to be labeled using a durable label and indelible ink.

Adequate sample volume must be provided for the analyses requested.

The temperature within the cooler must be maintained at 4°C during transit to the laboratory. Please ensure that appropriate quantities of ice / ice packs are enclosed within the cooler to maintain this temperature.

Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

Laboratory Personnel can provide information regarding sample volume, preservation, and holding time requirements.

Sample Acceptance & Log-in Record

Batch No._____

Was proper, full, and complete documentation received with the samples?
project name/location ☐ **yes**
sample identification ☐ **yes**
date/time of collection ☐ **yes**
collector's name ☐ **yes**
sample type ☐ **yes**

Were samples received un-damaged, and were all identifications un-questionable? ☐ **yes**

Were samples received in appropriately preserved containers? ☐ **yes**

Were method specified thermal preservation requirements met? ☐ **yes**
For samples with a specified temperature of 4°C, the acceptable temperature is just above the freezing temperature of water to 6°C. Evidence of having begun the chilling process needs to be present for samples received within 6 hours of collection.
(Note: cooler temperature upon receipt of sample and presence or absence of ice is directly recorded on the COC).

Were samples delivered prior to the expiration of any "short" holding times? ☐ **yes**

If "yes" cannot be checked for any of the above questions, provide details and document resolution of problem below. Indicate who was contacted, when they were contacted and by whom, and what decisions were made. Initial and date each entry.

*Date:*_____

*Client Contact:*_____

*Lab Contact:*_____

Authorization to proceed: Yes ☐ No ☐

_____

_____

_____

_____

Soil / Sediments / Sludges_____ Aqueous_____
Other_____

	# per sample		# per sample		Dissolved
4 oz jar	☐	40 mL VOA vials	☐		
16 oz jar	☐	NaOH (p) CN	☐		
32 oz jar	☐	H_2SO_4 (p) WC	☐		☐
5035 vials Preserved	☐	HNO_3 (p) Metals	☐		☐
5035 vials Frozen	☐	No Treat (p) general	☐		☐
_____	☐	H_2SO_4 (g) Phenol	☐		
Samples on Hold	☐	H_2SO_4 (g) O&G	☐	CLAC vials	☐
Location_____		H_2SO_4 (p) TOC/TOX	☐	EDB vials	☐
		No Treat amber / clear g	☐	ENDO	☐
		Trip Blank	☐	Sterile	☐
		_____	☐		

p = plastic g = glass

Due Date:			
Project Manager:			
Logged-in by:			
	Needed		Entered
	Total	TCLP	
Conventionals			
% Solids			
Metals			
Volatiles / BTEX			
PNAs			
BNAs			
PCBs / Pesticides			
TPH			
F-list V☐ SV ☐			
Sub-out Alcohols☐ Herbs☐ EOX ☐ TOC ☐ TOX ☐			
Reviewed By:	2nd Reviewed By:		
Date E-mailed:			
Date Faxed:			
Date Invoiced:	PO#		
Quote Enclosed: ☐	Surcharge:_____%		

Notes:

CHAIN OF CUSTODY RECORD

Page____ of ____ pgs

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: _____
Street Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____
Send Report To: _____
Sampled By: _____

Analyses

Project I.D.: _____
P.O. #.: _____

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature 0.1-6ºC Yes__ No.__ _____ºC
Received within 6 hrs. of collection:_____
Ice Present: Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature._____ºC
5035 Vials Frozen: Yes__ No__
Freezer Temperature:_____ºC

Containers Received Preserved: ☐ Yes ☐ No

Notes and Special Instructions: _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____
Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

18. Assuring the Quality of Environmental Test and Calibration Records

18.1. Introduction

18.1.1. Our objective is to provide our clients with data that is of known and documented quality that is legally defensible in a court of law.

Various checks are implemented to ensure the quality of the test. Statistical control charting is used to detect trends. Reference materials are used to verify calibration and training. Routine participation in a PT program per field of testing is used to monitor overall performance of the test. Replicate and retesting using various techniques is also used to verify test performance.

18.1.2. Quality control procedures can be broken down into three main categories: Instrumentation, Methods, and Samples. Tables A-C list the various quality control indicators frequently used by *First Environmental Laboratories, Inc.* Each method SOP will give the details concerning the quality control indicators and acceptable criteria.

Instrument Quality Control

Table A

Linear Range Analysis
Demonstration of Capability
Limit of Detection
Multi-Point Initial Calibration
Initial Calibration Verification Standard
Initial Calibration Blank
Continuing Calibration Verification Standard
Continuing Calibration Blank
Interference Check Standard (ICP Analysis)
System Tuning (GC/MS Analysis)
Internal Standard Response (Gas Chromatography)

Method Quality Control

Table B

Method Blanks
Lab Control Standard

Sample Quality Control

Table C

Surrogate or System Monitoring Compounds (Organic Analyses)
Matrix Spike/Matrix Spike Duplicate
Duplicates

18.2. Essential Quality Control Procedures

18.2.1. The purpose of a Quality Assurance Program is to verify that the data produced is technically sound, legally defensible and of consistently high quality. The data produced will be of known accuracy, precision, completeness, representativeness, and comparability. These objectives are measured by various internal quality control checks performed during the course of analysis. Each individual method will dictate which Quality Control Indicators (QCI) will be analyzed, at what frequency, and will specify the acceptance criteria. If an acceptance criterion is not met for a particular QCI, the analysis is halted and corrective action is taken. If necessary, samples are re-prepared or re-analyzed. When appropriate, data is flagged and a detailed explanation qualifying the data is provided in the case narrative submitted with the Analytical Report.

Method requirements supercede generic guidance provided in non-method documents such as this Quality Assurance Manual, the NELAC Standard, or non-method SOPs developed for training purposes.

18.2.2. Generally, the QCIs can be categorized as being instrument, method, or matrix specific. The following provides definitions of the various QCIs used to ensure that the highest level of data quality is produced consistently.

18.2.3. The specific method and training SOPs contain greater detail regarding frequency, acceptance criteria, initial corrective action, final action, and data qualification and take precedence over the general guidance provided in this document. These SOPs also provide formulae for calculating percent recovery, relative percent difference, regression equations, and statistical acceptance criteria.

18.3. Initial Validation

18.3.1. Prior to using an instrument or method for performing sample analysis, initial validation is performed to characterize the upper and lower range of operation, and to demonstrate precision and accuracy of the analysis.

Addition of an analyte to a previously validated method will require an initial demonstration of capability for that analyte.

18.3.2. Linear Range Analysis: A standard or series of standards analyzed to demonstrate the highest concentration at which the instrument shows acceptable performance.

18.3.3. Method Detection Limit (MDL) Study: Replicate (7 or more) analysis of spiked samples to statistically determine the lowest concentration that can be determined using the method.

Determination of the MDL requires that the test sample aliquot be processed through all stages of sample preparation normally associated with the analysis, i.e., digestion, distillation, and extraction.

18.3.4. The source for the DOC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the DOC will ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (i.e., reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is <u>not</u> required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 18th Edition of Standard Methods.

Analysis cannot begin until all acceptance criteria are met. If any one of the parameters do not meet acceptance criteria, the performance is unacceptable for that analyte. The source of error must be determined and the demonstration of capability repeated for the analytes of interest.

18.3.5. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown identity of target analyte(s). These performance or reference standards provide an independent check of the analytical and reporting procedures used by the laboratory.

18.4. Instrument Specific Quality Control Indicators

18.4.1. System Tuning (GC/MS analyses): The electronics of a GC/MS are adjusted so that a mass spectrum of PFTBA meets predetermined abundances. The tune is further checked by analyzing 4-BFB (Volatiles) or DFTPP (Semi-volatiles) which must meet standard abundances.

If the tune is unacceptable, then all associated data is unusable and the samples must be re-analyzed.

18.4.2. Multi-Point Initial Calibration: A plot of concentrations of known analyte standards verses the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce standards that cover the working range of the instrument.

18.4.3. Initial Calibration Verification Standard (ICVS): A standard from a source different from that used to prepare the multi-point calibration(s) used to verify that the material was of sufficient purity, and that the multi-point calibration was properly prepared.

The ICVS must be within acceptance criteria for the multi-point curve to be deemed acceptable.

18.4.4. Continuing Calibration Verification Standard (CCVS): A mid-level standard which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify the initial calibration.

If the CCVS fails, data for all samples analyzed after the failed CCVS is unusable and the samples must be re-analyzed after appropriate corrective action has been taken.

18.4.5. Continuing Calibration Blank or Reagent Blank: A blank which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify that the instrument baseline is zero and that the instrument is free of contamination. This QCI is used primarily for metals and conventionals analyses.

The analyte concentration in the blank will be less than the reporting limit unless the method contains an exception. Positive blank values greater than the reporting limit are

reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.4.6. Interference Check Standard: A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. This QCI is used only for ICP analysis.

If the interference check standard analysis is not within control, then the background correction points or the inter-element correction factors are incorrect and the accompanying sample data is not usable. After correcting the background correction points and interference correction factors, the samples must be re-analyzed.

18.4.7. Internal Standard: A spike added to each sample prior to performing an organic analysis that is used to perform analyte quantitation. The internal standard is also used to verify instrument response and retention time stability.

18.5. Method Specific Quality Control Indicators

18.5.1. Method Blanks: An analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The method blank is used to document that the procedures are free of contamination sources.

The analyte concentration in the procedure blank should be less than the reporting limit unless the method contains an exception, e.g., phthalates found in GC/MS semi-volatile analyses. Generally, procedure blanks are not subtracted unless permitted by the method. Positive blank values greater than the reporting limit are reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.5.2. Lab Control Standard (LCS): A spiked aliquot of analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The lab control standard is used to demonstrate that analyte is not lost during the course of sample preparation and analysis.

If the LCS is not within acceptance limits, the sample batch must be re-prepared and re-analyzed. If there is insufficient sample available for re-analysis, the out of control condition is noted and, if appropriate, the data is flagged.

18.5.3. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown

identity of target analyte(s). These performance or reference standards provide an independent check of the sample preparation and analytical procedures.

Failure to pass a performance sample initiates the corrective action process.

18.6. Sample Specific Quality Control Indicators

18.6.1. Surrogate or System Monitoring Compounds: An organic compound which is similar to the target analytes in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. The compound(s) are added to each sample prior to sample preparation or analysis to determine matrix effects and analyte recovery after sample analysis.

If the percent recovery for the surrogate(s) is not within acceptance limits, the sample will be re-extracted and re-analyzed. If this is not possible, the out of control condition is noted and, if appropriate, the data is flagged.

18.6.2. Matrix Spikes / Matrix Spike Duplicates (MS/MSD): Duplicate aliquots of sample spiked with a known concentration of target analytes. The spiking occurs prior to sample preparation and analysis. A matrix spike is used to determine the bias of a sample.

If the MS/MSD data is outside acceptance limits, the results for the LCS are checked. If the LCS is in control, the procedure is in control and the data may be reported with a flag identifying the outlier spike data. Potentially, there may be a matrix interference which adversely affected the analytical results. The Method of Standard Additions (MSA) may be used for quantification of metals analytes.

18.6.3. Duplicate: A second analysis that is performed on a sample to determine the precision of the analytical method in a given sample matrix.

If the relative percent difference is not within the acceptance limits, the sample will be reanalyzed. This may indicate that a non-homogenous sample aliquot was obtained for the initial analysis.

18.7. Specific Routine Procedures to Assess Data Precision, Accuracy and Completeness

18.7.1. Accuracy

Accuracy is a measurement of agreement between an observed value and a true (theoretical) value. Several of the above QCIs measure accuracy including; Initial Calibration, Continuing Calibration, Laboratory Control Standard, and Matrix Spikes.

18.7.2. Precision

Precision is a measurement of reproducibility in duplicate and replicate analyses. The relative percent difference (RPD) between duplicate analyses is a measurement of the precision of a given analysis.

18.7.3. Limit of Detection (LOD)

The LOD is an estimate of the minimum amount of a substance that an analytical process can reliably detect. The laboratory utilizes test methods that provide a detection limit that is appropriate and relevant for the intended use of the data.

An LOD is analyte and matrix specific, and is laboratory dependent. The LOD is initially determined for the compounds of interest in each test method in a quality system matrix of interest. The LOD includes all sample processing steps of the analytical method.

A LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature. OR when test results are not to be reported to the LOD. Where an LOD study is not performed, the lab may not report a value below the limit of quanitation.

LODs are determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis. The LOD is verified annually for each method, analyte, and matrix except if the following applies: the lowest calibration standard is equal to or below the reporting limit, or the reporting limit is verified by analyzing a standard at the reporting limit each time the analysis is performed.

The Limit of Quantitation (LOQ) is the minimum levels, concentrations, or quantities of an analyte that can be reported with a specified degree of confidence. The LOQ frequently equals the low calibration standard or is approximately 10 times the standard deviation from replicate measurements. In either case, the method LOQ is above the LOD.

If the annual review of the LOD indicates a change to the historic data base, the LOQ will be re-evaluated.

Unless specified otherwise by the method, a method detection limit study is used to determine the LOD. If an MDL is not appropriate, the procedure used to determine LOD will reflect instrument limitations and the intended application of the test method. The MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.

All procedures used for determining the LOD or MDL must be documented. Documentation must include the quality system matrix type. All supporting data must be retained

18.7.4. Standards & Reagents

All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better.

18.7.5. Selectivity & Sensitivity

The method used for analysis must be appropriately selective and sensitive to meet data quality objectives established by the client.

18.7.6. Test Conditions

Environmental and instrumental test conditions are controlled to the meet the needs to the test.

18.7.7. Completeness

The measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained under optimal conditions.

Control criteria for each quality control indicator either meet or exceed EPA method requirements. Analyte specific criteria are summarized in the SOP for a given analyte.

18.7.8. Comparability

The confidence with which one data set can be compared to another.

18.7.9. Representativeness

The degree to which the data accurately and precisely represent a characteristic of a population parameter, variation of a property, a process characteristic, or an operational condition.

18.7.10. Correlation of Results

Data is reviewed for correlation of results and chemical relationships. A list of most common relationships follows:

Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
Cr total = (Cr III) + (Cr VI)
Total Kjeldahl N = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration = or ≥ Dissolved Concentration

18.7.11. Uncertainty of Measurement

The total uncertainty of measurement needs to consider a variety of sources.

- Uncertainty due to the calibration equipment & calibration processes.
- Uncertainty of the testing instrument as calibrated.
- Uncertainty of the testing instrument during use.
- Uncertainty of the test results.

Uncertainty of measurement is inescapable since no measurement is infinitely precise and no measurement can be performed precisely the same way twice. It is a factor in the development of test methods, training, instrument calibration, and test performance.

In the event the client requests the measurement of uncertainty to be reported with the analytical results, the following documents will be used to calculate the measurement uncertainty:
"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document; and "CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

A variety of choices are made during the calculation of uncertainty of measurement. Care will be taken to evaluate the importance of the various components as they pertain to the project.

Interpretation of the data produced using these procedures will be carefully evaluated based on experience of personnel employed by the laboratory and the existing validation data. The laboratory will take precautions to ensure that the form of reporting does not imply more certainty than determined by the procedures for determining uncertainty of measurement.

18.8. Control Charts

Control charts are based upon a concept developed by Walter Shewart in 1934. The mean and standard deviation (n-1) for at least twenty measurements are determined. A line representing the mean is drawn on the chart. The upper and lower control limits, which are defined as plus and minus three times the standard deviation from the mean, are calculated and drawn on the chart. The range between the upper and lower control limits represents 99 percent of the normal distribution of observations. The upper and lower warning limits, which are defined as plus and minus three two times the standard deviation from the mean, are also calculated and drawn on the chart. The range between the upper and lower warning limits represents 95 percent of the normal distribution of observations. The methods provide specifications for acceptance criteria used to evaluate the result of a quality control indicator (QCI). Normally, the statistical limits generated by a single laboratory is expected to equal or be narrower than the method specification.

The following control charts or tabulations are maintained:

Metals:

Matrix Spike / Matrix Spike Duplicates
- Drinking Water / Dissolved Aqueous (undigested) Matrix
- Aqueous (digested) Matrix
- Soil Matrix

Laboratory Control Samples

Conventionals:

Matrix Spike / Matrix Spike Duplicates
- Drinking Water Matrix
- Aqueous Matrix
- Soil Matrix

Continuing Calibration Verification Sample
Laboratory Control Samples

Organics:

Surrogates
- Aqueous Matrix
- Soil Matrix

Matrix Spike / Matrix Spike Duplicates
- Aqueous Matrix
- Soil Matrix

Laboratory Control Samples

18.9. Interpretation of Control Charts

Control limits represent the normal distribution of a set of observations.
As a general guide, the following conditions indicate a problem exists and initiates the corrective action process:

- A point is outside the control limits
- Seven consecutive points in an increasing trend
- Seven consecutive points in a decreasing trend
- Seven consecutive points above the mean
- Seven consecutive points below the mean
- Three consecutive points occur between the warning and control limits

18.10. Analytical Record

The following essential information associated with analysis will ill be documented in the analytical record:

- Laboratory ID
- Date & time of analysis
- Instrumetn identification and operating conditions
- Analyte
- Analysis type
- Manual calculations
- Analyst intials / signature

18.12. Non-Standard Methods

When non-standard methods are used, all of the applicable procedures noted in sections 18.1. through 18.11. will be utilized to assure the quality of the test

18.13. References

SOP #106 titled, "IDC & IDMP"
SOP #129 titled, "QCI Inorganic & Organic"
SOP #110 titled "Organic QC"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"
SOP #109 titled, "MDL"
SOP #112 titled, "Statistical Control"
"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.
"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

19. Reporting the Results

19.1. Introduction

Results of analyses need to be reported objectively, accurately, and unambiguously. Data reduction is performed in accordance with internally established rules and conventions that meet method requirements. The content of the Analytical Report or Certificate of Analysis includes all information requested by the client and necessary for the interpretation of the analytical results, as well as, information required by the method. Quality control data is normally retained on file for reference. Quality control data packages can be prepared per client request.

19.2. Data Reduction

Following analysis, the raw data must be reduced to produce a final value to be reported. The specific calculations are included in the actual method references and method SOPs.

19.2.1. Significant Figures

All digits in a reported result are expected to be known definitely, except for the last digit, which may be in doubt. If more than a single doubtful digit is carried, the extra digit or digits are not significant. Report only such figures as are justified by the accuracy of the work. The reporting limits routinely used by the laboratory establishes significant figures for results. If the sample is analyzed at a dilution the number of significant figures used for reporting is adjusted accordingly.

Example:
Routine reporting limit for nitrite is 0.01 mg/L.
If the sample was analyzed at a 10x, the reporting limit changes to 0.1 mg/L.
If the sample was analyzed at a 100 x, the reporting limit changes to 1 mg/L.

19.2.2. Rounding

Round off by dropping digits that are not significant. If the digit 6,7,8,9 is dropped, increase preceding digit by one unit; if the digit 0,1,2,3,4 is dropped, do no not alter preceding digit. If the digit 5 is dropped, round off preceding digit to the nearest even number.

Example:
2.25 becomes 2.2 and 2.35 becomes 2.4

Generally, First Environmental does not report more than three significant figures.

Example:
11,642 becomes 11,600
1,162 becomes 1,160

19.2.3. Ambiguous Zeros

In a number written as 5.00, it is understood that all the zeros are significant, or else the number could have been rounded off to 5.0, 5 or whichever was appropriate.

In a number written as 0.52, the zero serves as a place holder. This avoids possible questioning in regards to a real number being excluded (.52).

19.2.4. Dry Weight vs. Wet Weight

Results for waste analyses (with the exception of TCLP analyses) are expressed on an "as is" basis (i.e., the sample results are not corrected for percent moisture). This is in accordance with protocols for "waste" materials.

Results for soils, sediments, and sludges are expressed on a dry weight basis per method protocols.

The calculation for converting wet weight results to dry weight is as follows:

$$\text{sample concentration} = \frac{\text{analyte concentration}}{\text{decimal equivalent of the percent total solids}}$$

19.2.5. Data Quality Flags

The following data flags may be used to qualify the data.

"J": Indicates an estimated concentration. This flag is used when reporting a result that is less than the routine reporting limit but greater than the method detection limit.

"B": Indicates the analyte was found in the associated blank as well as the sample. Common lab contaminants include, acetone, 2-butanone, and methylene chloride, and Bis-2ethylhexylpthalate.

"E": Indicates an estimated value. This flag may be used when the internal standard recovery for the associated compounds fails to meet acceptance criteria. Failure to meet acceptance criteria is due to the presence of a matrix interference. It may also be used to indicate the reported value exceeds the calibration range of the instrument.

"L": The analyte was detected as part of a GC/MS database search. The identification is considered tentative and the concentration is estimated.
"N": Analyte is not part of our NELAC accreditation
"S": Analyte was sub-contracted to another laboratory for analysis.

Other data quality flags may be utilized and appropriately defined in the case narrative.

19.3. Test Reports

The final report sent to the client consists of the following:

19.3.1. Cover Letter

19.3.1.1. A signed cover letter listing the client's name and address, client's project ID, *First Environmentals' File ID* (batch ID), and date of sample receipt.

The following statement is included in the cover letter:

"All analyses were preformed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number is XXXXXX: XX/XX/XX through XX/XX/XX"

19.3.2. Case Narrative

19.3.1.2. A case narrative is included, when necessary for the interpretation of test results, to explain the use of data quality flags, additions or exclusions to the test method, non-standard conditions that may have affected the quality of results, and specific exceptions to routine protocols or failures to meet method criterion.

Failures to meet sample acceptance criteria, such as, temperature compliance, are noted directly on the chain of custody. Failure to meet sample acceptance criteria other than temperature compliance, such as holding time or chemical preservation, will be included in the case narrative.

When required, a statement of the estimated uncertainty of the test results can be provided with the analytical result. Information on uncertainty is needed when a client's instruction requires.

In the event that an opinion or interpretation of results is requested by the client, the laboratory will document the basis upon which the opinion and interpretation is made. Opinions and interpretations will be clearly marked on the report.

19.3.3. The Analytical Report(s)

Each Analytical Report lists the following:

- Title, e.g., "Analytical Report"
- Client ID
- Project ID
- Sample Number (assigned by the laboratory)
- Sample Description
- Lab File ID (unique identification of the certificate or report)
- Date Received
- Date & Time Taken
- Date Reported
- Analyte or Analyte Group
- Results
- Unit of Measure
- Date Prepared
- Time Prepared if holding time is less than 72 hours
- Date Analyzed
- Time Analyzed if holding time is less than 72 hours
- Analysis Method and Method Revision
- Preparation Method
- Flags (data qualifiers)
- Client specific information as required.
- Specification of whether results for solid sample matrices are either "Dry Weight" or "Wet Weight"

The report format is designed to accommodate various test requests for either multiple or single analyte analyses. Required information is presented in a readable format minimizing the possibility of misinterpretation.

19.3.1.4. The original Chain of Custody Record.

19.3.4. Reports are paginated. Each page of the analytical report lists the laboratories File ID or assigned sample number. The first five digits of the sample number is the File ID or Batch Number.

19.3.5. The Analytical Report(s) and cover letter are printed on laboratory letterhead, which specifies the laboratories' name, address, and phone number. The Project Manager's name, signature and function.

19.3.6. When laboratory personnel performs sampling, this is documented on the chain of custody and in the cover letter accompanying the final report.

19.3.6. Analyses subcontracted to another laboratory will be flagged on the analytical report with an "S" in the flags column. The flag is defined in the case narrative to the report. A hardcopy of subcontracted results is retained in the project file and is available to the client upon request.

19.3.7. Simplification of the reporting procedures requires a written agreement with the client. In the event that the reporting procedures are simplified, data is readily retrievable.

19.3.8. Facsimiles and E-mail documents will contain the following qualifier:

"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

19.3.9. After completion and delivery of the final Analytical Report to the client, the laboratory will only correct, add or delete information from the report upon directions received from the client. These directions must be appropriately documented. Documentation includes a summary of the change(s), specification of who provided the instructions, the date, and the initials of the person who received the request for correction. Any supplemental report will clearly identify their purpose and will contain all reporting requirements.

19.3.10. In the event that a reporting error is discovered after forwarding the final Analytical Report to the client, the client will be notified immediately in writing. Appropriate actions will be taken to remedy the problem and provide corrected a Analytical Report. The corrected report will provide a summary of the error and the correct action. If the data remains compromised, a written summary of the problem and the scope of impact on the clients' data will be sent to the client.

19.4. References

Refer SOP #818 titled, "LIMS Data Reporting"

20. Definition of Terms Commonly Used in the Environmental Laboratory

DEFINITION OF TERMS & ACRONYMS COMMONLY USED IN THE ENVIRONMENTAL LABORATORY

ACCEPTANCE CRITERIA: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

ACCREDITATION: the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. In the context of the National Environmental Laboratory Accreditation Program (NELAP), this process is a voluntary one. (NELAC)

ACCURACY: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (QAMS)

AUDIT: a systematic evaluation to determine the conformance to quantitative and qualitative specifications of some operational function or activity. (EPA-QAD)

BATCH: environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples. (NELAC Quality Systems Committee)

BLANK: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. Blanks include:

> Equipment Blank: a sample of analyte free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC)

Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g. , distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA_QAD)

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analytes. (NELAC)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS).

CALIBRATION: set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (VIM: 6.11)

1) In calibration of support equipment the values realized by standards are established through the use of Reference Standards that are traceable to the International System of Units (SI).
2) In calibration according to test methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications.

CALIBRATION CURVE: the graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (NELAC)

CALIBRATION METHOD: a defined technical procedure for performing a calibration. (NELAC)

CALIBRATION STANDARD: a substance or reference material used to calibrate an instrument. (QAMS)

CERTIFIED REFERENCE MATERIAL (CRM): A reference material whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body. (ISO Guide 30 – 2.2)

CHAIN OF CUSTODY FORM; a record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; collector; time of collection; preservation; and requested analyses. (NELAC)

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSTATION AND LIABILITY ACT (CERCLA/SUPERFUND): the enabling legistlation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (ARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites. (NELAC)

CONFIDENTIAL BUSINESS INFORMATION (CBI): information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products. NELAC and its representatives agree to safeguarding identified CBI and to maintain all information identified as such in full confidentiality.

CONFIRMATION: verification of the identity of a component through he use of an approach with a different scientific principle from the original method. These may include, but are not limited to:

Second column confirmation
Alternate wavelength
Derivatization
Mass spectral interpretation
Alternative detectors or
Additional cleanup procedures
(NELAC)

CONFORMANCE: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements (ANSI/ANQC E4-1994)

CONTINUING CALIBRATION BLANK (CCB): A blank that is typically analyzed at the beginning of each analytical batch to verify that the instrument baseline is zero and that the instrument is free of contamination. This is used primarily for metals and wet chemistry analyses.

CONTINUING CALIBRATION VERIFICATION STANDARD (CCVS): A mid-level standard which is analyzed with each analytical batch to verify the initial calibration.

CORRECTIVE ACTION: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

DATA AUDIT: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e., that they meet specified acceptance criteria). (NELAC)

DATA REDUCTION: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (EPA-QAD)

DEMONSTRATION OF CAPABILITY: a procedure to establish the ability of the analyst to generate acceptable accuracy. (NELAC)

DETECTION LIMIT: the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit. (NELAC)

DOCUMENT CONTROL: The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)

ESTIMATED QUANTITATION LIMIT (EQL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the EQL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample EQLs are highly matrix-dependent. The EQLs in SW-846 are provided for guidance and may not always be achievable.

FIELD DUPLICATES: Independent samples that are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

FIELD MEASUREMENT: The determination of physical, biological, or radiological properties, or chemical constituents; that are measured on-site, close in time and space to

the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.

FIELD OF ACCREDITATION: (previously Field of Testing) NELAC's approach to accrediting laboratories by matrix, technology/method and analyte/analyte group. Laboratories requesting accreditation for a matrix-technology/method-analyte/analyte group combination or for an updated/improved method are required to submit only that portion of the accreditation process, not previously addressed. (NELAC)

FIELD OF PROFICIENCY TESTING: NELAC's approach to offering proficiency testing by matrix, technology, and analyte/analyte group.

HOLDING TIMES (MAXIMUM ALLOWABLE HOLDING TIMES): the maximum times that samples may be held prior to analysis and still be considered valid or not compromised. (40 CFR Part 136)

INITIAL DEMONSTRATION OF CAPABILITY (IDC) / INITIAL DEMONSTRATION OF METHOD PERFORMANCE (IDMP): The IDC/IDMP verifies and demonstrates that the instrument, method, and/or analyst is capable of generating precise and accurate analytical data. It is used to validate new analyst and new instrument performance, and to validate changes in analytical equipment or technique.

INITIAL CALIBRATION VERIFICATION STANDARD (ICVS): An ICVS verifies that the standards used to construct the curve were chemically pure, prepared properly, and that they have not degraded significantly since they were made. The ICVS should be obtained from a different source than that used to prepare the standards for constructing the calibration curve. The concentration of the ICVS should be 10%-50% of the maximum calibration range unless specified otherwise in the method. Ideally, the source is a different manufacturer altogether and the manufacturer predetermines the concentration. This standard does not go through sample preparation.

INTERFERENCE CHECK STANDARD (ICS): A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. Used in ICP metals analysis only.

INTERIM ACCREDITATION: temporary accreditation status for a laboratory that has met all accreditation criteria except for a pending on-site assessment which has been delayed for reasons beyond the control of the laboratory. (NELAC)

INTERNAL STANDARD: a known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (NELAC)

INTERNATIONAL SYSTEM OF UNITS (SI): the coherent system of units adopted and recommended by the General Conference on Weights and Measures. (CCGPM) (VIM 1.12)

LABORATORY CONTROL SAMPLE (however named, such as laboratory fortified blank, spiked blank, or QC check sample): a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (NELAC)

LINEAR DYNAMIC RANGE (LDR): The concentration range over which the analytical curve remains linear.

LIMIT OF DETECTION (LOD): An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific and is laboratory dependent.

LIMIT OF QUANTITATION (LOQ): The minimum levels, concentrations, or quantities of a analytes that can be reported with a specified degree of confidence.

MATRIX: the substrate of a test sample.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Non-Potable Water: any aqueous sample excluded from the definition of Drinking Water matrix. Includes surface water, groundwater, effluents, water treatment chemicals, and TCLP or other extracts.

Solid and Chemical Materials: includes soils, sediments, sludges, products and by-products of an industrial process that results in a matrix not previously defined.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest

from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC)

Quality System Matrix: These matrix definitions are an expansion of the field of accreditation matrices and shall be used for purposes of batch and quality control requirements :

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges and other matrices with >15% settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC)

MATRIX DUPLICATE: An intralaboratory split sample which is used to document the precision of a method in a given sample matrix.

MATRIX SPIKE (spiked sample or fortified sample): a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of Target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (QAMS)

MATRIX SPIKE DUPLICATE (spiked sample or fortified sample duplicate): a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (QAMS)

MAY: denotes permitted action, but not required action. (NELAC)

METHOD DETECTION LIMIT (MDL): one way to establish a Limit of Detection, defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

MATERIAL SAFETY DATA SHEETS (MSDS): Written information provided by vendors concerning a chemical's toxicity, health hazards, physical properties, fire, and reactivity data including storage, spill, and handling precautions.

MUST: denotes a requirement that must be met. (Random House College Dictionary)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST): an agency of the US Department of Commerce's Technology Administration that is working with EPA, States, NELAC, and other public and commercial entities to establish a system under which private sector companies and interested States can be accredited by NIST to provide NIST-traceable proficiency testing (PT) to those laboratories testing drinking water and wastewater. (NIST)

NATIONAL ENVIRONMENTAL LABORATORY ACCREDITATION CONFERENCE (NELAC): a voluntary organization of State and Federal environmental officials and interest groups purposed primarily to establilsh mutually acceptable standards for accrediting environmental laboratories. A subset of NELAP. (NELAC)

NATIONAL ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (NELAP): the overall National Environmental Laboratory Accreditation Program of which NELAC is a part. (NELAC)

NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP): a program administered by NIST that is used by providers of proficiency testing to gain accreditation for all compounds/matrices for which NVLAP accreditation is available, and for which the provider intends to provide NELAP PT samples. (NELAC)

NEGATIVE CONTROL: measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (NELAC)

NELAC STANDARDS: the plan of procedures for consistently evaluating and documenting the ability of laboratories performing environmental measurements to meet nationally defined standards established by the National Environmental Laboratory Accrediation Conference. (NELAC)

NELAP RECOGNITION: the determination by the NELAP Director that an accrediting authority meets the requirements of the NELAP and is authorized to grant NELAP accreditation to laboratories. (NELAC)

ORGANIC-FREE REAGENT WATER: For volatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. Organic-free reagent water may also be prepared by boiling water for 15 minutes and, subsequently, while maintaining the temperature at 90°C, bubbling a contaminant-free inert gas through the water for 1 hour.

For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

POSITIVE CONTROL: measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (NELAC)

PRECISION: the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (NELAC)

PRESERVATION: refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample. (NELAC)

PROFICIENCY TESTING: a means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (NELAC) (2.1)

PROFICIENCY TESTING PROGRAM: the aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting

of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (NELAC)

PROFICIENCY TEST SAMPLE (PT): a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria. (QAMS)

QUALITY ASSURANCE: an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence. (QAMS)

QUALITY ASSURANCE (PROJECT) PLAN (QAPP): a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

QUALILTY CONTROL: the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. (QAMS)

QUALITY CONTROL SAMPLE: a sample used to assess the performance of all or a portion of the measurement system. QC samples may be Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking.

QUALITY MANUAL: a document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (NELAC)

QUALITY SYSTEM: a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC. (ANSI/ASQC E-41994)

REAGENT GRADE: Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

REAGENT WATER: Water that has been generated by any method which would achieve the performance specifications for ASTM Type II water. For organic analyses, see the definition of organic-free reagent water.

REFERENCE MATERIAL: a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (IS) Guide 30-2.1)

REFERENCE STANDARD: a standard, generally of the highest metrological quality available at a given location, from which measurements made at the location are derived. (VIM-6.08)

REPLICATE ANALYSES: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval. (NELAC)

REQUIREMENT: denotes a mandatory specification; often designated by the term "shall". (NELAC)

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage, and disposal. (NELAC)

SAFE DRINKING WATER ACT (SDWA): the enabling legislation, 42 USC 300 f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations. (NELAC)

SAMPLE: Any solution or media introduced into an analytical instrument on which an analysis is performed excluding calibration standards, initials calibration verification check standards, calibration blanks, and continuing calibration verification check standards.

SAMPLE TRACKING: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting, and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of samples (NELAC)

SELECTIVITY: (Analytical chemistry) the capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances. (EPA-QAD)

SENSITIVITY: the capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (NELAC)

SHALL: denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled. (ANSI)

SHOULD: denotes a guideline or recommendation whenever noncompliance with the specification is permissible (ANSI)

SPIKE: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes. (NELAC)

SPLIT SAMPLES: Aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples should be taken for the matrix duplicate analysis. These are usually taken after mixing or compositing and are used to document intra- or inter-laboratory precision.

STANDARD: the document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of NELAC and meets the approval requirements of NELAC procedures and policies. (ASQC)

STANDARD ADDITION: The practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences.

STANDARD METHOD: a test method issued by an organization generally recognized as competent to do so.

STANDARD OPERATING PROCEDURES (SOPs): a written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks. (QAMS)

STANDARDIZED REFERENCE MATERIAL (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method. (EPA_QAD)

SURROGATE: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes. (QAMS)

TRACEABILITY: the property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons. (VIM-6.12)

TRIP BLANK: A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

VALIDATION: the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

VERIFICATION: confirmation by examination and provision of evidence that specified requirements have been met. (NELAC)

> NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.
>
> The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record.

WORK CELL: a well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented. (NELAC)

WORKING RANGE: the difference between the Limit of Quantitation and the upper limit of measurement system calibration.

SOURCES:

40CFR Part 136

American Society for Quality Control (ASQC), Definitions of Environmental Quality Assurance Terms, 1996

American National Standards Institute (ANSI), Style Manual for Preparation of Proposed American National Standards, Eighth Edition, March 1991

ANSI/ASQC E4, 1994

ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for Radiobioassay Laboratories

International Standards Organization (ISO) Guides 2, 30, 8402

International Vocabulary of Basic and General Terms in Metrology (VIM): 1984. Issued by BIPM, IEC, ISO, and OIML

National Institute of Standards and Technology (NIST)

National Environmental Laboratory Accreditation Conference (NELAC), July 1998 Standards

Random House College Dictionary

US EPA Quality Assurance Management Section (QAMS), Glossary of Terms of Quality Assurance Terms, 8/31/92 and 12/6/95

US EPA Quality Assurance Division (QAD)

Webster's New World Dictionary of the American Language

21. Use of Accreditation

21.1. The laboratory will display the most recent NELAP accreditation certificate.

21.2. The laboratory will ensure that statements made concerning NELAP accreditation fields of testing and accreditation status are accurate.

21.3. If the laboratory chooses to use the NELAC//NELAP logo or accrediting authority's name, the phrase "NELAC accredited" and the laboratory's accreditation number will be included. This applies to catalogs, advertisements, business solicitations, proposals, quotations and Analytical Reports.

21.4. The laboratories use of NELAP certificate, NELAP accreditation status and/or NELAC/NELAP logo do not constitute or imply endorsement by the accrediting authority and should never be construed as endorsement by the accrediting authority.

22. References

National Environmental Laboratory Accreditation Conference (NELAC), Quality Systems, Approved July 12, 2002.

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992. (This edition is utilized for the analysis of samples requiring compliance with Illinois Drinking Water Laboratory Certificate Program.)

"Standard Methods for the Examination of Water and Wastewater", 19th Edition, 1995.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substance in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"USEPA Contract Laboratory Program, Statement of Work for Organics Analysis," OLM01.0, Including Rev. OLM01.1 (December 1990) and Rev. OLM01.2 (January 1991).

"Laboratory Data Validation , Functional Guidelines for Evaluating Inorganics Anayses", USEPA, July, 1988.

"Laboratory Data Validation , Functional Guidelines for Evaluating Organics Analyses", USEPA, February, 1988.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

"Quality Assurance Principles for Analytical Laboratories", 2nd Ed., 1991.

"Manual for the Certification of Laboratories Analyzing Drinking Water," 4th Edition, March 1997.

"Quality Assurance for Chemical Measurement," John Keenan Taylor, Lewis Publishers Inc., 1987.

NELAC 2003 Standard

"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.

"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

First Environmental Laboratories

Standard Operating Procedure

Title: VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC/MS)

Matrices: aqueous, drinking water (non SDWA compliant), solids, chemical waste

Regulatory References:

SW-846, 3rd Edition, December 1996, Method 8260B
SW-846, 3rd Edition, December 1996, Method 5030B
SW-846, 3rd Edition, Method 5035A
EPA 600/4-82-057, July 1982, Method 624

Regulatory Limits: NA

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. Samples should be stored at 4°C prior to shipment.

Preservation Requirements: Aqueous samples are preserved in accordance with method 5030 and/or method 624. Each 40-mL sample vial is preserved with 0.5 mL of 50% HCL. Soil samples are collected and preserved in accordance with method 5035A. This method specifies several procedures for the collection and preservation of samples for either low-level or high-level analysis. 1.) Samples may be collected in empty sealed vials, cooled to 4 +/- 2°C for no more than 48 hours, then frozen upon receipt by the laboratory (-7 to –20°C). 2.) Samples may be collected in vials preserved with sodium bisulfate and/or methanol and then cooled to 4 +/- 2°C. 3.) Samples may be collected in empty sealed vials and frozen in the field. 4.) Samples for high-level analysis may be collected in bulk (e.g. 4-ounce jar) and cooled to 4 +/- 2°C. Specific details can be found in method 5035A Appendix A.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples are stored prior to analysis at 4°C or frozen upon receipt at -7 to –20°C as appropriate to the sample matrix and/or field preservation technique. Refrigerators and freezers that are dedicated to the storage of samples for volatiles analysis are located in the volatiles lab.

Container: 40mL glass vial with teflon-lined septa for aqueous matrices and 4 oz or method 5035A compliant container for solid matrices. 5035A compliant containers consist of either 3 empty tared 40mL

vials, or 2 tared vials containing 5mLs of 20% sodium bisulfate and 1 vial containing 10 mLs methanol. All 5035A containers must be pre-weighed and the tare weight indicated on the vial.

Single Analysis Sample Volume: 5 mL or 1 to 5g.

Holding Time: 14 days for preserved samples (7 days for unpreserved aqueous samples). 48 hours for unpreserved, unfrozen soil samples.

(Range) Reporting Limit: 1.0 ug/L – 200 ug/L; 5.0 ug/kg – 200 ug/kg
The range may be extended by dilution. Individual routine reporting limits are summarized in Table 1.

Summary of Method:

Method 8260 and 624 are used to determine volatile organic compounds in a variety of matrices. This SOP is applicable to nearly all types of samples, regardless of water content, including various air sampling trapping media, ground and surface water, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils, and sediments.

This SOP meets the requirements of both method 8260B and method 624 unless otherwise noted in the text of the document or in the summary tables in Section 6.

The compounds listed in table 1 can be determined by this method. Not all of these compounds are included in the routine calibration mixture.

	Reporting Limit (RL)	
Analyte	**Aqueous ug/L**	**Non-Aqueous ug/kg**
Acetone	100	100
Acetonitrile	100	100
Acrolein	100	100
Acrylonitrile	100	100
Allyl chloride	5.0	5.0
Benzene	5.0	5.0
Bromobenzene	5.0	5.0
Bromochloromethane (chlorobromomethane)	5.0	5.0
Bromodichloromethane	1.0	5.0
Bromoform	1.0	5.0
Bromomethane	5.0	10.0
n-Butanol	100	100
2-Butanone (Methyl Ethyl Ketone)	10.0	10.0
n-Butylbenzene	5.0	5.0
sec-Butylbenzene	5.0	5.0

Analyte	Aqueous ug/L	Non-Aqueous ug/kg
tert-Butylbenzene	5.0	5.0
Butyl chloride (1-Chlorobutane)	5.0	5.0
Carbon disulfide	5.0	5.0
Carbon tetrachloride	5.0	5.0
Chloroacetonitrile	PP	PP
Chlorobenzene	5.0	5.0
Chloroethane	10.0	10.0
2-Chloroethyl vinyl ether	10.0	10.0
Chloroform	1.0	5.0
Chloromethane (Methyl chloride)	10.0	10.0
o-Chlorotoluene	5.0	5.0
p-Chlorotoluene	5.0	5.0
Chlorodibromomethane (Dibromochloromethane)	1.0	5.0
1,2-Dibromo-3-Chloropropane (DBCP)	10.0	10.0
1,2-Dibromoethane	5.0	5.0
Dibromomethane (Methylene Bromide)	5.0	5.0
1,2-Dichlorobenzene	5.0	5.0
1,3-Dichlorobenzene	5.0	5.0
1,4-Dichlorobenzene	5.0	5.0
trans-1,4-Dichloro-2-butene	10.0	10.0
Dichlorodifluoromethane	5.0	5.0
1,2-Dichloroethane	5.0	5.0
1,1-Dichloroethane	5.0	5.0
1,1-Dichloroethene	5.0	5.0
cis-1,2-Dichloroethene	5.0	5.0
trans-1,2-Dichloroethene	5.0	5.0
2,2-Dichloropropane	5.0	5.0
1,2-Dichloropropane	5.0	5.0
1,3-Dichloropropane	5.0	5.0
1,1-Dichloro-2-propanone (1,1-Dichloroacetone)	PP	PP
1,1-Dichloropropene	5.0	5.0
cis-1,3-Dichloropropene	1.0	5.0
trans-1,3-Dichloropropene	1.0	5.0
Ethyl acetate	100	100
Ethylbenzene	5.0	5.0
Ethylene dibromide (EDB)(1,2-Dibromoethane)	10.0	10.0
Ethyl ether	50.0	50.0
Ethyl methacrylate	10.0	10.0
Heptane	5.0	5.0

Analyte	Aqueous ug/L	Non-Aqueous ug/kg
Hexachlorobutadiene	10.0	10.0
Hexachloroethane	10.0	10.0
Hexane	5.0	5.0
2-Hexanone (Methyl Butyl Ketone)	10.0	10.0
Iodomethane (Methyl Iodide)	10.0	10.0
Isopropylbenzene (Cumene)	5.0	5.0
p-Isopropyltoluene (Cymene)	5.0	5.0
Methacrylonitrile	10.0	10.0
Methyl acrylate	10.0	10.0
Methylene chloride (Dichloromethane)	5.0	5.0
Methyl methacrylate	10.0	10.0
4-Methyl-2-pentanone	10.0	10.0
Methyl-t-butyl ether (MTBE)	5.0	5.0
Naphthalene	5.0	5.0
Nitrobenzene	PP	PP
2-Nitropropane	10.0	10.0
Pentachloroethane	100	100
1-Propanol	100	100
2-Propanol (Isopropyl alcohol)	100	100
Propionitrile	10.0	10.0
n-Propylbenzene	5.0	5.0
Pyridine	PP	PP
Styrene	5.0	5.0
1,1,1,2-Tetrachloroethane	5.0	5.0
1,1,2,2-Tetrachloroethane	5.0	5.0
Tetrachloroethylene	5.0	5.0
Tetrahydrofuran	5.0	5.0
Toluene	5.0	5.0
1,2,3-Trichlorobenzene	5.0	5.0
1,2,4-Trichlorobenzene	5.0	5.0
1,1,1-Trichloroethane (Methylchloroform)	5.0	5.0
1,1,2-Trichloroethane	5.0	5.0
Trichloroethylene (Trichloroethene)	5.0	5.0
Trichlorofluoromethane	5.0	5.0
1,2,3-Trichloropropane	5.0	5.0
1,2,4-Trimethylbenzene	5.0	5.0
1,3,5-Trimethylbenzene	5.0	5.0
Vinyl acetate	10.0	10.0
Vinyl chloride	2.0	10.0
m&p-Xylene (isomers co-elute)	5.0	5.0
o-Xylene	5.0	5.0

Table I

PP : Poor purger

There are various techniques by which these compounds may be introduced into the GC/MS system. The more common techniques are purge-and-trap, by Methods 5030 and 624 (aqueous samples), and 5035A (solid and waste oil samples). Method 5000 provides more general information on the selection of the appropriate introduction method.

This SOP can be used to quantitate most volatile organic compounds that have boiling points below 200 deg C.

The reporting limit (RL) for an individual compound is somewhat instrument dependent and also dependent on the choice of sample preparation/introduction method. Using standard quadrapole instrumentation and the purge-and-trap technique, limits are approximately 5 ug/kg (wet weight) for soil/sediment samples, 0.5 mg/kg (wet weight) for wastes, and 5 ug/L for ground water. RLs will be proportionately higher for sample extracts and samples that require dilution or when a reduced sample size is used to avoid saturation of the detector.

This method is restricted to use by, or under the supervision of, analysts experienced in the use of gas chromatograph/mass spectrometers, and skilled in the interpretation of mass spectra and their use as a quantitative tool.

The volatile compounds are introduced into the gas chromatograph by the purge-and-trap method. The analytes are introduced directly to a narrow-bore capillary column for analysis. The column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) interfaced to the gas chromatograph (GC).

Analytes eluted from the capillary column are introduced into the mass spectrometer via a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

The method includes specific calibration and quality control steps that supersede the general requirements provided in Method 8000.

1. Instrumentation / Apparatus / Glassware

1.1. Purge-and-trap device for aqueous and solid samples

Tekmar 3000 and EST EnCon purge and trap devices meet the specifications outlined in methods 8260B and 624.

1.2. Gas chromatography/mass spectrometer/data system

Gas chromatograph – An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection with appropriate interface for sample introduction device.

The system includes all required accessories, including syringes, analytical columns, and gases. The Agilent 5890 or 6890 meets all the specifications required by methods 8260B and 624.

1.3. Gas chromatographic columns

30 m x 0.25 mm ID capillary column coated with ZB-624 (or DB-624), 1.4-um film thickness, or equivalent. (Agilent part number 19091V-402).

Dual purge and trap systems will use a 20 m x 0.18mm ID capillary column coated with DB-624 (or ZB-624) with a 1.0-um film thickness.

Injection port liners (HP Catalog #18740-80200, or equivalent). The analytical column is mounted 1 cm into the liner from the oven side of the injection port, according to manufacturer's specifications.

1.4. Mass spectrometer

Capable of scanning from 35 to 300 amu every 2 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for 4-Bromofluorobenzene (BFB) which meets all of the criteria in Table 6 when 5-50 ng of the GC/MS tuning standard (BFB) are injected through the GC. To ensure sufficient precision of mass spectral data, the desirable MS scan rate allows acquisition of at least five spectra while a sample component elutes from the GC. The Agilent model 5972 and 5973 meet all of the requirements of methods 8260B and 624.

1.5. GC/MS interface

The analytical column is directly coupled into the mass spectrometer ion source.

1.6. Data system

A computer system that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program must be interfaced to the mass spectrometer. The computer must have software that allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available. The Agilent data systems with Enviroquant software meet all of the method requirements.

1.7. Microsyringes –10-, 25-, 50-, 100-, 250- and 1,000-uL (gas-tight).

1.8. Balance - Top-loading, capable of weighing 0.01 g.

1.9. Vials – 5-, and 2-mL, with mini-nert septa valve for standards storage.

1.10. Disposable pipets – Pasteur, 1- and 10- mL graduated.

1.11. Volumetric flasks - Class A - 10-mL, 50-mL, 100-mL, 200-mL and 500-mL, with ground-glass stoppers.

1.12. Spatula - Stainless steel.

Maintenance is performed in accordance with procedures documented in the appropriate maintenance log book.

2. Reagents

2.1. Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

2.2. Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in section one.

2.3. Methanol, CH_3OH – "Purge and Trap" grade quality or equivalent, demonstrated to be free of analytes. NFPA Diamond:

2.4. Hydrochloric acid (1:1 v/v), HCl - Carefully add a measured volume of concentrated HCl to an equal volume of organic-free reagent water. NFPA Diamond:

3. Standards

All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, <u>must</u> be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the appropriate Standards Tracking Log. This unique number will also be applied to the label and the calibration certificate (documentation received from the vendor). This certificate documents the traceability to national standards of measurement and is retained for reference. The tracking log will also contain information on the expiration date of each standard entry.

1.1. Stock solutions

Stock solutions are purchased as certified solutions. Store, with minimal headspace and protected from light, at –10°C or less or as recommended by the standard manufacturer. Standards are returned to the freezer as soon as the analyst has completed mixing or diluting the standards to prevent the evaporation of volatile target compounds.

3.2. Frequency of Standard Preparation

3.2.1. Standards for the permanent gases are monitored frequently by comparison to the initial calibration curve. Fresh standards are prepared if this check exceeds a 20% drift. Standards for gases usually need to be replaced after one week or as recommended by the standard manufacturer. Dichlorodifluoromethane and dichloromethane will usually be the first compounds to evaporate from the standard and should, therefore, be monitored very closely when standards are held beyond one week.

3.2.2. Standards for the non-gases are monitored frequently by comparison to the initial calibration. Fresh standards are prepared if this check exceeds a 20% drift. Standards for non-gases usually need to be replaced after six months or as recommended by the standard manufacturer, unless the acceptability of the standard can be documented. Standards of reactive compounds such as 2-chloroethyl vinyl ether and styrene may need to be prepared more frequently.

1.1. Secondary dilution standards

3.3.1. Using stock standard solutions, prepare secondary dilution standards in methanol containing the compounds of interest, either singly or mixed together. Secondary dilution standards must be stored with minimal headspace and are checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them. Store in a vial with no headspace. Secondary standards for gases are replaced after one week unless the acceptability of the standard can be documented. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations. The analyst should also handle and store standards as stated below and return them to the freezer as soon as standard mixing or diluting is completed to prevent the evaporation of volatile target compounds.

3.3.2. Prepare the following VOA calibration solutions: Dilute the indicated volumes of each mixture to 40.0 mLs in a volumetric flask using "Purge and Trap Grade" Methanol.

Calibration Solution #1:

Catalog Number	Description	Initial Conc	Volume	Final Conc
47427-U	EPA 524.2 Rev 4 Mix	2000 ug/mL	1000 uL	50 ug/mL
4-7406	Iodomethane	2000 ug/mL	1000 uL	50 ug/mL
30431-510	502.2 CAL2000 Megamix	2000 ug/mL	1000 uL	50 ug/mL
47428-U	EPA 524 Rev 4 Ketones Mix	2000 ug/mL	1000 uL	50 ug/mL
4-0017	2-Chloroethyl vinyl ether	5000 ug/mL	400 uL	50 ug/mL
RK30216	Vinyl Acetate Standard	2000 ug/mL	1000 uL	50 ug/mL
ULAMN-803	Acrolein & Acrylonitrile	10000 ug/mL	1000 uL	250 ug/mL
	Hexane and Heptane	2000 ug/mL	1000 uL	50 ug/mL

Table 2

Store with minimal headspace in 2mL or 5mL vials with mini-nert valves and septa. Store in the VOA freezer at -18°C, separate from samples. This solution is replaced every 6 months.

The gases mixture, Supelco #48799-U, is prepared in a separate solution. The gases have a tendency to degrade/evaporate faster than the other compounds and this solution is replaced weekly.

If other analytes, not contained in the defined calibration mixtures, are required for a specific project, a calibration solution should be prepared in a similar manner as described here.

Calibration Solution #2:

Catalog Number	Description	Initial Conc	Volume	Final Conc
48799-U	Volatile Org Cpds Mix 6	2000 ug/mL	1000 uL	50 ug/mL

Table 3

Store with minimal headspace in 2mL or 5mL vials with mini-nert valves and septa. Store in the VOA freezer separate from samples.

3.4. Internal Standard/System Monitoring Compounds Solution (Surrogate standards)

3.4.1. A stock internal standard/surrogate solution in methanol is prepared. Each sample undergoing GC/MS analysis must be spiked with 1.0 uL of the surrogate spiking solution prior to analysis.

3.4.2. Prepare the Internal Standard/System Monitoring Compound (SMC) solution by diluting 1000 uL of Restek Catalog #30074, EPA 8260 Internal Standard Mix (2500 ug/mL each component) and 1000 uL of Restek Catalog #30073 EPA 8260 Surrogate Spike Mix (2500 ug/mL each component), to 10.0 mLs in a volumetric flask with "Purge and Trap" Grade methanol.

3.4.3. The solution is immediately transferred to the Archon autosampler standard vial. The unused portion is stored with minimal headspace in 2mL or 5mL vials with mini-nert valves and septa. Store in the VOA freezer at -18°C, separate from samples. This solution is replaced every 2 months.

3.5. 4-Bromofluorobenzene (BFB) standard

A standard solution containing 25 ng/uL of BFB in methanol is prepared. Prepare the 4-BFB solution by diluting 400 uL of 4-BFB Mix (2500 ug/mL) to 10.0 mLs in a volumetric flask with "Purge and Trap" Grade methanol.

1.1. Calibration standards

3.6.1. There are two types of calibration standards used for this method: initial calibration standards and calibration verification standards. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

3.6.2 Initial calibration standards are prepared at a minimum of five different concentrations from the secondary dilution of stock standards or from a premixed certified solution. Prepare these solutions in organic-free reagent water. At least one of the calibration standards must correspond to a sample concentration at or below that necessary to meet the data quality objectives of the project. The remaining

standards must correspond to the range of concentrations found in typical samples but must not exceed the working range of the GC/MS system. Initial calibration standards are mixed from fresh stock standards and dilution standards when generating an initial calibration curve.

3.6.3. For aqueous and non-aqueous calibrations, prepare the 6-point calibration using the following amounts of calibration solution #1 and #2, as described above, added to 50.0mLs of DI water in a volumetric flask:

Std Conc:	**5.0 ppB**	**10.0 ppB**	**20.0 ppB**	**50.0 ppB**	**100 ppB**	**200 ppB**
	5.0	10.0	20.0	50.0	100	200

Table 4

For non-aqueous calibrations, a 5.0mL aliquot will be transferred to a 40mL vial for analysis. For aqueous calibrations a 40-mL vial will be filled without headspace for analysis.

3.6.4. Analyze the initial calibration curve according to the analysis procedure in Section 5.

3.6.5. Calibration verification standards are prepared at a concentration of 50.0 ug/L. If method 624 is required, the standard is prepared at 20 ug/L. Prepare these solutions in organic-free reagent water.

3.6.6. It is the intent of EPA that all target analytes for a particular analysis be included in the initial calibration and calibration verification standard(s). These target analytes may not include the entire list of analytes for which the method has been demonstrated. However, the laboratory shall not report a quantitative result for a target analyte that was not included in the calibration standard(s).

3.6.7. The calibration standards must also contain the internal standards chosen for the analysis.

1.2. Matrix spiking and laboratory control sample (LCS) standards

3.7.1. Matrix spiking standards are prepared from volatile organic compounds which are representative of the compounds being investigated. At a minimum, the matrix spike must include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The matrix spiking solution must contain compounds that are expected to be found in the types of samples to be analyzed.

3.7.2. The matrix spike solution is purchased "ready to use" from NSI (Catalog #C-420WL 50 ug/mL). This mixture contains 54 of the target compounds from table 1. This same solution may be used as a second source standard to verify the initial calibration curve (ICVS).

3.7.3. Store with minimal headspace in 2mL or 5mL vials with mini-nert valves and septa. Store in the VOA freezer at -18°C, separate from samples. This solution is replaced every 6 months.

3.7.4. Great care must be taken to maintain the integrity of all standard solutions. It is recommended all standards in methanol be stored at –10°C or less, in amber bottles with PTFE-lined screw-caps.

4. Demonstration of Analytical Capability

Prior to the use of this method on analytical samples, the method must be validated with an Initial Demonstration of Method Performance (IDMP) (also known as an Initial Demonstration of Capability (IDC)) and a Method Detection Limit Study (MDL). The IDMP and MDL requirements are summarized in section 6 of this SOP. The determinative procedure in this SOP must be used for the associated IDMP and MDL. The IDMP and MDL are detailed in SOP #110, SOP #106 and SOP #109."

5. Analytical Procedures

5.1. Interferences

5.1.2. Major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The use of non-polytetrafluoroethylene (PTFE) thread sealants, plastic tubing, or flow controllers with rubber components should be avoided, since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of calibration and reagent blanks provide information about the presence of contaminants. When potential interfering peaks are noted in blanks, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter. Subtracting blank values from sample results is not permitted. If reporting values without correcting for the blank results in what the laboratory feels is a false positive result for a sample, the laboratory should fully explain this in text accompanying the uncorrected data.

5.1.2. Contamination may occur when a sample containing low concentrations of volatile organic compounds is analyzed immediately after a sample containing high concentrations of volatile organic compounds. A technique to prevent this problem is to rinse the purging apparatus and sample syringes with two portions of organic-free reagent water between samples. After the analysis of a sample containing high concentrations of volatile organic compounds, one or more blanks should be analyzed to check for cross-contamination. Alternatively, if the sample immediately following the high concentration sample does not contain the volatile organic compounds present in the high level sample, freedom from contamination has been established.

5.1.3. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds, or high concentrations of compounds being determined, it may be necessary to wash the purging device with a soap solution, rinse it with organic-free reagent water, and then dry the purging device in an oven at 105°C. In extreme situations, the entire purge-and-trap device may require dismantling and cleaning. Screening of the samples prior to purge-and-trap GC/MS analysis is highly recommended to prevent contamination of the system.

5.1.4. Many analytes exhibit low purging efficiencies from a 25-mL sample. This often results in significant amounts of these analytes remaining in the sample purge vessel after analysis. After removal of the sample aliquot that was purged, and rinsing the purge vessel three times with organic-free water, the empty vessel is subjected to a heated purge cycle prior to the analysis of another sample in the same purge vessel. This will reduce sample-to-sample carryover.

5.1.5. Special precautions must be taken to analyze for methylene chloride. The analytical and sample storage area is isolated from all atmospheric sources of methylene chloride. Otherwise, random background levels will result. Since methylene chloride will permeate through PTFE tubing, all gas chromatography carrier gas lines and purge gas plumbing is constructed from stainless steel or copper tubing. Laboratory clothing worn by the analyst must be clean, since clothing previously exposed to methylene chloride vapor during liquid/liquid extraction procedures can contribute to sample contamination

5.1.6. Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal of the sample container into the sample during shipment and storage. A trip blank prepared from organic-free reagent water and carried through the sampling, handling, and storage protocols can serve as a check on such contamination.

5.1.7. Direct injection - Some contamination may be eliminated by baking out the column between analyses. Changing the injector liner will reduce the potential for cross-contamination. A portion of the analytical column may need to be removed in the case of extreme contamination. The use of direct injection will result in the need for more frequent instrument maintenance.

5.2. Sample Preservation

5.2.1. See the introductory material to SW-846 Chapter 4, Organic Analytes, Sec. 4.1.

5.2.2. Volatile samples are stored in a refrigerator or freezer dedicated to the storage of volatile samples away from all standards, reagents, food and other contaminating sources. Refrigerators and freezers that are dedicated to the storage of samples for volatiles analysis are located in the volatiles lab.

5.3. Determinative Procedure

Purge-and-trap - This includes purge-and-trap for aqueous samples (Method 5030 and 624) and purge-and-trap for solid samples (Method 5035A). Method 5035A also provides techniques for extraction of high concentration solid and oily waste samples by methanol (and other water-miscible solvents) with subsequent purge-and-trap from an aqueous matrix using Method 5030.

Traditionally, the purge-and-trap of aqueous samples is performed at ambient temperature, while purging of soil/solid samples is performed at 40°C, to improve purging efficiency.

5.3.1. GC/MS Instrument Conditions (Split Injection)

In this technique the desorb line from the Tekmar unit is connected to the GC injection port. The sample is introduced to the narrow bore column using the split injection technique. (These parameters are programmed and saved into a Agilent Enviroquant method file named: *_8260S.M where "*" is the instrument ID letter.) A separate method file is kept for aqueous and non-aqueous sample analyses. The Agilent software stores calibration information as well as the analytical parameters in the Method file. Typically, the method name ending with an "S" will be the non-aqueous method file, and the method name ending with a "W" will be the aqueous method file.

Parameter	Setpoint
Column	ZB-624 or DB-624 20meter
Column ID/Thickness	0.18mm ID 1.0um
Interface	Cap Direct Split Inj.
GC Type	Agilent 5890 Series II/Plus or 6890
Mass Spectrometer	Agilent 5972A or 5973
Tune	BFB Tune + 300v (approx)
Scan Range	35-270 amu
Sampling #	3
Threshold	150
Carrier Gas	Helium
Vacuum Comp.	On
Pressure	16psi @ 35 °C
Constant Flow Mode	1.0 mL/min
Split Flow	25 ml/min
Split Ratio	25:1
Inj. B Temp	220 °C
Detector B Temp	280 °C
Initial Temp	45 °C
Initial Time	1 minute
Rate(1)	18.00 °C /min
Final Temp(1)	190 °C
Final Time(1)	0 min
Rate(2)	25.0 °C /min
Final Temp(2)	220 °C
Final Time(2)	1.50 min
Total GC run time	11.76 min
Purge B	On (during entire run)

Table 5

5.3.2. BFB

Each GC/MS system must be hardware-tuned to meet the criteria in Table 6 for a 5-50 ng injection or purging of 4-bromofluorobenzene (2-uL injection of the BFB standard). Analyses must not begin until these criteria are met.

In the absence of specific recommendations on how to acquire the mass spectrum of BFB from the instrument manufacturer, the following approach has been shown to be useful: The mass spectrum of

BFB may be acquired in the following manner. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished using a single scan no more than 20 scans prior to the elution of BFB. Do not background subtract part of the BFB peak. Alternatively, the analyst may use other documented approaches suggested by the instrument manufacturer.

BFB (4-BROMOFLUOROBENZENE) MASS INTENSITY CRITERIA

m/z	Required Intensity (relative abundance)
50	15 to 40% of m/z 95
75	30 to 60% of m/z 95
95	Base peak, 100% relative abundance
96	5 to 9% of m/z 95
173	Less than 2% of m/z 174
174	Greater than 50% of m/z 95
175	5 to 9% of m/z 174
176	Greater than 95% but less than 101% of m/z 174
177	5 to 9% of m/z 176

Table 6

Use the BFB mass intensity criteria in Table 6 as tuning acceptance criteria.

NOTE: All subsequent standards, samples, MS/MSDs, LCSs, and blanks associated with a BFB analysis must use identical mass spectrometer instrument conditions.

5.3.3. Calibration Curve

A different calibration curve is necessary for aqueous and non-aqueous procedures because of the differences in conditions and equipment. A set of at least five different calibration standards is necessary to meet the requirements of both method 8260 and 624. Calibration must be performed using the sample introduction technique that will be used for samples. For Method 5030 or 624, the purging efficiency for 5 mL of water is greater than for 25 mL. Therefore, develop the standard curve with whichever volume of sample that will be analyzed.

To prepare a calibration standard, add an appropriate volume of a secondary dilution standard solution to an aliquot of organic-free reagent water in a volumetric flask. Use a microsyringe and rapidly inject the alcoholic standard into the expanded area of the filled volumetric flask. Remove the needle as quickly as possible after injection. Mix by inverting the flask three times only. Discard the contents contained in the neck of the flask. Aqueous standards are not stable and are prepared daily. For soil analysis, prepare

the standard in a 5.0 mL gas tight syringe. Then transfer the contents to a 40 mL vial. For aqueous samples, prepare the standards in a 50 mL volumetric flask. Then transfer the contents to a 40 mL vial.

Proceed with the analysis of the calibration standards following the procedure in method 624, 5030 or 5035A.

Update the initial calibration in the Enviroquant method identification file. This will automatically update the response factors that will be used in the quantification of target compounds.

5.3.3.1 System Performance Check Compounds (SPCCs)

A system performance check is made before this calibration curve is used. Five compounds (the System Performance Check Compounds, or SPCCs) are checked for a minimum average response factor. These compounds are chloromethane; 1,1-dichloroethane; bromoform; chlorobenzene; and 1,1,2,2-tetrachloroethane. These compounds are used to check compound instability and to check for degradation caused by contaminated lines or active sites in the system. Example problems include:

Chloromethane is the most likely compound to be lost if the purge flow is too fast.

Bromoform is one of the compounds most likely to be purged very poorly if the purge flow is too slow. Cold spots and/or active sites in the transfer lines may adversely affect response. Response of the quantitation ion (m/z 173) is directly affected by the tuning of BFB at ions m/z 174/176. Increasing the m/z 174/176 ratio relative to m/z 95 may improve bromoform response.

1,1,2,2-Tetrachloroethane and 1,1-dichloroethane are degraded by contaminated transfer lines in purge-and-trap systems and/or active sites in trapping materials

The minimum mean response factors for the volatile SPCCs are as follows:

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

5.3.3.2. Calibration Check Compounds (CCCs)

The purpose of the CCCs are to evaluate the calibration from the standpoint of the integrity of the system. High variability for these compounds may be indicative of system leaks or reactive sites on the column. Meeting the CCC criteria is not a substitute for successful calibration of the target analytes using one of the approaches described in Sec. 7.0 of Method 8000.

The RSD for each individual Calibration Check Compound (CCC) must be equal or less than 30%. If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration standards, refer to Sec. 7.0 of Method 8000. The CCCs are:

1,1-Dichloroethene	Toluene
Chloroform	Ethylbenzene
1,2-Dichloropropane	Vinyl chloride

If an RSD of greater than 30% is measured for any CCC, then corrective action to eliminate a system leak and/or column reactive sites is necessary before reattempting calibration.

5.3.3.3. Evaluation of Retention Times

The relative retention times of each target analyte in each calibration standard must agree within 0.06 relative retention time units. Late-eluting compounds usually have much better agreement.

5.3.3.4. Linearity of Target Analytes

If the RSD of any target analyte is 15% or less, then the response factor is assumed to be constant over the calibration range, and the average response factor may be used for quantitation. If the RSD of any target analyte is greater than 15%, a linear regression or quadratic regression may be used for quantitation. After the initial calibration is performed, update the instrument method file with the appropriate quantitation method (average RF, linear regression or quadratic regression). Document the method used by printing a method compound list and including this form with the daily QC file.

5.3.4. Initial Calibration Verification

Immediately after a successful initial calibration curve, the curve must be verified with a second source standard. This initial calibration verification standard (ICVS) is prepared from a source other than that used for the initial calibration according to section 3.7 of this SOP. Optimally, the ICVS should contain all of the compounds in the initial calibration. It must contain 90% of the compounds in the calibration.

Each compound in the ICVS must agree within +/- 15% of the true value. If a 50 ug/L ICVS is used, the recovery of each component must be between 42.5 and 57.5 ug/L.

5.3.5. Daily Calibration Verification

Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

1. Prior to the analysis of samples or calibration standards, inject or introduce 5-50 ng of the 4-bromofluorobenzene standard into the GC/MS system. The resultant mass spectra for the BFB must meet the criteria given in Table 6 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

2. The initial calibration curve is verified once every 12 hours prior to sample analysis, using the same introduction technique as used for samples. This is accomplished by analyzing a 50 ug/L calibration standard (Use a 20 ug/L standard if method 624 is required). The results from the calibration standard analysis must meet the verification acceptance criteria provided in table 7 below. This verification includes evaluation of the SPCC and CCC compounds (when method 8260 is required). Each SPCC compound in the calibration verification standard must meet its minimum response factor. This is the same check that is applied during the initial calibration. If the percent difference or drift for each CCC is less than or equal to 20%, the initial calibration is assumed to be valid. If the criterion is not met (i.e., greater than 20% difference or drift), for any one CCC, then corrective action must be taken prior to the analysis of samples. If the CCC's are not included in the list of analytes for a project, and therefore not included in the calibration standards, then all analytes must meet the 20% difference or drift criterion.

Continuing Calibration Verification Criteria

Parameter	Method 624 CCVS Range*	Method 8260 CCVS Range**	Method 8260 SPCC Min. RRF
Benzene	12.8 - 27.2		
Bromodichloromethane	13.1 - 26.9		
Bromoform	14.2 - 25.8		0.10
Bromomethane	2.8 - 37.2		
Carbon tetrachloride	14.6 - 25.4		
Chlorobenzene	13.2 - 26.8		0.30
Chloroethane	7.6 - 32.4		
2-Chloroethylvinyl ether	D - 44.8		
Chloroform	13.5 - 26.5	40.0 – 60 0	
Chloromethane	D - 40.8		0.10
Dibromochloromethane	13.5 - 26.5		
1,2-Dichlorobenzene	12.6 - 27.4		
1,3-Dichlorobenzene	14.6 - 25.4		
1,4-Dichlorobenzene	12.6 - 27.4		
1,1-Dichloroethane	14.5 - 25.5		0.10
1,2-Dichloroethane	13.6 - 26.4		
1,1-Dichlorothene	10.1 - 29.9	40.0 – 60.0	
trans-1,2-Dichloroethene	13.9 - 26.1		
1,2-Dichloropropane	6.8 - 33.2	40.0 – 60.0	
cis-1,3-Dichloropropene	4.8 - 35.2		
trans-1,3-Dichloropropene	10.0 - 30.0		
Ethyl benzene	11.8 - 28.2	40.0 – 60.0	
Methylene chloride	12.1 - 27.9		
1,1,2,2-Tetrachloroethane	12.1 - 27.9		0.30

Parameter	Method 624 CCVS Range*	Method 8260 CCVS Range**	Method 8260 SPCC Min. RRF
Tetrachloroethene	14.7 - 25.3		
Toluene	14.9 - 25.1	40.0 – 60.0	
1,1,1-Trichloroethane	15.0 - 25.0		
1,1,2-Trichloroethane	14.2 - 25.8		
Trichloroethene	13.3 - 26.7		
Trichlorofluoromethane	9.6 - 30.4		
Vinyl chloride	0.8 - 39.2	40.0 – 60.0	

Table 7

* Concentration measured in CCVS sample, in µg/L (Spike amount = 20 ug/L).
** Concentration measured in CCVS sample, in µg/L (Spike amount = 50 ug/L).
D = Detected; result must be greater than zero. SPCC not applicable for method 624.

3. A method blank is analyzed after the calibration standard, or at any other time during the analytical shift, to ensure that the total system (introduction device, transfer lines and GC/MS system) is free of contaminants. If the method blank indicates contamination, then it may be appropriate to analyze a solvent blank to demonstrate that the contamination is not a result of carryover from standards or samples

5.3.6. Internal Standard Retention Time

The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

5.3.7. Internal Standard Response

If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to + 100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required. If the EICP area for any of the internal standards in the subsequent samples changes by a factor of two (-50% to + 100%) from that in the CCVS, those samples must be re-analyzed. If appropriate, the mass spectrometer must be inspected for malfunctions and corrections must be made.

5.4. Sample Preparation

All samples and standard solutions must be allowed to warm to ambient temperature before analysis. Set up the introduction device as outlined in the method of choice.

The process of taking an aliquot destroys the validity of remaining volume of an aqueous sample for future analysis by introducing headspace to the sample vial.

5.4.1. Aqueous Samples

With the Varian Archon, EST Centurion or EST 8100 autosampler, the 40 mL sample vial that was collected in the field is placed directly on the autosampler tray. The autosampler is then instructed to withdraw a 5 mL aliquot for analysis. The internal standard and surrogate solution is automatically added by the autosampler.

The following procedure may be used to dilute aqueous samples for analysis of volatiles. All steps must be performed without delays, until the diluted sample is in the 40 mL vial.

1. Dilutions may be made in volumetric flasks (50- to 100-mL). Select the volumetric flask that will allow for the necessary dilution. Intermediate dilution steps may be necessary for extremely large dilutions.

2. Calculate the approximate volume of organic-free reagent water to be added to the volumetric flask, and add slightly less than this quantity of organic-free reagent water to the flask.

3. Inject the appropriate volume of the original sample from the syringe or volumetric pipet into the flask. Dilute the sample to the mark with organic-free reagent water. Cap the flask, invert, three times. Repeat the above procedure for additional dilutions.

4. Fill a 40-mL vial with the diluted sample, making sure there is no headspace when the cap is applied.

MS/MSD/LCS: Add 50 uL of the matrix spike solution to a 50-mL aliquot of the sample chosen for spiking in a 50-mL volumetric flask. Disregarding any dilutions, this is equivalent to a concentration of 50 ug/L of each matrix spike standard.

Follow the same procedure in preparing the laboratory control sample (LCS), except the spike is added to a clean matrix. (e.g. Laboratory DI water.)

5.4.2. Non-Aqueous Samples Low Concentration Procedure

There are 3 types of sample preservatives all using 40-mL vials; 1.) a frozen sample, 2.) a refrigerated sample in sodium bisulfate and, 3.) an untreated refrigerated sample that has been collected in the last 48 hours. Remove the 40-mL vial containing the sample from the freezer or refrigerator. Weigh the sample and vial, subtract the tare weight and record the sample weight directly on the vial. This vial is then

placed directly on the autosampler tray. The autosampler is then instructed to add reagent water to the vial so that the final volume of water in the vial is 10 mLs. The internal standard and surrogate solution is added along with the reagent water. The Archon will then purge the soil sample within the 40 mL vial, while heating the sample to 40°C and activating the stir bar motor. It may be useful to indicate the type of preservation used on the sample raw data. (i.e. indicate if sodium bisulfate, refrigeration or freezing was used.)

5.4.3. Non-Aqueous Samples High Concentration Procedure

The following procedure is used to dilute non-aqueous samples for analysis of volatiles. All steps must be performed without delays, until the diluted sample is in the 40 mL vial.

There are 3 possible ways that samples may be methanol preserved: 1.) An aliquot of sample is added to a methanol preserved vial in the field. 2.) Methanol is added to one of the frozen vials in the laboratory. 3.) An aliquot of sample is taken from a bulk sample (usually in a 4 oz jar), weighed and methanol added in the laboratory.

Weigh the field methanol-preserved vial on the top pan balance. Determine the weight of the sample by subtracting the tare weight. If a frozen unpreserved vial is being used, first thaw the sample, then weigh the vial and subtract the tare weight before the methanol is added. If no methanol-preserved vial has been collected in the field, weigh approximately 10 grams of sample into a 40 mL vial. Add 10 mLs of methanol, agitate for 2 minutes and then allow the extract to settle. (A centrifuge may be used to expedite the settling.)

Withdraw a 1.0 mL aliquot of the methanol extract and dilute it to 50 mLs in a volumetric flask. Cap the flask, invert, three times. Repeat above procedure for additional dilutions. (If a further dilution is required, use a smaller volume of the methanol extract.)

Fill a 40-mL vial with the diluted sample, making sure there is no headspace when the cap is applied. Analyze this dilution using the same procedure as an aqueous sample.

MS/MSD/LCS: Add 5 uL of the matrix spike solution to 5.0-mL organic-free water and add to a pre-weighed aliquot of the sample chosen for spiking. Disregarding any dilutions, this is equivalent to a concentration of 50 ug/kg of each matrix spike standard.

Follow the same procedure in preparing the laboratory control sample (LCS), except the spike is added to a clean matrix.

> NOTE: It may be a useful diagnostic tool to monitor internal standard retention times and responses (area counts) in all samples, spikes, blanks, and standards to effectively check drifting method performance, poor injection execution, and anticipate the need for system inspection and/or maintenance.

If the initial analysis of the sample or a dilution of the sample has a concentration of any analyte that exceeds the initial calibration range, the sample must be reanalyzed at a higher dilution. Typically, this is 200 ug/L for most compounds.

5.5. Qualitative analysis

The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined to be the three ions of greatest relative intensity, or any ions over 30% relative intensity if less than three such ions occur in the reference spectrum. Compounds are identified as present when the following criteria are met.
The Enviroquant software method is set-up to meet the specifications outlined in method 8260B, section 7.6.1.

For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted.

5.6. Quantitative analysis

Sample calculations for volatile analyses are made according to the following procedure:

5.6.1. The target compound concentrations are calculated by the internal standard method. The relative response factor (RRF) from the multi-point calibration is used to calculate the concentration in the sample.

$$\text{Sample Concentration} = \frac{(\text{Area of Compound})\ (\text{Amt IS})\ (\text{Final Volume})}{(\text{Area IS})\ (\text{RRF})\ (\text{Initial Volume or Weight})}$$

The automatic Agilent quantitation algorithm will report the calculation above for water samples on the report summary page. The soil sample concentration must be calculated manually using the following equation:

$$\text{Sample Concentration (dry weight)} = \frac{(\text{Reported Concentration})\ (5)}{(\text{Weight of sample purged})\ (\%\ \text{Total Solids}/100)}$$

(Note: The multiplier "5" in the numerator is to convert the concentration, which is calculated as micrograms per Liter, to total nanograms.)

5.6.2. High Concentration (Medium Level) Soil Calculation:

Sample calculations for volatile soil analyses are made according to the following procedure:

The target compound concentrations are calculated by the internal standard method. The relative response factor (RRF) from the multi-point calibration is used to calculate the concentration in the sample.

$$\text{Sample Concentration} = \frac{(\text{Area of Compound})\ (\text{Amt IS})\ (\text{Volume of total extract in uL})}{(\text{Area IS})\ (\text{RRF})\ (\text{Volume of purged extract})(\text{Initial Weight})}$$

The automatic Agilent quantitation algorithm will report the calculation above for water samples on the report summary page. The soil sample concentration must be calculated manually using the following equation:

$$\text{Sample Concentration (dry weight)} = \frac{(\text{Reported Concentration, ug/L})\ (5)\ (\text{Volume of total extract in uL})}{(\text{Volume extract added for purging, uL})(\text{Sample Weight})(\%\text{TS}/100)}$$

5.7. Reporting Limits

Reporting limits are normally 3-10 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit. The routine reporting limits are summarized in Table 1 of this SOP.

5.8. Expression of Results for Solid Samples

Soils are to be expressed on a dry weight basis as ug/kg. The exception would be a solid material submitted for RCRA compliance, in which case the results are expressed on a wet weight basis.

5.9. Evaluate Matrix Spike and Laboratory Control Samples

The matrix spike (MS) and laboratory control spikes (LCS) are evaluated according to the criteria outlined in SOP #110 sections 6.5 and 6.4. The control limits are updated according to SOP #110 and made available to the analyst for MS/MSD evaluation. If method 624 is being utilized, the recovery values in table 8 below must be used in evaluating the spiked samples.

No action is taken on out of control MS/MSD data alone to qualify an entire batch. If the MS/MSD data is outside acceptance limits, check the %R or RPD of the LCS. If the LCS is in control, the procedure is in control and the data is acceptable.

Summarize the MS/MSD results and include with the raw data in the daily QC package.

Matrix Spike/Laboratory Control Spike Criteria: Aqueous Matrix

Parameter	Method 624 Percent Recovery	Method 8260B Percent Recovery	Method 8260B RPD
Benzene	37 - 151	76 – 138*	20
Bromodichloromethane	35 - 155		
Bromoform	45 - 169		
Bromomethane	D - 242		
Carbon tetrachloride	70 - 140		
Chlorobenzene	37 - 160	77 – 121*	20
Chloroethane	14 - 230		
2-Chloroethylvinyl ether	D - 305		
Chloroform	51 - 138		
Chloromethane	D - 273		
Dibromochloromethane	53 - 149		
1,2-Dichlorobenzene	18 - 190		
1,3-Dichlorobenzene	59 - 156		
1,4-Dichlorobenzene	18 - 190		
1,1-Dichloroethane	59 - 155		
1,2-Dichloroethane	49 - 155		
1,1-Dichlorothene	D - 234	86 – 154*	20
trans-1,2-Dichloroethene	54 - 156		
1,2-Dichloropropane	D - 210		
cis-1,3-Dichloropropene	D - 227		
trans-1,3-Dichloropropene	17 - 183		
Ethyl benzene	37 - 162		
Methylene chloride	D - 221		
1,1,2,2-Tetrachloroethane	46 - 157		
Tetrachloroethene	64 - 148		
Toluene	47 - 150	83 – 128*	20
1,1,1-Trichloroethane	52 - 162		

Parameter	Method 624 Percent Recovery	Method 8260B Percent Recovery	Method 8260B RPD
1,1,2-Trichloroethane	52 - 150		
Trichloroethene	71 - 157	69 – 140*	20
Trichlorofluoromethane	17 - 181		
Vinyl chloride	D - 251		

Table 8
D = Detected; result must be greater than zero.
* - These values represent typical statistical recovery ranges. This method requires updates based upon statistical analysis of laboratory data.

5.10. Evaluate System Monitoring Compounds (Surrogates)

The system monitoring compounds (surrogates) are evaluated according to the criteria outlined in SOP #110 section 6.7. The control limits are updated according to SOP #110 and made available to the analyst for sample evaluation. If a system monitoring compound recovery is outside control limits, the sample is to be re-analyzed. If the duplicate data is also outside acceptance limits, the procedure is in control, there is a sample matrix effect and the data is acceptable.

If there is an obvious matrix effect, such as the presence of large amounts of petroleum hydrocarbons, and the surrogates are biased high, the analyst may elect not to re-analyze the sample. In this situation, a re-analysis could further contaminate the analytical system, and the analyst's judgment is sufficient to determine if the out of control situation was caused by the sample matrix.

6. Summary of Quality Control Indicators – Method 8260 (non-italicized) and Method 624 (italicized)

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement) See Table 9 Notes 1	Initial Corrective Action	Final Action / Data Qualification See Table 9 Notes 3
Method Detection Limit Study (MDL) See MDL SOP #109 for details See Table 9 Notes 2	8260: Initial method validation and each time there is a significant change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis. *624:Same*	8260: The calculated MDL must be greater than 1/10th the MDL spiking concentration and greater than "0", and the MDL spiking concentration must be greater than the calculated MDL. Minimum of 7 replicates. *624: Same*	Re-analyze and re-process MDL for analytes that fail to meet acceptance criteria.	Do not report results below the MDL.
Initial Demonstration of Capability (IDC) See IDC/IDMP SOP #106 for details	8260: Initial method validation and each time there is a significant change in the instrumentation, personnel, matrix or test method that affects the sensitivity of the analysis. *624:Same*	8260: %R = 70-130 *624: See Table 5 within method 624*	Re-analyze and re-process the IDC for analytes that fail to meet acceptance criteria.	IDC/IDMP criteria must be met prior to sample analysis.
System Tuning Compound	8260: At the start of every 12 hour sequence *624. Same*	8260: Table 6 (Section 5.3.2.) *624. Same*	Re-tune mass spectrometer electronics	Sample analysis must not begin until criteria are met
Initial Calibration Curve	8260: referenced – performed at least annually *624:Same*	CCCs must be <30% RSD and SPCC > specified RRF *624:No criteria.*	Identify problem(s) and re-analyze calibration curve.	Sample analysis must not begin until criteria are met.
Initial Calibration Verification (ICVS) 2nd source concentration =	8260: immediately following the calibration curve *624: No criteria*	8260: ± 15% / As supplied by manufacturer (at 95% confidence Level) *624: No criteria*	Re-evaluate the calibration curve to verify that all criteria have been met.	Data can only be released for analytes that have passed the ICVS criteria

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement) See Table 9 Notes 1	Initial Corrective Action	Final Action / Data Qualification See Table 9 Notes 3
Continuing Calibration Verification Standard (CCVS) concentration = 50 ppb	8260: every 12-hour sequence prior to sample analysis. *624: Same; Concentration is 20 ug/L*	8260: CCCs must be less than 20% difference from initial calibration *624: 624 target cpds must meet limits in table 7*	Inspect instrument for cause(s) and re-analyze calibration standard.	Data can only be released for analytes that have passed the ICVS criteria.
Method Blank See Table 9 Notes 4	8260: every 12 hour sequence following the CCVS *624:Same*	8260: Less than the reporting limit. If MB and samples have hits > RL, then MB must be <10% of sample concentration. *624: Same*	Check for contamination sources and re-analyze blank.	The concentration of a targeted analyte in the blank is at or above the reporting limits, AND is greater than 1/10 of the amount measured in any sample.
Laboratory Control Standard (LCS) concentration = 50 ppb	8260: per batch of samples *624: Not required* See Table 9 Notes 5	8260: % Recovery = ±3 std dev of historical data set for the control limit. *624: Not applicable*	Determine cause of problem and re-prepare and re-analyze the affected samples.	Results of analytes failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) concentration = 50 ppb	8260: per batch of samples per matrix *624:Same (only MS required)* See Table 9 Notes 5 & 6 Sample selection is arbitrary.	8260: % Recovery = ±3 std dev of historical data set for the control limit. *624:624 target cpds must meet limits in Table 8.*	Evaluate the LCS with respect to the MS/MSD. If the LCS was acceptable, evaluate the sample for matrix interferences.	The information from the MS/MSD is sample/matrix specific and is not normally used to determine the validity of an entire batch.
Surrogate or System Monitoring Compounds	8260: every analytical sample. *624: Same*	8260: % Recovery = ±3 std dev of historical data set for the control limit. *624:Use Same Limits*	Re-analyze sample to check for matrix effect.	Results of analyses failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file. The affected sample data needs to be qualified appropriately.
Internal Standard Areas	8260: every analytical sample *624:Same*	8260: Areas must be +/- 50% of the CCVS internal standards. *624: Same*	Re-analyze sample to check for matrix effect.	Results of analyses failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the data file.

Table 9

Table 9 Notes:

1. If statistical control limits have not been determined, then the specification is utilized for data assessment until sufficient data is collected to determine statistical control limits.

2. Detection Limit

- Detection limit shall be initially determined for the compounds of interest in each test method in a matrix in which there are not target analytes nor interferences at a concentration that would impact the results or the detection limit must b determined in the matrix of interest.
- Detection limits must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
- All sample processing steps of the analytical method shall be included in the determination of the detection limit.

3. If a QCI fails to meet accept criteria, the analyst will prepare a case narrative documenting the failure and the associated decisions regarding reanalysis vs. acceptance of the data. The case narrative will be added to the project file. Project management will review case narratives during the preparation of the final report and make final decisions regarding data flagging requirements.

4. Definition of Method Blank: (per NELAC Glossary 2002 Standard) a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentration that impact the analytical results for sample analyses.

5. Definition of Batch· (per NELAC Glossary 2002 Standard) environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

6. Definition of Matrix· (per NELAC Glossary 2002 Standard) the substrate of a test sample.

- Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.
- Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
- Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.
- Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

6.1. Method Performance

Method performance data can be found in SW-846, 3rd Edition, December 1996 and it's updates, Method 8260B Section 9.0. and Tables 1 – 31. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP)."

7. Notes

7.1. Tips and Hints

The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard is evaluated to determine if the chromatographic system is operating properly. Questions that are asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed), recalibration of the system must take place.

Flow diagrams and graphs can be found in SW-846, 3rd Edition, December 1996 and it's updates, Method 8260B p. 86.

7.2 Method Modifications

Methods 624 and 8260 describe a procedure to withdraw a 5 mL aliquot from the sampling containers using gas-tight syringes. Advancements in autosampler instrument design now make that unnecessary. The autosampler equipment itself withdraws the 5 mL aliquot and automatically adds internal standard and surrogate spiking solutions.

8. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to the Section 20. of the Quality Assurance Manual.

9. Safety

The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review electronically. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

10. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

11. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan, SOP #901, "Sample Disposal," and SOP #902, "Waste Disposal."

12. References

The analyst is required to have read and understood various supporting documents including regulatory method references, First Environmental's Quality Assurance Manual, First Environmental's Chemical Hygiene Plan, and non-method SOPs that support QA activities.

SOP #106, "Initial Demonstration of Capability / Initial Demonstration of Method Performance."

SOP #109, "Method Detection Limits."

SOP #110, "Summary of Quality Control Indicators – Organics Analyses." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.

SOP #112, "Statistical Control."

SOP #114, "Calibration Curves – Organics." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.

SOP #118, "Measurement Traceability & Calibration."

SOP #123, "Sample Instructions & Materials."

SOP #901, "Sample Disposal"

SOP #902, "Waste Disposal"

First Environmental's Quality Assurance Manual

First Environmental's Chemical Hygiene Plan

SW-846 method 5035A Appendix A and method 5030 provide further information concerning sample preparation

13. Approvals

Reviewed for Technical Accuracy by: _____

Reviewed for Quality Assurance Compliance by: _____

Implementation Date: 01/20/05

End Use Date: _____

First Environmental Laboratories

Standard Operating Procedure

Title: SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC/MS)

Matrices: aqueous, drinking water (non-SDWA compliant), solids, chemical wastes

Regulatory References:
SW-846, 3rd Edition, December 1996 and its updates, Method 8270C
EPA 600/4-82-057, July 1982, Method 625

Regulatory Limits: Not Applicable (usually project specific).

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal. Samples should be stored at 4°C prior to shipment.

Preservation: Cool, 4°C.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples are stored prior to analysis at 4°C.

Container: 1 Liter amber glass wide-mouth with teflon liner or 32 ounce clear glass wide-mouth with teflon liner (for non-aqueous samples).

Single Analysis Sample Volume: 1000 mL or 30 g.

Holding Time: 14 days for non-aqueous samples; 7 days for aqueous samples.

(Range) Reporting Limit: 10.0 ug/L – 50 ug/L; 330 ug/kg (see Table 1).

Summary of Method:

This method is used to determine the concentration of semivolatile organic compounds in extracts prepared from many types of solid waste matrices, soils, air sampling media and water samples. Direct injection of a sample may be used in limited applications.

This SOP meets the requirements of both method 8270C and method 625 unless otherwise noted in the text of the document or in the summary tables in section 6.

This method can be used to quantitate most neutral, acidic, and basic organic compounds that are soluble in methylene chloride and capable of being eluted, without derivatization, as sharp peaks from a gas chromatographic fused-silica capillary column coated with a slightly polar silicone. Such compounds include polynuclear aromatic hydrocarbons, chlorinated hydrocarbons and pesticides, phthalate esters, organophosphate esters, nitrosamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols, including nitrophenols. See Table 1 for a list of compounds and their reporting limits (Not all of these compounds are included in the routine calibration mixture).

Reporting Limits (RL)

TestName	Aqueous ug/L	Non-Aqueous ug/kg
Acenaphthene	10	330
Acenaphthylene	10	330
Acetophenone	10	330
2-Acetylaminofluorene (2AAF)	20	660
4-Aminobiphenyl	20	660
Aniline	10	330
Anthracene	10	330
Azobenzene	10	330
Benzidine	10	330
Benzo(a)anthracene	10	330
Benzo(a)pyrene	10	90
Benzo(b)fluoranthene	10	330
Benzo(ghi)perylene	10	330
Benzo(k)fluoranthene	10	330
Benzoic acid	10	330
Benzyl alcohol	20	330
bis(2-Chloroethoxy)methane	10	330
bis(2-Chloroethyl)ether	10	330
bis(2-Chloroisopropyl)ether	10	330
bis(Chloromethyl)ether	10	330
4-Bromophenyl phenyl ether	10	330
Butyl benzyl phthalate	10	330
Carbazole	10	330
4-Chloroaniline	10	330
Chlorobenzilate	10	330

TestName	Aqueous ug/L	Non-Aqueous ug/kg
4-Chloro-3-methylphenol	20	330
2-Chloronaphthalene	10	330
2-Chlorophenol	10	330
4-Chlorophenyl phenyl ether	10	330
Chrysene	10	330
Di-n-butyl phthalate	10	330
Di-n-octylphthalate	10	330
Diallate	10	330
Dibenzo(a,h)anthracene	10	90
Dibenzofuran	10	330
1,2-Dichlorobenzene	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
3,3'-Dichlorobenzidine	20	660
2,2'-Dichlorodiisopropyl ether	10	330
2,4-Dichlorophenol	10	330
2,6-Dichlorophenol	10	330
Diethyl phthalate	10	330
Dimethoate	20	660
p-(Dimethylamino)azobenzene	10	330
7,12-Dimethylbenz(a)anthracene	10	330
3,3'-Dimethylbenzidine	10	330
2,4-Dimethylphenol	10	330
Dimethyl phthalate	10	330
1,3-Dinitrobenzene(DNB)	20	660
4,6-Dinitro-2-methylphenol	50	1600
4,6-Dinitro-o-Cresol	50	1600
2,4-Dinitrophenol	10	1600
2,4-Dinitrotoluene	10	250
2,6-Dinitrotoluene	10	260
Dinoseb	20	660
Diphenylamine	20	660
1,2-Diphenylhydrazine (as Azobenzene)	10	330
Disulfoton	10	330
Ethyl methanesulfonate	20	660
bis(2-Ethylhexyl)phthalate	5	330
Famphur	ND	ND
Fluoranthene	10	330
Fluorene	10	330
Hexachlorobenzene	10	330
Hexachlorobutadiene	10	330
Hexachlorocyclopentadiene	10	330
Hexachloroethane	5	330
Hexachlorophene	10	1600

TestName	Aqueous ug/L	Non-Aqueous ug/kg
Hexachloropropene	50	1600
Indeno(1,2,3-cd)pyrene	10	330
Isodrin	20	660
Isophorone	10	330
Isosafrole	10	330
Kepone	ND	ND
Methapyrilene	100	1600
Methyl methanesulfonate	10	330
Methyl parathion	10	330
3-Methylcholanthrene	10	330
2-Methylnaphthalene	10	330
3-Methylphenol	10	330
2-Methylphenol	10	330
4-Methylphenol	10	330
3 & 4-Methylphenol	10	330
Naphthalene	10	330
1,4-Naphthoquinone	10	330
1-Naphthylamine	10	330
2-Naphthylamine	10	330
5-Nitro-o-toluidine	10	330
2-Nitroaniline	50	1600
3-Nitroaniline	50	1600
4-Nitroaniline	20	1600
Nitrobenzene	10	260
2-Nitrophenol	10	1600
4-Nitrophenol	50	1600
n-Nitroquinoline-n-oxide	10	330
n-Nitrosodi-n-butylamine	10	330
n-Nitrosodi-n-propylamine	10	330
n-Nitrosodiethylamine	20	660
n-Nitrosodimethylamine	10	330
n-Nitrosodiphenylamine	10	330
n-Nitrosomethylethylamine	10	330
n-Nitrosomorpholine	10	330
n-Nitrosopiperidine	10	330
n-Nitrosopyrrolidine	50	1600
Parathion (Ethyl)	10	330
Pentachlorobenzene	10	330
Pentachloroethane	10	330
Pentachloronitrobenzene	20	660
Pentachlorophenol	10	330
Phenacetin	20	660
Phenanthrene	10	330
Phenol	10	330

TestName	Aqueous ug/L	Non-Aqueous ug/kg
p-Phenylenediamine	10	330
Phorate	10	330
2-Picoline	10	330
Pronamide	10	330
Pyrene	10	330
Pyridine	10	330
Safrole	100	1600
1,2,4,5-Tetrachlorobenzene	10	330
2,3,4,6-Tetrachlorophenol	10	330
Thionazin	20	660
o-Toluidine	10	330
2,4,6-Tribromoanisole	10	100
2,4,6-Tribromophenol	10	100
2,4,6-Trichloroanisole	10	100
1,2,4-Trichlorobenzene	10	330
2,4,5-Trichlorophenol	10	330
2,4,6-Trichlorophenol	10	330
O,O,O-Triethyl phosphorothioate	10	330
1,3,5-Trinitrobenzene(TNB)	10	330

Table 1

In most cases, this method is not appropriate for the quantitation of multicomponent analytes, e.g., Aroclors, Toxaphene, Chlordane, etc., because of limited sensitivity for those analytes. When these analytes have been identified by another technique, this method is appropriate for confirmation of the presence of these analytes when concentration in the extract permits.

The following compounds may require special treatment when being determined by this method:

Benzidine may be subject to oxidative losses during solvent concentration and its chromatographic behavior is poor.

Hexachlorocyclopentadiene is subject to thermal decomposition in the inlet of the gas chromatograph, chemical reaction in acetone solution, and photochemical decomposition.

N-nitrosodimethylamine and pyridine are difficult to separate from the solvent under the chromatographic conditions described (particularly if the column has been shortened by routine maintenance to less than 23 meters).

N-nitrosodiphenylamine decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine.

Pentachlorophenol, 2,4-dinitrophenol, 4-nitrophenol, benzoic acid, 4,6-dinitro-2-methylphenol, 4-chloro-3-methylphenol, 2-nitroaniline, 3-nitroaniline, 4-chloroaniline, and benzyl alcohol are subject to erratic chromatographic behavior, especially if the GC system is contaminated with high boiling material.

Pyridine may perform poorly at the GC injection port temperatures listed in the method. Lowering the injection port temperature may reduce the amount of degradation. The analyst needs to use caution if modifying the injection port temperature as the performance of other analytes may be adversely affected.

In addition, analytes in the list provided above are flagged when there are limitations caused by sample preparation and/or chromatographic problems.

The estimated quantitation limit (EQL) of an individual compound is approximately 330 ug/kg (wet weight) for soil/sediment samples, 1-200 mg/kg for wastes (dependent on matrix and method of preparation), and 10 ug/L for ground water samples (see Table 1). EQLs will be proportionately higher for sample extracts that require dilution to avoid saturation of the detector.

The samples are prepared for analysis by gas chromatography/mass spectrometry (GC/MS) using the appropriate sample preparation and, if necessary, sample cleanup procedures.

The semivolatile compounds are introduced into the GC/MS by injecting the sample extract into a gas chromatograph (GC) with a narrow-bore fused-silica capillary column. The GC column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) connected to the gas chromatograph.

Analytes eluted from the capillary column are introduced into the mass spectrometer via a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

The method includes specific calibration and quality control steps that supersede the general requirements provided in Method 8000.

1. Instrumentation / Apparatus / Glassware

1.1 Gas chromatograph/mass spectrometer system

The analyst should be familiar with the operation and maintenance of the instrumentation, as well as the data acquisition and reduction software before beginning the analysis of samples.

1.2 Gas chromatograph - An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection and all required accessories, including syringes, analytical columns, and gases. The capillary column should be directly coupled to the source. The Hewlett Packard 5890 or 6890 meets all the specifications required by this method.

1.3 Column - 30 m x 0.32 mm ID (or 0.25 mm ID) 0.25 um film thickness silicone-coated fused-silica capillary column (Supelco PTE-5 or equivalent).

1.4 Mass spectrometer : Capable of scanning from 35 to 500 amu every 1 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for decafluorotriphenylphosphine (DFTPP) which meets the

criteria in Table 7 when 1 uL of the GC/MS tuning standard is injected through the GC (50 ng of DFTPP).

GC/MS interface - Any GC-to-MS interface may be used that gives acceptable calibration points at 50 ng per injection for each compound of interest and achieves acceptable tuning performance criteria. For a narrow-bore capillary column, the interface is usually capillary-direct into the mass spectrometer source.

The Hewlett Packard models 5972 and 5973 meet all of the requirements of this method.

1.5 Data system - A computer system should be interfaced to the mass spectrometer. The system must allow the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer should have software that can search any GC/MS data file for ions of a specific mass and that can plot such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software should also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available. The Hewlett Packard data systems with Enviroquant software meet all of the method requirements.

1.6 Volumetric flasks, Class A - Appropriate sizes with ground-glass stoppers.

1.7 Balance - Analytical, capable of weighing 0.0001 g.

1.8 Bottles - glass with polytetrafluoroethylene (PTFE)-lined screw caps or crimp tops.

2. Reagents

2.1. Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

2.2. Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One of SW-846.

3. Standards

Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

Transfer the stock standard solutions into bottles with PTFE-lined screw-caps. Store, protected from light, at –10°C or less or as recommended by the standard manufacturer. Stock standard solutions should

be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

Stock standard solutions must be replaced after 1 year or sooner if comparison with quality control check samples indicates a problem.

3.1. Internal Standard Solution

The internal standards recommended are 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12}. Other compounds may be used as internal standards as long as the requirements given in Sec. 7.3.2 of method 8270C are met.

The internal standard solution for BNA extracts is prepared first by sonicating the ISTD mix (RK#31006 which contains 4000 ug/mL of each ISTD compound) for 10 minutes. If particulates still appear in the bottom of the ISTD ampule, sonicate the solution longer until these particles go into solution. Then dilute 1.0mL of the sonicated ISTD mix to a 2.5mL final volume. This is your spiking solution. Prior to spiking samples or standards, sonicate this solution for 10 minutes. Then spike each 1.0mL of BNA extract with 25.0uLs of this solution. This will result in an extract concentration of 40 ug/mL for each individual ISTD component. Store at –10°C or less when not in use. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

3.2. DFTPP System Check Standard

The DFTPP system check standard is purchased prepared from Supelco (Catalog #4-7387). The standard also contains 50 ng/uL each of 4,4'-DDT, pentachlorophenol, and benzidine to verify injection port inertness and GC column performance. Store at –10°C or less when not in use.

3.3. Semi-Volatile Initial Calibration Preparation

A minimum of five calibration standards should be prepared at five different concentrations. At least one of the calibration standards should correspond to a sample concentration at or below that necessary to meet the data quality objectives of the project. The remaining standards should correspond to the range of concentrations found in actual samples but should not exceed the working range of the GC/MS system. Each standard should contain each analyte for detection by this method. A solution containing all of the target compounds can be obtained commercially prepared. (NSI, Inc. Catalog #C507) This solution contains all of the compounds of interest (including surrogate compounds) at 200 ug/mL.

Prepare a 6-point calibration curve using the NSI solution according to the following (these must be prepared in silanized, 1.5mL amber vials):

Calibration Solution	10 ug/mL	20 ug/mL	50 ug/mL	100 ug/mL	120 ug/mL	160 ug/mL
NSI Cat#C507	50 uL	100 uL	250 uL	500 uL	600	800
uLs Methylene Chloride	950	900	750	500	400	200

Table 2

If the expanded Appendix IX list is to be analyzed, prepare the initial curve at the same concentrations listed in Table 2. Use the NSI K-737 kit and dilute to the concentrations in Table 2.

Prior to analysis add the appropriate amount of ISTD solution to each vial. (25.0uL of a 1600 ug/mL solution will yield 40 ug/mL). To conserve standard solutions, you may use exactly half of the amounts indicated in table 2 above. (Use half of the routine ISTD solution amount.)

It is the intent of the EPA that all target analytes for a particular analysis be included in the calibration standard(s). These target analytes may not include the entire list of analytes (Table 1) for which the method has been demonstrated. However, the laboratory shall not report a quantitative result for a target analyte that was not included in the calibration standard(s). If additional compounds are required for a project, a calibration curve must be prepared using the concentrations described in Table 2.

Each 1-mL aliquot of calibration standard should be spiked with 25 uL of the internal standard solution prior to analysis. All standards should be stored at –10°C or less, and should be freshly prepared once a year, or sooner if check standards indicate a problem. The calibration verification standard should be prepared weekly and stored at 4°C. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

3.4. Surrogate Spike:

The recommended surrogates are phenol-d_6, 2-fluorophenol, 2,4,6-tribromophenol, nitrobenzene-d_5, 2-fluorobiphenyl, and p-terphenyl-d_{14}. Prepare individual surrogate spiking solutions for Base/Neutral and Acid fractions.

Dilute 1.0mL of Acid or Base/Neutral Surrogate Standard Mix to 50.0 mL with Methanol and place into a clean 4-ounce amber jar with a teflon closure. This solution should be stored at 4°C. BNA samples should be spiked with 1.0mL of each solution

Acid Surrogate Standard Mix: Restek catalog #31087; 10,000ug/mL each component, 5mL Vial.
Acid Surrogate Standard Mix: Restek catalog #31063; 10,000ug/mL each component, 1mL Vial.
B/N Surrogate Standard Mix: Restek catalog #31062; 5,000ug/mL each component, 1mL Vial.
B/N Surrogate Standard Mix: Restek catalog #31086; 5,000ug/mL each component, 5mL Vial.

3.5. MS/MSD Spike:

3.5.1 Prepare a combined solution of the B/N and Acid spiking compounds. Dilute 1.0mL each of the B/N Matrix Spike Mix (Restek #31074) and Acid Matrix Spike Mix (Restek #31061) to 50.0mLs in Methanol. BNA samples should be spiked with 1.0mL of this solution. The same standard may be used as the laboratory control standard (LCS). This is a source separate from the calibration standard. The current spiking compounds include:

Acid Compounds	Base-Neutral Compounds
Phenol	1,4-Dichlorobenzene
2-Chlorophenol	n-Nitroso-di-n-propylamine
4-Chloro-3-methylphenol	1,2,4-Trichlorobenzene
4-Nitrophenol	Acenaphthene
Pentachlorophenol	2,4-Dinitrotoluene
	Pyrene

Table 3

3.5.2 Some projects may require the spiking of the specific compounds of interest and the spiking compounds listed in Method 3500 would not be representative of the compounds of interest required for the project. When this occurs, the matrix and LCS spiking standards should be prepared in methanol, with each compound present at a concentration appropriate for the project.

3.5.3 Sometimes a request for the analysis of 8270 pesticide compounds is received. In this case, an additional spike is prepared and added to the LCS and MS/MSD.

Prepare the 8270 pesticide spiking solution with the recommended spike mix listed below.

Custom mix: Supelco quote #20494098, 1,000ug/mL each component, 1mL vial.

Dilute 400uL of the custom mix to 40mL in methanol. BNA MS/MSD samples should be spiked with 1.0mL of this solution. Expiration: 1 year

3.5.4 A spike mixture containing 90% of the compounds reported in method 625 may be required when extracting/analyzing method 625 samples.

3.6. Other Reagents:

Acetone, hexane, methylene chloride, isooctane, carbon disulfide, toluene, and other appropriate solvents should be pesticide quality or equivalent.

4. Analytical Procedures

4.1. Interferences

Raw GC/MS data from all blanks, samples, and spikes must be evaluated for interferences. Determine if the source of interference is in the preparation and/or cleanup of the samples and take corrective action to eliminate the problem.

Contamination by carryover can occur whenever high-concentration and low-concentration samples are sequentially analyzed. To reduce carryover, the sample syringe must be rinsed with solvent between sample injections. Whenever an unusually concentrated sample is encountered, it should be followed by the analysis of solvent to check for cross-contamination.

4.2. Sample Preservation

Samples should be kept cool (4 °C) prior to extraction, and held within the appropriate container.

4.3 Determinative Procedure

4.3.1. GC/MS Instrument Conditions (Splitless Injection)

In this technique the electronically controlled injection port pressure is programmed to allow the maximum amount of analyte to be introduced to the analytical column. The sample is introduced to the narrow bore column using the splitless injection technique.

Parameter	Setting
Column	PTE-5MS 30meter
Column ID/Thickness	0.32mm ID 0.25um
Interface	Cap Direct Splitless Inj.
Tune	DFTPP Tune
Scan Range	35-510 amu
Sampling #	3
Threshold	100
Carrier Gas	Helium
Vacuum Comp.	On
Pressure(1)	20psi @ 50 °C
Time Pressure(1)	1.0 min
Pressure Rate(1)	99 psi/min
Pressure(2)	5.8 psi
Constant Flow Mode	0.84 mL/min
Injector Temp	260 °C
Interface (Detect B)Temp	280 °C
Initial Temp	40 °C
Initial Time	3 minutes
Rate(1)	10 00 °C/min
Final Temp(1)	200 °C
Final Time(1)	0 min
Rate(2)	20.0 °C/min
Final Temp(2)	290 °C
Final Time(2)	10.0 min
Total GC run time	32.50 min
Purge B	Off (for 1.0 min)

Table 4

4.3.2. DFTPP

4.3.2.1. The GC/MS system must be hardware-tuned using a 50 ng injection of DFTPP. Analyses must not begin until the tuning criteria are met.

4.3.2.2. In the absence of specific recommendations on how to acquire the mass spectrum of DFTPP from the instrument manufacturer, the following approach has been shown to be useful: Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished using a single scan acquired no more than 20 scans prior to the elution of DFTPP. The background subtraction should be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the DFTPP peak.

4.3.2.3. Use the DFTPP mass intensity criteria in the following table as tuning acceptance criteria. Alternatively, other documented tuning criteria may be used (e.g. CLP, Method 525, or manufacturer's instructions), provided that method performance is not adversely affected.

DFTPP (Decafluorotriphenylphosphine) MASS INTENSITY CRITERIA

m/z	Required Intensity (Relative Abundance)
51	30 to 60% of *m/z* 198
68	0 to 2% of *m/z* 69
69	0 to 100% of *m/z* 198
70	0 to 2% of *m/z* 69
127	40 to 60% of *m/z* 198
197	0 to 1% of *m/z* 198
198	Base Peak, 100% Relative abundance
199	5 to 9% of *m/z* 198
275	10 to 30% of *m/z* 198
365	1 to 100% of *m/z* 198
441	Greater than 0% but less than 100% of *m/z* 198
442	39 to 100% of *m/z* 198
443	17 to 23% of *m/z* 442

Table 5

NOTE: All subsequent standards, samples, MS/MSDs, and blanks associated with a DFTPP analysis must use the identical mass spectrometer instrument conditions.

4.3.2.4. Corrective action: If tuning criteria are not met, re-tune the system electronics using the Enviroquant tuning routines and then re-inject the DFTPP standard. If the criteria continue to fail, additional maintenance procedures may be required (such as source cleaning).

4.3.2.5. The GC/MS tuning standard solution should also be used to assess GC column performance and injection port inertness. Degradation of DDT to DDE and DDD should not exceed 20%. (See Sec. 8.0 of Method 8081 for the percent breakdown calculation). Benzidine and pentachlorophenol should be present at their normal responses, and no peak tailing should be visible. *Method 625: Check the tailing and degradation values. Use the* Chromeval *function of the Agilent software to generate this report. File the report in the daily QC file folder.*

4.3.2.6. If degradation is excessive and/or poor chromatography is noted, the injection port may require cleaning. It may also be necessary to break off the first 6-12 in. of the capillary column. The use of a guard column between the injection port and the analytical column may help prolong analytical column performance.

4.3.3. Calibration Curve. A set of at least five different calibration standards is necessary. Calibration must be performed using the sample introduction technique that will be used for samples typically injected with the autosampler). Analyze 1-2 uL of each calibration standard (containing internal standards) and tabulate the area of the primary characteristic ion against concentration for each target. A

set of at least five calibration standards is necessary (see Sec. 3 above). The injection volume must be the same for all standards and sample extracts.

The response factors (RFs) for each target analyte are calculated automatically by the software according to the following formula (relative to one of the internal standards):

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:

A_s = Peak area of the analyte or surrogate.
A_{is} = Peak area of the internal standard.
C_s = Concentration of the analyte or surrogate, in ug/L.
C_{is} = Concentration of the internal standard, in ug/L.

Update the initial calibration in the Enviroquant method identification file. This will automatically update the response factors that will be used in the quantification of target compounds.

For more detail on instrument calibration, consult SOP #114 "Calibration Curves-Organics".

4.3.4. System performance check compounds (SPCCs). A system performance check must be performed to ensure that minimum average RFs are met before the calibration curve is used. For semivolatiles, the System Performance Check Compounds (SPCCs) are: N-nitroso-di-n-propylamine; hexachlorocyclopentadiene; 2,4-dinitrophenol; and 4-nitrophenol.

The minimum acceptable average RF for these compounds is 0.050. These SPCCs typically have very low RFs (0.1-0.2) and tend to decrease in response as the chromatographic system begins to deteriorate or the standard material begins to deteriorate. They are usually the first to show poor performance. Therefore, they must meet the minimum requirement when the system is calibrated.

If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

4.3.5. Calibration check compounds (CCCs). The purpose of the CCCs are to evaluate the calibration from the standpoint of the integrity of the system. High variability for these compounds may be indicative of system leaks or reactive sites on the column. Meeting the CCC criteria is not a substitute

for successful calibration of the target analytes using one of the approaches described in Sec. 7.0 of Method 8000.

The RSD for each individual Calibration Check Compound (CCC) must be equal or less than 30%. If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration standards, refer to Sec. 7.0 of Method 8000. The CCCs are:

Phenol	1,4-Dichlorobenzene
2-Nitrophenol	2,4-Dichlorophenol
Hexachlorobutadiene	4-Chloro-3-methylphenol
2,4,6-Trichlorophenol	Acenaphthene
n-Nitrosodiphenylamine	Pentachlorophenol
Fluoranthene	Di-n-octylphthalate
Benzo(a)pyrene	

If an RSD of greater than 30% is measured for any CCC, then corrective action to eliminate a system leak and/or column active sites is necessary before reattempting calibration.

4.3.6. Evaluation of retention times. The relative retention times of each target analyte in each calibration standard should agree within 0.06 relative retention time units. Late-eluting compounds usually have much better agreement.

4.3.7. Linearity of target analytes. If the RSD of any target analyte is 15% or less, then the response factor is assumed to be constant over the calibration range, and the average response factor may be used for quantitation. If the RSD of any target analyte is greater than 15%, a linear regression or quadratic regression may be used for quantitation.

4.3.8. Frequency of Initial Calibration. Recalibration is required when instrument performance criteria cannot be met. In some cases, recalibration may be required at regular intervals. (See section 4.2 of SOP #114 "Calibration Curves – Organics".)

4.3.9. Initial Calibration Verification Standard (ICVS). An ICVS verifies that the standards used to construct the curve were valid. The ICVS (at 50 ug/mL) should be obtained from a different source than that used to prepare the initial calibration curve. It must contain 90% of the compounds in the calibration. The ICVS must be analyzed immediately following a calibration curve and the results must be within 85 to 115 percent recovery for 90% of the compounds in the spike mixture. See section 6.1 of SOP #110 "Summary of Quality Control Indicators – Organics" for additional details.

4.3.10. GC/MS calibration verification - Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

4.3.10.1. Prior to the analysis of samples or calibration standards, inject or introduce 50 ng of the DFTPP standard into the GC/MS system. The resultant mass spectra for DFTPP must meet the criteria given in Table 5 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

4.3.10.2. The initial calibration curve for each compound of interest is verified once every 12 hours prior to sample analysis, using the introduction technique and conditions used for samples. This is accomplished by analyzing a 50 mg/L (*Use a 100 mg/L standard if method 625 is required.*) calibration standard (the mid-point of the calibration curve). The results from the calibration standard analysis must meet the verification acceptance criteria provided in Table 6 below. A system performance check must be made during every 12-hour analytical shift. This verification includes evaluation of the SPCC and CCC compounds. Each SPCC compound in the calibration verification standard must meet its minimum response factor. This is the same check that is applied during the initial calibration. If the percent difference or drift for each CCC is less than or equal to 20%, the initial calibration is assumed to be valid. If the criterion is not met (i.e., greater than 20% difference or drift), for any one CCC, then corrective action must be taken prior to the analysis of samples. If the CCC's are not included in the list of analytes for a project, and therefore not included in the calibration standards, then all analytes must meet the 20% difference or drift criterion.

Parameter	Method 625 CCVS Range*	Method 8270C CCVS Range**	Method 8270C SPCC Min RRF
Phenol	80 – 120	35 - 65	NA
2-Nitrophenol	80 – 120	35 - 65	NA
Hexachlorobutadiene	80 – 120	35 - 65	NA
2,4,6-Trichlorophenol	80 – 120	35 - 65	NA
n-Nitrosodiphenylamine	80 – 120	35 - 65	NA
Fluoranthene	80 – 120	35 - 65	NA
Benzo(a)pyrene	80 – 120	35 - 65	NA
1,4-Dichlorobenzene	80 – 120	35 - 65	NA
2,4-Dichlorophenol	80 – 120	35 - 65	NA
4-Chloro-3-methylphenol	80 – 120	35 - 65	NA
Acenaphthene	80 – 120	35 - 65	NA
Pentachlorophenol	80 – 120	35 - 65	NA
Di-n-octylphthalate	80 – 120	35 - 65	NA
N-Nitroso-di-n-propylamine	80 – 120	NA	0.050
Hexachlorocyclopentadiene	80 – 120	NA	0.050
2,4-Dinitrophenol	80 – 120	NA	0.050
4-Nitrophenol	80 – 120	NA	0.050

Table 6
* Concentration measured in CCVS sample, in ug/L (Spike amount = 100 ug/L)
**Concentration measured in CCVS sample, in ug/L (Spike amount = 50 ug/L) SPCC not applicable for method 625

4.3.10.3. If the continuing instrument calibration verification results obtained are outside established acceptance criteria, corrective actions must be performed. First, inspect the instrumentation for causes (e.g. leaks, poor injection, tuning drift), then re-inject the standard. If routine corrective action procedures fail to produce a second consecutive (immediate) calibration verification within acceptance criteria, then a new initial instrument calibration must be performed. Sample analyses shall not occur until a new initial calibration curve is established and verified. However, sample data associated with an

unacceptable calibration verification may be reported as qualified data under the following special conditions:

A. When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

B. When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

4.3.11. Internal standard retention time. The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from the that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

4.3.12. Internal standard response. If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to + 100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

4.4 GC/MS Analysis of Samples

4.4.1. Prior to analysis, add 25 uL of the internal standard solution to the 1-mL concentrated sample extract obtained from sample preparation. Allow the sample extract to warm to room temperature.

4.4.2. Inject a 1-2 uL aliquot of the sample extract into the GC/MS system, using the same operating conditions that were used for the calibration. The volume to be injected should contain 100 ng of base/neutral and 200 ng of acid surrogates (assuming 100% recovery). The injection volume must be the same volume used for the calibration standards.

4.4.3. If the response for any quantitation ion exceeds the initial calibration range of the GC/MS system, the sample extract must be diluted and reanalyzed. Additional internal standard must be added to the diluted extract to maintain the same concentration as in the calibration standards (40 ng/uL).

4.4.4. NOTE: It may be a useful diagnostic tool to monitor internal standard retention times and responses (area counts) in all samples, spikes, blanks, and standards to effectively check drifting method performance, poor injection execution, and anticipate the need for system inspection and/or maintenance.

4.5 Qualitative analysis

4.5.1. The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The laboratory using the conditions in this method must generate the reference mass spectrum. The characteristic ions from the reference mass spectrum are defined to be the three ions of greatest relative intensity, or any ions over 30% relative intensity if less than three such ions occur in the reference spectrum. Compounds are identified as present when the following criteria are met.

4.5.2. The intensities of the characteristic ions of a compound must maximize in the same scan or within one scan of each other. Selection of a peak by a data system target compound search routine where the search is based on the presence of a target chromatographic peak containing ions specific for the target compound at a compound-specific retention time will be accepted as meeting this criterion.

4.5.3. The RRT of the sample component is within ± 0.06 RRT units of the RRT of the standard component.

4.5.4. The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%.)

4.5.5. Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

4.5.6. Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e., a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important.

4.5.7. Examination of extracted ion current profiles of appropriate ions can aid in the selection of spectra and in qualitative identification of compounds. When analytes coelute (i.e., only one chromatographic peak is apparent), the identification criteria may be met, but each analyte spectrum will contain extraneous ions contributed by the coeluting compound.

4.5.8. The Enviroquant software method should be set-up to meet the specifications listed above.

4.5.9. For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted.

4.6 Quantitative analysis

Sample calculations for semi-volatile analyses are made according to the following procedure:

4.6.1. The target compound concentrations are calculated by the internal standard method. The response factor (RF) from the multi-point calibration is used to calculate the concentration in the sample.

$$\text{Sample Concentration} = \frac{(\text{Area of Compound})\ (\text{Amt IS})\ (\text{Final Volume})}{(\text{Area IS})\ (\text{RF})\ (\text{Initial Volume or Weight})}$$

4.6.2. The automatic Hewlett Packard quantitation algorithm will report the "on-column" concentration of the target analytes using the following equation:

$$\text{"on-column" Concentration} = \frac{(\text{Area of Compound})\ (\text{Amt IS})}{(\text{Area IS})\ (\text{RF})}$$

4.6.3. The analyst, using the following equation can now calculate the sample concentration:

$$\text{Sample Concentration} = \frac{(\text{"on-column" Concentration})\ (\text{Final Volume})}{(\text{Initial Weight or Volume of sample})\ (\%\ \text{Total Solids})}$$

4.7. Interferences

See method 3510C, 3540C and 8270C for a detailed description of possible interferences.

4.8. Reporting

Table 1 and method 8270C describe practical quantitation limits for applicable compounds. Reporting limits are normally 3-10 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

4.9 Expression of Results for Solid Samples

Soils should be expressed on a dry weight basis as ug/kg. The exception would be a solid material submitted for RCRA compliance, in which case the results should be expressed on a wet weight basis.

5. Quality Control

5.1 Every analyst must read and be familiar with SOP #110 "Summary of Quality Control Indicators – Organics Analyses". Information is provided there concerning acceptance criteria, corrective action and effect on sample data for QCIs in this procedure.

5.2 The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard should be evaluated to determine if the chromatographic system is operating properly. Questions that should be asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed), recalibration of the system must take place.

5.3 A method blank should be analyzed with every analytical batch. A batch of samples is defined as one to twenty environmental samples of the same matrix that are prepared together with the same process and personnel, using the same lot of reagents with a maximum time between the start of processing of the first sample and the start of processing of the last sample being 24 hours. The method blank is taken through all the steps of extraction and analysis. No target compounds should be present in the blank. If target compounds are present, check for contamination and re-inject the blank. (See section 6.3.5 in SOP #110.)

5.4 An MS/MSD must be extracted with each batch of samples. If insufficient sample is received to perform an MS/MSD extraction, an LCS and Duplicate should be used. If the MS/MSD data is outside acceptance limits, check the %R or RPD of the LCS. If the LCS is in control, the procedure is in control and the data is acceptable. Statistical control limits are generated by matrix according to SOP #112. (See SOP #110 for additional details.) *If method 625 is being utilized, the acceptable recovery limits in Table 7 below must be used in evaluating the spiked samples.*

Matrix Spike/Laboratory Control Sample Spike Criteria: Aqueous Matrix

Parameter	Method 625 % Recovery	Method 8270C % Recovery	Method 8270C RPD
Acenaphthene	47-145	57-100*	31
Acenaphthylene	33-145		
Anthracene	27-133		
Benzo(a)anthracene	33-143		
Benzo(b)fluoranthene	24-159		
Benzo(k)fluoranthene	11-162		
Benzo(a)pyrene	17-163		
Benzo(ghi)perylene	D-219		
Benzyl butyl phthalate	D-152		
Bis(2-chloroethyl)ether	12-158		
Bis(2-chloroethoxy)methane	33-184		

Parameter	Method 625 % Recovery	Method 8270C % Recovery	Method 8270C RPD
Bis(2-chloroisopropyl)ether	36-166		
Bis(2-ethylhexyl) phthalate	8-158		
4-Bromophenyl phenyl ether	53-127		
2-Chloronaphthalene	60-118		
4-Chlorophenyl phenyl ether	25-158		
Chrysene	17-168		
Dibenzo(a,h)anthracene	D-227		
Di-n-butyl phthalate	1-118		
1,2-Dichlorobenzene	32-129		
1,3-Dichlorobenzene	D-172		
1,4,-Dichlorobenzene	20-124	41-84*	28
3,3'-Dichlorobenzidine	D-262		
Diethyl phthalate	D-114		
Dimethyl phthalate	D-112		
2,4-Dinitrotoluene	39-139	61-106*	38
2,6-Dinitrotoluene	50-158		
Di-n-octyl phthalate	4-146		
Fluoranthene	26-137		
Fluorene	59-121		
Hexachlorobenzene	D-152		
Hexachlorobutadiene	24-116		
Hexachloroethane	40-113		
Indeno(1,2,3-cd)pyrene	D-171		
Isophorone	21-196		
Naphthalene	21-133		
Nitrobenzene	35-180		
N-Nitrosodi-n-propylamine	D-230	37-109*	38
Phenanthrene	54-120		
Pyrene	52-115	54-122*	31
1,2,4-Trichlorobenzene	44-142	43-88*	28
4-Chloro-3-methylphenol	22-147	61-108*	42
2-Chlorophenol	23-134	52-89*	40
2,4-Dichlorophenol	39-135		
2,4-Dimethylphenol	32-119		
2,4-Dinitrophenol	D-191		
2-Methyl-4,6-dinitrophenol	D-181		

Parameter	Method 625 % Recovery	Method 8270C % Recovery	Method 8270C RPD
2-Nitrophenol	29-182		
4-Nitrophenol	D-132	19-58*	50
Pentachlorophenol	14-176	52-135*	50
Phenol	5-112	20-39*	42
2,4,6-Trichlorophenol	37-144		

Table 7

D = Detected, result must be greater than zero
* · These values represent typical statistical recovery ranges This method requires updates based upon statistical analysis of laboratory data

5.5 A Laboratory Control Spike (LCS) may be required if the MS/MSD is outside control limits. An LCS should be extracted for every batch in the event it will need to be evaluated. The LCS is spiked with the solution used for the MS/MSD. Statistical control limits are generated by matrix according to SOP #112. (See SOP #110 for additional details.) In some cases an LCS duplicate will also be analyzed. This should be analyzed for RPD as well. *If method 625 is being utilized, the acceptable recovery limits in Table 7 must be used in evaluating the spiked samples.*

5.6 Surrogate or System Monitoring Compounds are added to every sample, spike and method blank to monitor matrix effects and analyte recovery through sample extraction and analysis. Control limits will be established statistically according to SOP #112 "Statistical Control". If a recovery is outside control limits, the sample is to be re-analyzed. If the duplicate data is also outside acceptance limits, the procedure is in control, there is a sample matrix effect and the data is acceptable.

5.7 An MDL study must be performed prior to using this method. Please refer to SOP #109 for details on the procedure.

5.8 Method Performance: Method performance data can be found in SW-846, 3rd Edition, December 1996 and it's updates, Method 8270C Section 9.0. Data for method 625 can be found in Tables 6 and 7 within method 625. Internal performance data will be collected in accordance with SOP #112, "Statistical Control". Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP)."

6.0 Summary of Quality Control Indicators

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement) See Table 9 Notes 1	Initial Corrective Action	Final Action / Data Qualification See Table 9 Notes 3
Method Detection Limit Study (MDL) See MDL SOP #109 for details See Table 9 Notes 2	8270. Initial method validation and each time there is a significant change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis. *625 Same*	8270 The calculated MDL must be greater than 1/10th the MDL spiking concentration and greater than "0", and the MDL spiking concentration must be greater than the calculated MDL. Minimum of 7 replicates. *625 Same*	Re-analyze and re-process MDL for analytes that fail to meet acceptance criteria.	Do not report results below the MDL.
Initial Demonstration of Capability (IDC) See IDC/IDMP SOP #106 for details	8270. Initial method validation and each time there is a significant change in the instrumentation, personnel, matrix or test method that affects the sensitivity of the analysis. *625 Same*	8270. %R = 70-130 *625 See Table 6 within method 625*	Re-analyze and re-process the IDC for analytes that fail to meet acceptance criteria.	IDC/IDMP criteria must be met prior to sample analysis.
System Tuning Compound	8270 The start of every 12 hour sequence *625 Same*	8270. See Method SOP *625 Same, Evaluate peak tailing and degradation*	Re-Tune system electronics	Sample analysis must not begin until criteria are met.
Initial Calibration Curve	Referenced *625 Same*	CCCs must be <30% RSD and SPCC > specified RRF. *625 No Criteria*	Identify problems, Re-analyze calibration curve.	Sample analysis must not begin until criteria are met

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement) See Table 9 Notes 1	Initial Corrective Action	Final Action / Data Qualification See Table 9 Notes 3
Initial Calibration Verification (ICVS)	Immediately following the curve *625 No Criteria*	± 15% or within stated limits *625 No Criteria*	Re-evaluate the calibration curve to verify that all criteria have been met	Data can only be released for analytes that have passed the ICVS criteria
Continuing Calibration Verification Standard (CCVS)	Once every 12 hour sequence prior to sample analysis. *625 Same, Concentration is 100 ug/L*	CCCs must be less than 20% difference from Initial Calibration *625 625 target cpds must meet limits in table 6*	Inspect instrument for causes, re-analyze calibration standard	Data can only be released for analytes that have passed the CCVS criteria.
Method Blank	Per batch of samples *625 Same*	Less than the reporting limit *625 Same*	Check for cont. problems; Re-analyze blank	The concentration of a targeted analyte in the blank is at or above the reporting limits, AND is greater than 1/10 of the amount measured in any sample.
Laboratory Control Standard (LCS)	Per batch of samples *625 Same*	3 standard deviations for the control limit and 2 standard deviations for the warning limit* *625 Same*	Determine cause of problem and re-prepare and re-analyze the affected samples.	Results of analytes failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file
Matrix Spike / Matrix Spike Duplicate (MS/MSD) - concentration	Once per 20 or fewer samples per matrix type, per sample extraction or preparation procedure *625 Same*	8270: 3 standard deviations for the control limit and 2 standard deviation for the warning limit *625 625 Target cpds must meet limits in Table 7*	Evaluate the LCS with respect to the MS/MSD. If the LCS was acceptable, evaluate the sample for matrix interferences	The information from the MS/MSD is sample/matrix specific and is not normally used to determine the validity of an entire batch
Surrogate or System Monitoring Compounds	Every analytical sample. *625 Same*	8270. 3 standard deviations for the control limit and 2 std devs for the warning limit *625 Use same limits*	Re-analyze sample to check for matrix effect	Results of analyses failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file. The affected sample data needs to be qualified appropriately.

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement) See Table 9 Notes 1	Initial Corrective Action	Final Action / Data Qualification See Table 9 Notes 3
Internal Standard Areas	Every analytical sample *625 Same*	Areas must be +/- 50% of the CCVS internal standards *625 Same*	Re-analyze sample to check for matrix effect.	Results of analyses failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the data file.

Table 9

Table 9 Notes:

1. If statistical control limits have not been determined, then the specification is utilized for data assessment until sufficient data is collected to determine statistical control limits.

2. Detection Limit

- Detection limit shall be initially determined for the compounds of interest in each test method in a matrix in which there are not target analytes nor interferences at a concentration that would impact the results or the detection limit must b determined in the matrix of interest.
- Detection limits must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
- All sample processing steps of the analytical method shall be included in the determination of the detection limit.

3. If a QCI fails to meet accept criteria, the analyst will prepare a case narrative documenting the failure and the associated decisions regarding reanalysis vs. acceptance of the data. The case narrative will be added to the project file. Project management will review case narratives during the preparation of the final report and make final decisions regarding data flagging requirements.

4. Definition of Method Blank: (per NELAC Glossary 2002 Standard) a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentration that impact the analytical results for sample analyses.

5. Definition of Batch: (per NELAC Glossary 2002 Standard) environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared

environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

6. Definition of Matrix: (per NELAC Glossary 2002 Standard) the substrate of a test sample.

- Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.
- Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
- Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.
- Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

7. Notes

7.1. Tips and Hints

The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard is evaluated to determine if the chromatographic system is operating properly. Questions that are asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed), recalibration of the system must take place.

8. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to the SOP titled, Analytical Definitions & Acronyms.

9. Safety

The toxicity or carcinogenicity of each reagent used in this method have not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

10. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

11. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan.

12. References

The analyst is required to have read and understood various supporting documents including regulatory method references, First Environmental's Quality Assurance Manual, First Environmental's Chemical Hygiene Plan, and non-method SOPs that support QA activities.

SOP #106, "Initial Demonstration of Capability / Initial Demonstration of Method Performance."

SOP #109, "Method Detection Limits."

SOP #110, "Summary of Quality Control Indicators – Organics Analyses." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.

SOP #112, "Statistical Control."

SOP #114, "Calibration Curves – Organics." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.

SOP #118, "Measurement Traceability & Calibration."

SOP #123, "Sample Instructions & Materials."

SOP #901, "Sample Disposal"

SOP #902, "Waste Disposal"

First Environmental's Quality Assurance Manual

First Environmental's Chemical Hygiene Plan

13. Approvals

Reviewed for Technical Accuracy by: Neal E Cleghorn
Neal Cleghorn

Reviewed for Quality Assurance Compliance by: Lorrie Franklin
Lorrie Franklin

Implementation Date: 2-15-06

End Use Date: _____

First Environmental Laboratories

Standard Operating Procedure

Title: Cyanide – Total, Automated – Skalar

Regulatory References:
EPA 600/4-79-020, Method 335.4 R1.0

Matrices: aqueous (wastewater and groundwater), drinking water

Regulatory Limits: NA

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal. Samples will be stored at 4°C prior to shipment.

Preservation: pH 12 using approximately 4 NaOH pellets/L. All samples should be held at 4°C until time of analysis. Remove oxidizing agents, such as chlorine, prior to preservation if at all possible. Also, if known to be present, treat for sulfide prior to preservation. If sulfide is present, oxidizing compounds would not be expected.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples are stored prior to analysis at 4°C.

Container: 250 cc plastic for aqueous samples

Single Analysis Sample Volume: 15 mL

Holding Time: 14 days

(Range) Reporting Limit - Upper End: 0.005 mg/L – 0.10 mg/L
Note: The range can be extended by diluting the sample

Summary of Method: The automated procedure for the determination of Cyanide is based on the following reaction; the cyanide as hydrogen cyanide (HCN) is released from cyanide complexes by means of UV digestion (only for total cyanide) and distillation. Cyanides are converted to cyanogens chloride by reactions of chloramines-T. Cyanogen chloride subsequently reacts with pyridine and barbituric acid to give a red colored complex. This complex is measured at 600 nm.

1. Instrumentation / Apparatus / Glassware

1.1. Skalar SanPlus Analyzer

	intermediate		
Standard 1	0.02 mg/L	0.2 mL of 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
Standard 2	0.04 mg/L	0.4 mL of 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
Standard 3	0.06 mg/L	0.6mL of 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
Standard 4	0.08 mg/L	0.8 mL of 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
Standard 5	0.10 mg/L	1.0 mL of 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
2nd Source Standard, Cyanide	1000 mg/L	See below	1 year
Continuing Calibration Verification Standard (CCVS) 2 nd source (also serves as ICVS)	0.05 mg/L	0.5 mL of 2nd source 10 mg/L intermediate diluted to 100 mL fv	Prepare daily
Reporting Limit Verification Standard(RLVS)	0.005mg/L	0.5 mL of 1 mg/L intermediate diluted to 10 mL fv	Prepare daily
Drift	0.06 mg/L	mid standard (S3)	Prepare daily
Matrix Spike / Matrix Spike Duplicate (MS/MSD)	0.04 mg/L	10 mL of sample + 400 uL of 1 mg/L intermediate	Prepare daily

3.1. Cyanide 2nd Source Standard (1000 mg/L): Dissolve 2.51g of potassium cyanide and 2.00g of sodium hydroxide in distilled water and dilute to 1 liter volumetrically.
NFPA Diamond Safety Information for Cyanide: Health (blue) 3 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - poison

3.2. Cyanide Intermediate Standard #1 (10mg/L): 1 mL of 1000 mg/L standard diluted to 100 mL volumetrically. Prepare from purchased stock standard and 2nd source standard.
NFPA Diamond Safety Information for Cyanide: Health (blue) 3 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - poison

3.3. Cyanide Intermediate Standard #2 (1 mg/L): 1 mL of 10 mg/L intermediate standard diluted to 10 mL using volumetric pipettes.
NFPA Diamond Safety Information for Cyanide: Health (blue) 3 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - poison

3.4. Recommended source for PE samples is ERA.

4. Analytical Procedure

4.1. Interferences

4.4. Reporting Limits

4.4.1 The routine reporting limit for an aqueous sample is 0.005 mg/L. The MDL determined during instrument validation was 0.0021 mg/L.

4.4.2. Reporting limits are normally 3-10 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

Continuing Calibration Blanks	after every 10th samples	If RB/CCB and samples have concentrations >RL, then the RB/CCB <10% of the sample concentration.	problems and/or instrument drift. Re -run the CCB and evaluate the sample results with respect to the CCB. Reanalyze samples as determined by this evaluation.	the appropriate data qualifier. Flag samples that have analyte concentrations less than 10 times the concentration found in the applicable blank..
Continuing Calibration Standard (CCVS) - concentration middle of range	Daily at the beginning, end, and after every 10th samples	Specification: ± 10% Statistical Control: 3 standard deviations for the control limit and 2 standard deviations for the warning limit	Re-run the CCVS and evaluate the sample results with respect to the CCVS result.. Reanalyze samples as determined by this evaluation	Data can only be released for analytes that have passed the CCVS criteria.
Reporting Limit Verification Standard - concentration equaling the reporting limit	Daily at the beginning @ a concentration equaling the reporting limit	Specification: ± 25	Re-run the RLVS and evaluate the sample results with respect to the RLVS. Reanalyze samples as determined by this evaluation.	Results for positive samples can be reported. Results of non-detect samples need to be documented in the case narrative prepared by the analyst and included in the project file
Matrix Spike / Matrix Spike Duplicate (MS/MSD) - concentration 20 to 50 percent of range See Table Note 5	Per batch Selection of sample for MS/MSD is arbitrary See Table Note 4	Specification: ±25% Recovery and RPD 20 Statistical Control: 3 standard deviations for the control limit and 2 standard deviation for the warning limit *±20%* *PRD 20*	Evaluate the LCS with respect to the MS/MSD. If the LCS was acceptable, evaluate sample for matrix interferences.. Examine the sample for homogeneity. Evaluate the spike concentration vs. native analyte concentration. If the concentration of analyte is >4x the spike concentration, then the spiking level is insignificant to the sample. Evaluate the sample for the presence of interferences by re-analyzing the sample and the MS at a dilution. Acceptable spike recovery indicates the presence of interference.	The information from the MS/MSD is sample/matrix specific and is not normally used to determine the validity of an entire batch. No action is taken on out of control MS/MSD data alone to qualify an entire batch

QC Table Notes:

1. Detection Limit

5.2. Method Performance

5.2.1.Method performance data can be found in SW-846, 3rd Edition, December 1996 and its updates, Method 9014 Section 9.0. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

5.2.2Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP)."

5.2.3. Refer to SOP #107, "Inorganic QC" for additional information regarding QCIs.

6. Notes

6.1. Tips and Hints

6.1.2. Soil samples cannot be run through the Skalar Auto Analyzer. Must use manual distillation and colorimetric procedures.

Flow diagrams and graphs can be found in EPA Methods 335.4 – 14-16.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to Section 20 of the Quality Assurance Manual.

8. Safety

The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

Copies of specific MSDS can be obtained from various websites on an as needed basis.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which

First Environmental Laboratories

Standard Operating Procedure

Title: Cyanide, total - Distillation / Colorimetric (Includes titrimetric standardization of stock solution) / Cyanide Amenable to Chlorination / Weak Acid Dissociable

Regulatory References:
EPA 600/4-79-020, Method 335.2, Method became obsolete on_____.
SW-846, 3rd Edition, July 1992 and it's updates, Method 9010B / 9014
SW-846, Revision 3 November 2004 changes to Method 9010C for Total and Amenable Cyanide Distillation.
Although the alpha change, the methods are equivalent. We reference 9010B/9014.
Standard Methods, 18th Edition, 4500CN A,B,C,D,E,G,I(SDWA approved procedure)
Standard Methods, 19th Edition, 4500CN A,B,C,D,E,G,I (SDWA approved procedure)
Standard Methods, 20th Edition, 4500CN A,B,C,D,E,G,I (SDWA approved procedure)
Standard Methods, 21st Edition, 4500CN A,B,C,D,E,G,I
The most current edition of Standard Methods is in use.
Standard Method, 20th and 21st Edition, are equivalent.

Matrices: aqueous(wastewater and ground water), drinking water, solids(soil/sediment), chemical wastes

Regulatory Limits: NA

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal. Samples will be stored at 4^0C prior to shipment.

Preservation: pH of 12 (approximately 4 NaOH pellets/L), refrigerate at 4°C. Remove oxidizing agents, such as chlorine, prior to preservation if at all possible. Also, if known to be present, treat for sulfide prior to preservation. If sulfide is present, oxidizing compounds would not be expected.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples are stored prior to analysis at 4°C.

Container: 250cc plastic for aqueous matrices or 4 oz jar for solid matrices

Single Analysis Sample Volume: 50 mL or 2.5g

Holding Time: 14 days

(Range) Reporting Limit - Upper End: 0.005 mg/L - 1.000 mg/L
Introducing a sample dilution at either the distillation or colorimetric stage of analysis can extend the range Samples having a concentration higher than 5 mg/L can be analyzed using the titrimetric procedure, which extends the range to 1000 mg/L.

Summary of Method: A reflux-distillation procedure is used to extract soluble cyanide salts and many insoluble cyanide complexes. It is based on the decomposition of nearly all cyanides by a reflux distillation procedure using strong acid and a magnesium catalyst. Cyanide, in the form of hydrocyanic acid (HCN) is

purged from the sample and captured into an absorber-scrubber containing sodium hydroxide solution. The cyanide ion in the absorbing solution is then manually determined colorimetrically using a spectrophotomete

In the colorimetric measurement, the cyanide is converted to cyanogen chloride (CNCl) by reaction with chloramine-T at a pH less than 8 without hydrolyzing to the cyanate After the reaction is complete, a red-blue color is formed on the addition of pyridine-barbituric acid reagent. The concentration of NaOH must be the same in the standards, the scrubber solutions, and any dilutions of the original scrubber solution to obtain colors of comparable intensity.

1. Instrumentation / Apparatus / Glassware

1.1. Distillation Apparatus: Andrews Glass Midi - Distillation Unit Model 110-10R

1.2. Spectrophotometer capable of measurement at 578 nm with a 1.0 cm cell or larger

1.3. Analytical balance capable of accurately weighing 0.0001g

1.4. Top loading balance capable of accurately weighing 0.1g

1.5. Maintenance is performed in accordance with procedures documented on the appropriate maintenance log book/file.

2. Reagents

All reagents should be prepared from reagent grade materials using deionized water and volumetric glasswar

2.1. Sodium Arsenite ($NaAsSO_2$): Dry chemical. Expiration Date: per manufacturer's labeling. This chemical is used for dechlorination. Alternatively, sodium thiosulfate ($Na_2S_2O_3$) or ascorbic acid may be used to dechlorinate the sample.

2.2. Sodium dihydrogenphosphate (also known as sodium phosphate monobasic, monohydrate - $NaH_2PO_4*H_2O$): Dissolve 138g of $NaH_2PO_4*H_2O$ in 900 mL of DI water, and dilute to 1L FV volumetrically. Expiration Date 1 year. This reagent should be refrigerated. Warm to room temperature prior to analysis.

2.3. Chloramine-T solution: Dissolve 1.00g of water soluble chloramine-T in 100 mL of DI water and refrigerate until ready to use. Expiration Date: 1 day

2.4. Pyridine-barbituric acid reagent: **Prepare this reagent in a hood.** Weigh 30g of barbituric acid in a 500mL flask, add just enough DI water to wash the sides of the flask, and wet the barbituric acid. Add 150 mL of pyridine and mix. Add 30 mL of concentrated HCl, mix, and cool to room temperature before diluting to 500 mL FV volumetrically. Expiration Date: This reagent is stable for approximately six months if stored in a cool, dark place. If precipitate forms, discard reagent and prepare fresh lot. Warm to room temperature prior to analysis.
NFPA Diamond Safety Information for Pyridine: Health (blue) 3 / Flammability (red) 2 / Reactivity (yellow) 2 / Hazard (white) 3 – contact

NFPA Diamond Safety Information for Barbituric Acid: Health (blue) 0 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - inhalation

2.5. Rhodanine indicator: Dissolve 20 mg 5 [p-(Dimethylamino) benzylidene] rhodanine in 100 mL acet volumetrically. Expiration Date: 5 years.
NFPA Diamond Safety Information for Acetone· Health (blue) 1 / Flammability (red) 3 / Reactivity (yellow) 0

2.6. 0.0192N Silver Nitrate ($AgNO_3$): Purchase as a prepared reagent. Expiration Date: per manufacturer's labeling.

2.7. Nitrate Test Strips

2.8. Sulfamic acid solution, 0.8N: Dissolve 80g H_2NSO_3H in DI water and dilute to 1L FV volumetrically. Expiration Date: 1 year

2.9. Potassium Iodide Test Strips (checks for the presence of chlorine)

2.10. Lead Acetate Test Strips (checks for the presence of sulfide)

2.11. Lead Carbonate Powder or Cadmium Carbonate Powder

2.12. Sodium hydroxide solution, 1.25N: Dissolve 50g of NaOH in DI water and dilute to 1L FV volumetrically. Expiration Date: 1 year.
NFPA Diamond Safety Information for Sodium Hydroxide (NaOH): Health (blue) 3 / Reactivity (yellow) 1

2.13. Sodium hydroxide solution, 0.25N: Dilute 200 mL of 1.25N NaOH to 1L FV volumetrically with DI water. Expiration Date: 1 year.
NFPA Diamond Safety Information for Sodium Hydroxide (NaOH): Health (blue) 3 / Reactivity (yellow) 1

2.14. Sulfuric acid, 18N: slowly add 500 mL of concentrated H_2SO_4 to 500 mL of DI water. The reaction is exothermic and reagent preparation should be performed in a hood. Expiration Date: 1 year.
NFPA Diamond Safety Information for Sulfuric Acid (H2SO4): Health (blue) 3 / Reactivity (yellow) 2 /Hazard (white) no-water

2.15. Magnesium chloride solution: Dissolve 510g of $MgCl_2*6H_2O$ in DI water and dilute to 1L FV volumetrically. Expiration Date: 1 year.

2.16. Acetate Buffer ***SDWA Compliant***: Dissolve 41.0g sodium acetate trihydrate, $NaC_2H_3O_2\,H_2O$, in 50 mL DI water. Add glacial acetic acid to adjust to pH 4.5, appoximately 50 mL. Dilute to 1L FV volumetrically. Expiration Date. 1 year.

2.17. Zinc Acetate Solution: Dissolve 12g of zinc acetate in 50 mL of DI water and dilute to a FV of 100 mL. Expiration Date: 1 year.

2.18. Sodium Hypochlorite Solution (6%): Purchased prepared from VWR. Expitation Date. per manufacture's instructions

2.19. Bismuth Nitrate (0.062M), $Bi(NO)_3\,5H_2O$: Dissolve 3g of $Bi(NO)_3\,5H_2O$ into 10 mL of DI water. While stirring, add 25 mL of Glacial Acetic Acid, CH_3COOH. Stir until dissloved and dilute to 100 mL FV. Expiration Date: 1 Year.

2.20. Antifoam B Silicone Emulsion: purchased prepared from VWR

3. Standards

All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, must be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the appropriate Standards Tracking Log. This unique number will also be applied to the label.

3.1. 1000 mg/L Cyanide Stock Standard. Dissolve 2.51g of potassium cyanide (KCN) and 2.00g potassium hydroxide (KOH) in 900 mL DI water and dilute to 1L FV. Expiration Date: 1 year
NFPA Diamond Safety Information for Cyanide: Health (blue) 3 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - poison

Exceptional Contact Hazard Read the MSDS. Do not flush stock standard to sewer. Dispose of stock standard in an appropriate manner consistent with practices used by the lab for disposal of samples which have a hazardous rating. Alternatively, place stock standard in a large beaker under the hood. Add bleach or calcium hypochorite while stirring. This process, which is alkaline chlorination, will destroy the cyanide. A cyanide test strip can be utilized to prove that the cyanide has been destroyed or a spot test can be performed.

3.1.1. Standardize the stock solution prior to use and then monthly by using the following procedure: The stock standard solution is titrated with standard silver nitrate to form the soluble cyanide complex, $Ag(CN)_2^-$. As soon as all CN has been complexed and a small excess of Ag^+ has been added, the excess Ag^+ is detected by the silver-sensitive indicator, p-dimethylaminobezalrhodanine, which immediately turns from a yellow to a salmon color. The indicator is sensitive to about 0.1 mg Ag/L.

a. Using a volumetric pipet, measure 25 mL of 1000 mg/L stock solution into a 150 mLbeaker.

b. Add 0.5 mL rhodanine indicator

c. Titrate with 0.0192N $AgNO_3$ to first color change from yellow to brownish pink. Approximately 25 mL of titrant will be required to reach the titration end point.

d. Calculation:

$$\text{mg/L CN} = \frac{(\text{mL titrant - mL blank})\left(\frac{1\text{ mg CN}}{1\text{ mL titrant}}\right) \times 1000}{\text{mL of stock standard}}$$

Provided 0.0192N $AgNO_3$ titrant and 25 mL of standard is titrated, then the calculation reduces tot he following:

$$\text{mg/L CN} = (\text{mL titrant - mL blank}) \times 40$$

For 0.0192N AgNO3 1 mL of titrant is equal to 1 mg CN.

3.2. 100 mg/L Intermediate Cyanide Standard: Prepare fresh at the tme the stock standard is restandardized. Add an appropriate volume of stock solution to 20 mL 1.25N NaOH and dilute 100 mL FV volumetrically with DI water. Expiration Date: 1 month
NFPA Diamond Safety Information for Cyanide: Health (blue) 3 / Flammability (red) 0 / Reactivity (yellow) 0 / Hazard (white) - poison

$$\text{mL of stock standard needed} = \frac{10000}{\text{concentration from standardization procedure}}$$

3.3. Procedure Blank (PB): Add 50mL of DI water into 50 mL sample distillation tube. Required to be processed with distillation procedure.

3.4. 1 mg/L LCS: Pipet 500 uL of the intermediate cyanide standard into 50 mL DI water contained in a sample distillation tube Required to be processed with distillation procedure.

3.5. 0.500 mg/L CCVS: Prepare fresh daily by pipetting 500 uL of the intermediate cyanide standard and 20 mL of 1.25N NaOH into a volumetric flask and diluting to 100 mL FV with DI water.

3.6. To Spike the Sample: Pipet 100 uL of intermediate cyanide standard into the sample being spiked. Since the sample is refluxed/distilled and the released CN is trapped in 50 mL of NaOH, the scrubber solution will contain 0.200 mg/L CN. A 20 mL portion of scrubber solution is used in the determinative step

3.7. Recommended source for ICVS / PE is ERA or equivalent.

4. Analytical Procedures

4.1. Interferences

4.1.1. The method detects inorganic cyanides that are present as either simple soluble salts or complex radicals. The cyanide in some metal complexes such as cobalt, gold and platinum is not completely recovered. Most organic cyanide compounds, such as nitriles, are decomposed during distillation and are not recovered. Method 9010B is not intended to determine if a sample is hazardous by the characteristic of reactivity.
Note: SW-846 has amended the section 7.3.3. The guidance and requirement for reactivity has been removed. Final Rule – June 14, 2005.

4.1.2. Sulfides adversely affect the colorimetric procedure and should be removed prior to preservation if possible. Sulfide converts CN^- to CNS^- rapidly, especially at a high pH. It distills over and adversely affects the colorimetric procedures by complexing with the CN^- and preventing the colorimetric reaction from occurring.

Note: Method 9010B cites the removal of sulfide during the distillation procedure using bismuth nitrate.

4.1.3. High results may be obtained for samples that contain nitrate and/or nitrite. During the distillation, nitrate and nitrite will form nitrous acid, which will react with some organic compounds to form oximes. These compounds once formed will decompose under test conditions to generate HCN. The possibility of interference of nitrate and nitrite is eliminated by pretreatment with sulfamic acid

4.1.4. Chlorine and other oxidizing agents decompose most cyanides and should be removed prior to preserving the sample.

4.1.5. Numerous other interferences exist. Consult Standard Methods for complete descriptions and suggestions for removal of a specific interference.

4.2. Sample Preservation

4.2.1. Oxidizing agents, such as chlorine, decompose most cyanides. To determine whether oxidizing agents are present, test a drop of the sample with acidified potassium iodide (KI) starch test paper. A blue color indicates the need for treatment. Add sodium arsenite a few crystals at a time until a drop of a sample produces no color on the indicator strip. Alternatively, sodium thiosulfate or ascorbic acid may be used to dechlorinate the sample, but avoid an excess greater than 0.1g /L.

4.2.2. If sulfide is suspected to be present, check for presence by placing a drop of sample on lead acetate paper that has been previously moistened with acetic acid buffer (#1). Darkening of the paper indicates the presence of S^{-2}. If sulfide is found to be present, add lead carbonate or cadmium carbonate powder to the sample until a black precipitate no longer forms. Alternatively, treat with bismuth nitrate as specified in method 9010B.

4.3. Sample Preparation for Cyanide Amenable to Chlorination

Note: Determination of amenable cyanide also requires the analysis of a separate aliquot of sample for total cyanide. The difference in determined concentration is the cyanide amenable to chlorination.

4.3.1. Place 100 mL portion of sample into a 150 mL beaker cover with aluminum foil. Keep beaker co l with a foil wrapped watch glass during chlorination.

4.3.2. Check pH of sample with pH paper. The sample pH should be >11. If not, add 1.25N NaOH until sample has a pH >11. Sample pH is maintained between 11 and 12 throughout the entire reaction.

4.3.3. Add 500 uL of Sodium Hypochlorite Solution (6%) into sample while sample is mixing on stirrer. Test for excess chlorine with potassium iodide test strips. A distinct blue color indicates that sufficient chlorine is present. Maintain excess chlorine for 1 hour while stirring sample continuously. Check for the presence of chlorine at 15 minute intervals.

4.3.4. After 1 hour, remove any residual chlorine with the addition of 0.5g of ascorbic acid. Sample is now ready to be processed through distillation procedure.

4.4. Sample Preparation for total distillation

4.4.1. A 50 mL aliquot of DI water carried through all the preparative steps serves as the procedure blank (PB) and demonstrates that the procedure is free of contamination. Frequency: 1/20 samples - minimum.

4.4.2. A 50 mL aliquot of 1.00 mg/L LCS processed through all the preparative steps demonstrates the efficiency of the entire procedure. Frequency: 1/20 samples - minimum

4.4.3. Duplicate matrix spikes: see section 3.6.

4.4.4. If the sample is from a drinking water source, check for chlorine with potassium iodide test strips. ..l present, remove by treating with sodium arsenite.

4.4.5. Check all aqueous samples for the presence of nitrite / nitrate with a test strip.

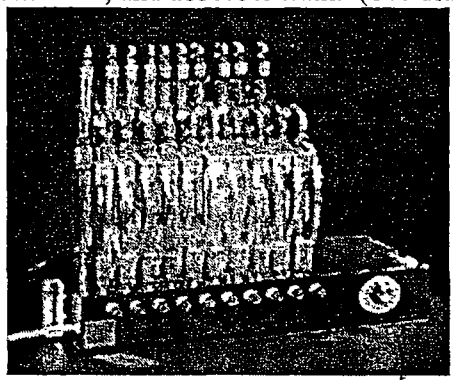
Note: Method states to do this but, we bipass this step by adding 2.5 mL of sulfamic acid solution to all samples processed through distillation.

4.4.6. Analysis requires 50 mL for aqueous samples and 2.5g + 50 mL of DI water for solid samples. Transfer the sample to the distillation tube. (The tube is calibrated to 50 mL.)

4.4.7. Add 250 uL of Antifoam B Silicone Emulsion to all leachates and soapy samples to prevent sample from fizzing or bubbling over into the condenser tube.

4.4.8. Transfer 50 mL of 0.25N NaOH to the gas absorbing tube. (The tube is calibrated to 50 mL)

4.4.9. Connect the distillation tube, condenser, and absorber train. (See diagram below)



Note: If less than 10 samples are being analyzed, load the unit from left to right.

4.4.10. Turn on the vacuum and adjust the valves to give a flow of 3 bubbles per second from the impingers in each distillation tube. Turn on the cooling water to give a flow of 6 GPH per sample (flow meter should be set at 10 for 10 samples) The flow meter is marked accordingly.

4.4.11. Add 2.5 mL of bismuth nitrate solution through the sample/media inlet tube. Allow sample to mix.

Note: This step is done to all leachates, dark soils, oily soils, and sludges to remove sulfide interference.

4.4.12. Add 2.5 mL of sulfamic acid solution through the sample/media inlet tube. Allow sample to mix for 3 minutes

4.4.13. After 5 minutes of vacuum flow, add 5 mL of 18N H_2SO_4 (50%) through the sample/media inlet tube. Mix for 3-5 minutes. The sample pH must be below 2.0.

4.4.14. Add 2 mL magnesium chloride through the sample/media inlet tube. Rinse with DI water.

Note: The requirement to use magnesium chloride in the distillation first appeared in the 15th Edition of Standard Methods. Review of the data demonstrates that it is not essential. Use of magnesium chloride in the distillation is left to the discretion of the analyst. This appears in the 21st Edition of Standard Methods, 4500CN$^-$,C section 1.

4.4.15. Turn on the heating unit and set the dial to 105. Heat the sample to boiling taking care to prevent solution backup by periodic adjustment of the vacuum flow. The timer will automatically turn off heaters after 1 1/2 hours of refluxing. Continue vacuum for another 15 minutes. Separation of "hot" glassware components may result in bumping, boil over, and spray of hot, corrosive materials. After cooling, turn off the vacuum and cooling water.

4.4.16. Wipe the unit housing with a mild sodium bicarbonate solution to neutralize acid spills after each use.

4.5. <u>Sample Preparation for Weak Acid Dissociable Cyanide Distillation.</u>

4.5.1. Follow procedures 4.4.6. -4.4.10. for sample set up.

4.5.2. Add 2 mL of Acetate Buffer. Allow samples to mix.

4.5.3. Add 2 mL of Zinc Acetate. Allow samples to mix.

4.5.4. Add 2-3 drops of methyl red indicator. Rinse the inlet tube with a small amount of DI water. If solution does not turn pink, add 1+9 acetic acid dropwise until solution turns pink

4.5.5. Follow procedure 4.4.15.

<u>4.6. Determinative Procedure</u>

Note: Temperature of reagents can affect the response factor of the colorimetric determination. Reagents stored in the refridgerator should be warmed to ambient temperature before use.

4.6.1. A 20 mL aliquot of 0.25N NAOH is processed through the colorimetric analysis serves a reagent/calibration blank and monitors the reagents for contamination. Frequency: at the beginning and e. of the run, and after every tenth sample.

4.6.2. A 20 mL aliquot of 0.500 mg/L CCVS processed through the colorimetric analysis monitors the performance of the determinative procedure. Frequency: at the beginning and end of the run, and after every tenth sample.

4.6.3. Duplicate spiked aliquots of sample (MS/MSD) monitor the precision and accuracy of the procedure for a specific matrix. If the sample required preparation, the MS/MSD are processed in a similar manner. Frequency: 1/20 sample of the same matrix - minimum. See Section 3.5. for instructions on how to spike the sample.

4.6.5. Pipet 20 mL of sample into a 50 beaker cup.

Note: The blank should consist of 0.25N NaOH and all standards should be prepared in 0.25N NaOH.

4.6.4. If sulfide is a suspected problem after distillation, test for S^{-2}. Add powdered lead carbonate to the remaining portion containing the 0.25N NaOH in small amounts until the black precipitate no longer forms. Swirl to mix between each addition. Filter or decant liquid from the cup through a Whatman 40 filter paper and proceed with cyanide analysis.

4.6.6. Add 6 mL of phosphate buffer solution and mix.

4.6.7. Add 1 mL of chloramine-T solution and mix. Wait 2 minutes. If turbidity forms after addition of phosphate buffer, then clears when chloramine-T is added, check if chlorine is still present using potas iodide test strip. If chlorine is not present, sample has high chlorine demand and should be processed at a dilution. Alternatively, add 0.5 mL chloramine T and recheck for the presence of chlorine after 2 minutes.

4.6.8. Add 2 mL of pyridine-barbituric acid and mix.

4.6.9. Read absorbance after 8 minutes at 578 nm.

Note: If turbidity develops after the addition of either the phosphate buffer or chloramine-T, a background reading may need to be taken on a separate aliquot of sample treated with the first two reagents.

If a sample requires dilution, 0.25N NaOH should be used to bring the diluted sample to volume.

SDWA Compliant Analysis
The following changes are required to ensure SDWA compliance:
Method 4500CN-E (SM) requires the use of acetate buffer (section 2.17 of SOP) and differing volumes of sample and reagents. Use the following volumes:
25 mL sample volume
1 mL acetate buffer
2 mL chloramine T
5 mL pyridine
Dilute to 50 mL fv using 17 mL of 0.25N NaOH

4.7. Calculation

Include factors resulting from sample preparation and/or the need to analyze the sample at a dilution. The formula provided below assumes the sample was a clean water not requiring dilution.

If necessary, correct the absorbance reading by subtracting the background reading. From the corrected absorbance, determine the mg/L of cyanide present by reference to the calibration curve.

$$\text{mg/L total CN / WAD CN} = \text{abs of sample} \times \text{response factor} \times \frac{50}{\text{mL or g of sample distilled}}$$

$$\text{where: response factor} = \frac{\text{concentration of standard}}{\text{absorbance of standard}} = 1/\text{slope}$$

The slope is obtained from the calculation of the correlation coefficient, where m = slope. This calculation is based on the relationship, x = my +b

$$\text{mg/L CN Ammendable} = \text{mg/L CN in unchlorinated portion of sample} - \text{mg/L CN found in chlorinated portion of sample}$$

4.8. Reporting Limits

4.8.1. The routine reporting limit for an aqueous sample is 0.005 mg/L

4.8.2. The routine reporting limit for a non-aqueous sample is 0.10 mg/kg

4.8.3. Reporting limits are normally 3-10 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

4.8.4. Expression of Results for Solid Samples

Soils should be expressed on a dry weight basis as mg/kg. The exception would be a solid material submitted for RCRA compliance, in which case the results should be expressed on a wet weight basis.

5. Quality Control Indicator Assessment

5.1. Each quality control indicator (QCI) must be assessed for compliance with the following criterion on a real time basis. When applicable, the percent recovery and/or the relative percent difference (RPD) is also recorded on the raw data/lab book form.

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement)	Initial Corrective Action	Final Action / Data Qualification
Method Detection Limit Study (MDL) See MDL SOP #109 for details See QC Table Notes 1	Initial method validation and each time there is a significant change in the test method that affects how the test is performed., or when a change in instrumentation occurs that affects the sensitivity of the analysis, provided the reporting limit is equal to the low standard in the calibration curve, or a reporting limit verification standard is run daily.	The calculated MDL must be greater than 1/10th the MDL spiking concentration and greater than "0", and the MDL spiking concentration must be greater than the calculated MDL Minimum of 7 replicates.	Re-analyze and re-process MDL for analytes that fail to meet acceptance criteria	Do not report results below the MDL.
Initial Demonstration of Capability (IDC) See IDC/IDMP SOP #106 for details	Initial method validation and each time there is a significant change in the instrumentation, personnel, matrix or test method that affects the sensitivity of the analysis	The source and concentration of IDC may vary depending on the purpose of the study. %R = 80-120	Re-analyze and re-process IDC for analytes that fail to meet acceptance criteria.	IDC/IDMP criteria must be met prior to sample analysis.
Calibration Curve See Calibration Curves Inorganic #102 for details and validation file for historic performance	Referenced Low standard in curve should equal reporting limit	cc = 0.995, back calculation of percent recovery within 10% of true value	Identify problem(s) and re-analyze the calibration curve.	Sample analysis must not begin until criteria are met.
Initial Calibration Verification (2nd source)	Immediately following the curve	±10% or within stated limits as supplied by manufacturer (95% confidence limit)	Re-evaluate the calibration curve to verify that all criteria have been met.	Data can only be released for analytes that have passed the ICVS criteria.
Reagent Blank / Continuing Calibration Blanks	Daily at the beginning, end, and after every 10th samples	Less than the reporting limit. If RB/CCB and samples have concentrations >RL, then the RB/CCB <10% of the sample concentration	Check for contamination problems and/or instrument drift Re -run the CCB and evaluate the sample results with respect to the CCB. Reanalyze samples as determined by this evaluation.	The data may be reported with the appropriate data qualifier. Flag samples that have analyte concentrations less than 10 times the concentration found in the applicable blank .
Continuing Calibration Standard VS) -	Daily at the beginning, end, and after every 10th samples	Specification ± 10% Statistical Control· 3 st d	Re-run the CCVS and evaluate the sample results with respect to	Data can only be released fr analytes that have passed th

concentration middle of range		deviations for the control limit and 2 standard deviations for the warning limit	the CCVS result.. Reanalyze samples as determined by this evaluation.	CCVS criteria.
Procedure Blank (PB) (or Method Blank) See Table Notes 3	Per batch See Table Note 4	Less than the reporting limit. If PB and samples have concentrations >RL, then the PB must be <10% of the sample concentration.	Check for contamination problems. Evaluate the sample results with respect to the PB. Reanalyze samples as determined by this evaluation.	If samples are not reprocessed, the data may be reported with the appropriate data qualifier Flag samples that have analyte concentrations less than 10 times the concentration found in the applicable blank.
Laboratory Control Standard (LCS) - concentration upper end of range	Per batch See Table Note 4	Specification· ± 20% Statistical Control 3 standard deviations for the control limit and 2 standard deviations for the warning limit	Determine cause of problem and re-prepare and re-analyze the affected samples..	Results of analytes failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) - concentration 20 to 50 percent of range See Table Note 5 ***SDWA Compliant Requirement: Matrix Spike / Matrix Spike Duplicate (MS/MSD) concentration 20 to 50 percent of range.***	Per batch Selection of sample for MS/MSD is arbitrary See Table Note 4 ***Per batch, where a batch is defined as every 10 samples***	Specification· ±25% Recovery and RPD 20 Statistical Control 3 standard deviations for the control limit and 2 standard deviation for the warning limit ***±20%*** ***PRD 20***	Evaluate the LCS with respect to the MS/MSD. If the LCS was acceptable, evaluate sample for matrix interferences.. Examine the sample for homogeneity. Evaluate the spike concentration vs. native analyte concentration. If the concentration of analyte is >4x the spike concentration, then the spiking level is insignificant to the sample. Evaluate the sample for the presence of interferences by re-analyzing the sample and the MS at a dilution. Acceptable spike recovery indicates the presence of interference.	The information from the MS/MSD is sample/matrix specific and is not normally used to determine the validity of an entire batch. No action is taken on out of control MS/MSD data alone to qualify an entire batch

QC Table Notes·

1 Detection Limit

- Detection limit shall be initially determined for the compounds of interest in each test method in a matrix in which there are not target analytes nor interferences at a concentration that would impact the results or the detection limit must be determined in the matrix of interest
- Detection limits must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
- All sample processing steps of the analytical method shall be included in the determination of the detection limit.

2. If a QCI fails to meet accept criteria, the analyst will prepare a case narrative documenting the failure and the associated decisions regarding reanalysis vs. acceptance of the data. The case narrative will be added to the project file Project management will review case narratives during the preparation of the final report and make final decisions regarding data flagging requirements.

3. Definition of Method Blank: (per NELAC Glossary 2002 Standard) a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentration that impact the analytical results for sample analyses. Synonymous with procedure blank (PB).

4. Definition of Batch: (per NELAC Glossary 2002 Standard) environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

5. Definition of Matrix: (per NELAC Glossary 2002 Standard) the substrate of a test sample.

- Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.
- Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
- Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.
- Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined

5.2. Method Performance

5.2.1. Method performance data can be found in SM 4500 CN^- D,E,G,I, Section 6, and SW – 846, Method 9014, Section 9.0. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

5.2.2. Prior to the use of this method on analytical samples, the method must be validated with an Initial Demonstration of Method Performance (IDMP) (also known as an Initial Demonstration of Capability (IDC)) and a Method Detection Limit Study (MDL). The IDMP and MDL requirements are summarized in section Table 5 of this SOP. The determinative procedure in this SOP must be used for the associated IDMP and MDL. The IDMP and MDL are detailed in SOP #106 and #109 respectively.

5.2.3. Refer to SOP #107, "Inorganic QC" for additional information regarding QCIs.

6. Notes

6.1. Tips and Hints

6.1.1. The smell of almonds indicates the possible presence of cyanide gas. Take action immediately by clearing the lab area of personnel and contacting the safety officer. Samples which smell like almonds should be handled with extreme caution.

6.1.2. The normality of the solution affects the intensity of the color formed.

6.1.3. When connecting cold finger condenser tubing, push in the tubing until the tab clicks while squeezing the tab. Failure to depress the tab may result in a nicked o-ring and a leaky seal. The cold finger condenser may be removed from the reflux impinger without disconnecting it from the water manifolds.

6.1.4. Clean frits by dipping in 1 + 1 HCL.

6.1.5. Method 9014 states that the curve must be distilled in the same manner as the samples when treating samples for sulfide interference using bismuth nitrate. The reason stated is as follows: "Standards distilled by this method will give a linear curve, at low concentrations, but as the concentration increases, the recovery decreases." A curve was distilled using the bismuth nitrate procedure and the same response was obtained as an undistilled curve. The data is on file for reference.

6.1.6. The addition of lead carbonate to check for sulfide interferences, should be done after the 20 mL of sample being colored has been removed. The lead carbonate adds a turbid interference that can cause false positive results if the portion treated is not filtered through a Whatman 40 filter paper first.

6.2. Discussion - Regulatory Compliance

Various dechlorinating agents are referenced in the different regulatory methods.

The three referenced methods do not agree regarding the normality of the scrubber solution. The key is to maintain consistency between the normality of all blanks, standards, samples, sample dilutions, and the curve used for calculating results. The scrubber solution must have a normality that is "strong" enough to trap the evolved cyanide. The normality of solution used in this SOP is 0.25N NaOH vs. 0.125N (SW-846) method reference. The portion of reagents used to perform the colorimetric procedure is doubled to maintain equivalent chemistry.

The methods also do not agree regarding the treatment procedures for the removal of sulfide interferences. This SOP details the procedure that has proven the most successful historically. The use of bismuth nitrate for the

removal of sulfide as detailed in Method 9010 has been known to introduce a false positive result. When using bismuth nitrate for the removal of sulfide, sulfamic acid must be used in order to remove the nitrate interfe caused by the bismuth nitrate.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to Section 20 of the Quality Assurance Manual.

8. Safety

The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

Copies of specific MSDS can be obtained from various websites on an as needed basis.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The labora continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan, SOP #901, "Sample Disposal," and SOP #902, "Waste Disposal."

11. References

The analyst is required to have read and understood various supporting documents including regulatory method references, First Environmental's Quality Assurance Manual, First Environmental's Chemical Hygiene Plan, and non-method SOPs that support QA activities.

SOP #106, "Initial Demonstration of Capability / Initial Demonstration of Method Performance."

SOP #107, "Summary of Quality Control Indicators – Inorganics Analyses." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.

SOP #109, "Method Detection Limits."

SOP #112, "Statistical Control."

SOP #118, "Measurement Traceability & Calibration."

SOP #123, "Sample Instructions & Materials."

SOP #901, "Sample Disposal"

SOP #902, "Waste Disposal"

First Environmental's Quality Assurance Manual

First Environmental's Chemical Hygiene Plan

"Method of Soil Analysis", 2nd Edition, American Society of Agronomy/Soil Science Society of America.

12. Approvals

Reviewed for Technical Accuracy by: Joy Zaworski

Reviewed for Quality Assurance Compliance by: Lorrie Franklin

Implementation Date: 01/27/06

End Use Date: _____

First Environmental Laboratories

Standard Operating Procedure

Title: ICP / MS Metals

Matrices: aqueous, drinking water, solids, chemical wastes

Regulatory References: EPA 600/R-94/111 May 1994, Method 200.8 (Revision 5.4)
SW-846, 3rd Edition, December 1996, Method 6020A

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

For the determination of dissolved analytes, the sample must be filtered through a 0.45-um membrane filter at the time of collection prior to preservation. If filtering cannot be done in the field, it should be done in the laboratory as soon as practicably possible.

Preservation: HNO_3 pH<2.

If samples are not preserved at the time of collection, they should be preserved within two weeks of collection. Following acidification, the sample should be mixed, held for sixteen hours, and then verified to be pH <2. If pH is verified to be >2, more acid must be added and the sample held for sixteen hours until verified to be pH <2.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples may be stored prior to analysis at 4°C or room temperature.

Container: 250 or 500 cc plastic or 16 oz jar (use 500cc plastic if Hg analysis is also required)

Single Analysis Sample Volume: 50 mL / 0.5 g

Holding Time: 6 months

(Range) Reporting Limit - Upper End: analyte specific. See Table 1, Compound List and Analytical Range.

Summary of Method: The instrument used by First Environmental Laboratories, Inc. for performing ICP/MS metals analyses is a Perkin Elmer Elan 9000 ICP-MS. If necessary, samples are digested prior to analysis. Samples are nebulized into a radio frequency plasma where ionization occurs. The ions produced in the plasma gas are then introduced into a high vacuum chamber and separated on the basis of their mass-to-charge ratio by a quadrapole mass spectrometer. The separated ions are detected by an electron multiplier and the information is processed by a data handling system. Internal standards are used to compensate for changes in the instrument sensitivity and sample matrix.

SDWA Requirement

If sample(s) have turbidity >1.0 NTU, then the sample must be digested utilizing the appropriate procedure.

The nomenclature used in method 200.8 differs from that used in this SOP.

Compound List and Analytical Range
Methods 200.8R5.4/6020
Instrument – Perkin Elmer Elan 9000 ICPMS

Table 1

Analyte	Reporting Limit Aqueous mg/L	Reporting Limit Non-Aqueous mg/kg	High End of Range mg/L
Arsenic	0.002	0.2	0.5
Aluminum	0.05	5.0	0.5
Antimony	0.006	1.0	0.5
Barium	0.001	0.1	0.2
Beryllium	0.001	0.1	0.5
Boron	0.01	1	0.1
Cadmium	0.001	0.1	0.5
Calcium	0.1	10	80
Chromium	0.001	0.1	0.5
Cobalt	0.001	0.1	0.5
Copper	0.001	0.1	0.5
Iron	0.01	1.0	0.5
Lead	0.002	0.2	0.1
Magnesium	0.1	10	50
Manganese	0.001	0.1	0.5
Molybdenum	0.01	1.0	0.3
Nickel	0.001	0.1	0.5
Potassium	0.1	10	25
Selenium	0.002	0.2	0.5
Silver	0.001	0.1	0.2
Sodium	0.1	10	50
Thallium	0.002	1.0	0.1
Tin	0.02	2	0.3
Vanadium	0.01	1.0	0.5
Zinc	0.005	0.5	0.5

The high end of range may be extended by introducing a dilution.

1. Instrumentation / Apparatus / Plasticware

1.1. Instrument model: Elan 9000 ICP-MS with Nickel interface cones, a cross flow nebulizer and a Scot-type spray chamber made of acid resistant Ryton plastic. The instrument uses the AS-90 autosampler.

1.2. Argon Gas Supply – High purity grade (99.99%)

1.4. Disposable sample tubes SKALAR Part No. SA1033

1.5. Peristalic Pump Tubing for Gilson peristaltic pump:

Black/Black - 0.030 mm i.d. (for sample introduction)
Purple/White – 0.110 mm i.d. (for drain)
Red/Red – 0.045 mm i.d. (for rinse station)

1 6. A Polyscience Model 3370 Air cooled recirculator is used to keep the cooling water temperature constant.

1.7. Analytical Balance, capable of weighing to 0.1mg accurately

1.8. Top Pan Balance, capable of weighing to 0.05g accurately

1.9. Labware: all reusable labware should be plastic.

2. Reagents

All reagents should be prepared from reagent grade materials using E-pure water and volumetric plastic ware. Care must be taken not to contaminate solutions with metals or minerals.

2.1. Concentrated Ultra-Pure Nitric Acid Catalog #NX0407-2
NFPA Diamond Safety Information for Nitric Acid (HNO_3): Health (blue) 3 / Hazard (white) oxidizer.

3. Calibration Standards & Spiking Solutions

3.1. All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, must be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the appropriate Standards Tracking Log. This unique number will also be applied to the label and the calibration certificate (documentation received from the vendor). This certificate documents the traceability to national standards of measurement and is retained for reference. The tracking log will also contain information on the expiration date of each standard entry.

3.2. Details regarding the preparation of solutions used to perform analyses are found in the bench reference titled, 508.1 ICPMSSTD

3.3. All standards should be prepared from reagent grade materials using E-pure water and volumetric plastic ware. See the attachment to this SOP.

3.4 The instrument is calibrated with 5 standards of varying concentrations (10, 20, 100, 1000 and 10000 ppb) and a blank. The calibration curve is forced through zero. The correlation coefficient for the first order linear plot of the calibration curve must be 0.995 or greater.

3.5 The linearity and accuracy of the curve are tested with a standard that is purchased from a vendor with a separate lot number from that of the calibration standards (second source). The level used for the second source solution is approximately one half of the highest calibrated standard. The concentration of this standard must fall between 90-110% of the stated true value for the data to be acceptable. This solution is run immediately after the initial calibration and subsequently after 10 samples. Data that does not meet these criteria cannot be used.

3.6 Data is not reported if it exceeds the linear range. The sample must be diluted within the linear range in order for the result to be valid.

3.7. Recommended source for PE samples is ERA.

4. Analytical Procedure

4.1. Interferences

4.1.1. Isobaric interferences occur when an isotope of one element is at the same nominal mass as an isotope of another element (e.g., Mo 98 and Ru 98). Corrections for isobaric interferences may be made by measuring the intensity due to the interfering element at another isotope and using its natural abundance ratios to correct for its presence at the analytical mass of interest. Most commonly used corrections for isobaric interferences are already present as default interference equations in the ELAN NT software.

4.1.2. Molecular interferences are caused by molecular species formed in the plasma with plasma or matrix ions (examples of common molecular interferences include ArCl, ClO, nitrogen dimer, oxygen dimer, oxide species, double charged species, etc.) Predictions about the type of molecular interferences may be made using knowledge about the sample matrix. Molecular interferences can often be corrected for in the same manner as isobaric interferences, i.e., measuring the intensity present at another isotope and using isotope ratios to calculate the amount of the interfering species. For example, corrections for interferences of $Ar^{40}Cl^{35}$ on As at mass 75 may be made by measuring the intensity of ArCl present at mass 77 ($Ar^{40}Cl^{37}$) and converting to the apparent intensity of ArCl at mass 75 by using the isotopic ratio of Cl^{37} to Cl^{35}.

4.1.3. Abundance sensitivity is a property defining the degree to which the wings of a mass peak contribute to adjacent masses. The abundance sensitivity is affected by ion energy and quadrupole operating pressure. Wing overlap interferences may result when a small ion peak is being measured adjacent to a large one. The spectrometer resolution can be adjusted to minimize wing overlap.

4.1.4. Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer and the tip of the injection tube on the torch. This may affect aerosol flow rate and cause instrumental drift.

4.1.5. Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Chemical interferences are highly dependent on matrix type and the specific analyte.

4.1.6. Memory interferences result when analytes in a previous sample contribute to the signals measured in a new sample. Memory effects can result from sample deposition on the uptake tubing to the nebulizer and from the build up of sample material in the plasma torch and spray chamber.

4.1.7. Internal standardization must be used in all analyses to correct for instrument drift and physical interferences. For full mass range scans, a minimum of three internal standards must be used. Internal standards must be present in all samples, standards and blanks at identical levels.

4.1.8. All masses which might affect data quality must be monitored during the analytical run. This information should be used to correct the data for identified interferences.

4.2. Instrument Startup

1. Set the pressure gauge for the argon tank to 120 PSI and the instrument pressure gauge to 80 PSI.

2. Turn on the two vents and water recirculator.

2. Check tubing. It should not be flat, hard, worn, or discolored.

3. Load tubing onto the peristaltic pump using the collars on the tubing. The purple/white tubing is for the drain, the black/black tubing is for introduction of sample to the instrument. The sample tubing may need to be replaced often, but the other tubing used for the drain should last much longer.

4. Review maintenance log for instrument conditions and note where appropriate.

5. Rinse solution should be at least half full. If not, prepare more and fill.

6. Waste Container: make sure the container is not more that ¾ full. If it is, then empty the contents flushing the waste area with lots of water.

7. Interface Cones: Open the torch box. Remove and inspect the outside of the sampling and skimmer cones around the orifice. Using a Kimwipe, gently rub the cones to remove surface deposits. It may be necessary to clean the cones with detergent if they seem to be dirty. Care must be used not to damage the cones when cleaning is required. Replace cones after they have been checked and cleaned. Close torch box.

8. Chiller Temp, Ppressure and Water Level: the temperature of the water needs to be regulated at 18 degrees. The unit will indicate whether the level is optimal for use by a low water light on the front of the unit.

9. Start up the Elan Software

10. Open the instrument panel using the instrument icon on the toolbar.

11. Using the mouse, select the "Start" button.

12. Send the autosampler probe to the rinse position.

13. Allow instrument to warm up for least 30 minutes prior to checking performance.

4.3 Checking Instrument Performance

1. After 30 minute warm up, open the Daily Performance Workspace file "_First Daily Performance.wrk"

2. Check the instrument performance with the Stab/Masscal Solution (PE #N8125030). Monitor the levels for Rhodium, Background at Mass 220, % double charged ions, and % oxide levels. The following ranges are acceptable for routine analysis:

Magnesium	>100,000cps
Indium	>400,000cps
Uranium	>300,000cps
Background at mass 220:	<25
% Double Charge Ba2+/Ba:	<3%
% Oxide CeO/Ce:	<3%

Oxides and double charged levels can be reduced by slightly decreasing the nebulizer flow rate.
If acceptable levels are obtained, the analysis can proceed.
If unacceptable levels are obtained, perform maintenance following the steps outline in the maintenance log.

4.4. Analysis

1. Open the workspace file "_FirstSmplanlysis.wkp".
2. Select the "Review files" option from the files menu.
3. Choose the "New" button next to the dataset filename. Use the format MMDDYY to save the new file.
4. Change the destination pathname found on the "Report" tab for the method. Change to format MMDDYY.
5. Edit the Sample window for batch analysis to update with new sample information.
6. The Calibration action for the first sample for which concentration results are desired must be "analyze blank, standards, and sample"
7. The calibration action for all other samples is usually "Analyze Sample", unless periodic recalibration is desired
8. Enter peri-pump control speeds for all samples
9. Save Sample file
10. Load the samples into the autosampler positions specified in the sample file.
11. Select the samples to be analyzed by highlighting the row number with the mouse
12. Select "Analyze Batch"

Aspirate the rinse blank for 5-10 minutes before beginning a batch run to avoid carry-over and contamination

4.5. Queue

Calibration Standards
ICV
ICB
Low Level Verification Standard
ICSA
ICSAB
PB
LCS
MS
MSD

10 samples
Rerun CCV and CCB every ten samples and at the end of the run

Note: all QC standards & MS/MSD, except for calibration standard(s), are prepared from a second source stock standard.

4.6. Sample Analysis

4.6.1. All samples are digested except for dissolved metals and drinking water samples Refer to the digestion bench references for details regarding the actual digestion procedures. If sample(s) have turbidity >1.0 NTU, then the sample must be digested utilizing the appropriate procedure.

4.6.2. Samples requiring dissolved metals must be filtered through a 0.45-um membrane filter at the time of collection prior to preservation. If filtering cannot be done in the field, it will be done in the laboratory as soon as practicably possible.

4.6.3. SDWA samples require digestion if the turbidity of the sample is greater than 1 NTU.

4.7. Shutdown

1. Open the instrument panel using the instrument icon on the toolbar.
2. Using the mouse, select the "Stop" button.
3. Shut off vents and recirculation.
4. Remove pump tubing from peristaltic pump

4.8. Calculations

Results are expressed on the instrument printout as ug/L. Apply appropriate dilution factors and/or sample preparation factors. If required, convert the result o mg/L or mg/kg prior to entry in the LIMS.

4.9. Calculation of Hardness

ppm Ca x 2.497 + ppm Mg x 4.118 = Total Hardness (ppm)

4.10. Reporting Limits

4.10.1. The routine reporting limits are listed in Table 1, Compound List and Analytical Range.

4.10.2. Reporting limits are normally at least 20 times the method detection limit. This enables the use of routine reporting limits even when a 5 or 10 times dilution is performed due to matrix issues such as high TDS. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

4.10.3. Soils should be expressed on a dry weight basis as mg/kg. The exception would be a solid material submitted for RCRA compliance, in which case the results should be expressed on a wet weight basis.

4.10.4. Information regarding significant figures and rounding can be found in the following file: madre/word/forms/qa/rounding sig fig.doc.

4.10.5. Information regarding auto-calculation spreadsheets can be found in SOP #115, "Electronic Da' Management." madre/word/sop/qa/approval forms auto calc.doc

4.11. Record Keeping

4.11.1. Results of MS/MSD are calculated via the calculation program used for control charting. This data sheet is printed and kept in the QC file. Evaluation of the acceptability of all QCIs must be performed prior to releasing data.

4.11.2. QC data is filed by date, while sample data is filed chronologically by client.

5. Quality Control

5.1. Each quality control indicator (QCI) must be assessed for compliance with the following criterion on a real time basis. Failure to meet the criterion fails the batch. When applicable, the percent recovery and/or the relative percent difference (RPD) are also recorded on the raw data/lab book form.

DAILY

Quality Control Indicator (QCI)	Frequency	Acceptance Criteria (Specification or Statistical Requirement)	Initial Corrective Action	Final Action / Data Qualification
Method Detection Limit Study (MDL) See MDL SOP #109 for details See QC Table Notes 1	Initial method validation and each time there is a significant change in the test method that affects how the test is performed. or when a change in instrumentation occurs that affects the sensitivity of the analysis, provided the reporting limit is equal to the low standard in the calibration curve, or a reporting limit verification standard is run daily.	The calculated MDL must be greater than 1/10th the MDL spiking concentration and greater than "0", and the MDL spiking concentration must be greater than the calculated MDL. Minimum of 7 replicates.	Re-analyze and re-process MDL for analytes that fail to meet acceptance criteria.	Do not report results below the MDL.
Initial Demonstration of Capability (IDC) See IDC/IDMP SOP #106 for details	Initial method validation and each time there is a significant change in the instrumentation, personnel, matrix or test method that affects the sensitivity of the analysis.	The source and concentration of IDC may vary depending on the purpose of the study. %R = 80-120	Re-analyze and re-process IDC for analytes that fail to meet acceptance criteria.	IDC/IDMP criteria must be met prior to sample analysis
Linear Dynamic Range (LDR) - concentration is at upper limit	Annual Verification Or Instrument Change	±10%	NA	If the LDR cannot be verified, then the LDR must be re-determined.
Internal Standard	Added to every sample, blank, standard	SW-846: 30-120% *EPA 200.8: 60-125%* of original response in calibration blank Refer to Table 2: Analytes and	Flush system with rinse blank and monitor intensities of internal stand in calibration blank. If problem continues, dilute fresh aliquot of sample by	Do not report results when internal standard does not meet acceptance criteria. Consult with Project Manager.

		Associated Internal Standards	factor of two, add appropriate internal standard and reanalyze.	
Initial Calibration	Daily	>0.995	NA	NA
Continuing Calibration Verification Standard 2nd source	after every 10 samples and at the end	90%-110%	Re-run the CCVS and evaluate the sample results with respect to the CCVS result. Reanalyze samples as determined by this evaluation.	Samples must be reanalyzed that are bracketed by the QC sample.
Reagent Blank / Continuing Calibration Blanks	Daily at the beginning, end, and after every 10 samples	Less than the reporting limit	Check for contamination problems and/or instrument drift. Re-run the CCB and evaluate the sample results with respect to the CCB. Reanalyze samples as determined by this evaluation.	Reanalyze those samples that do not meet evaluation criteria.
Low Level Calibration Verification Standard	Daily	80-120%	The laboratory's sample result cannot be reported lower than the lowest calibration standard unless a low level calibration verification standard is analyzed. If the percent recovery does not meet acceptance criteria, the reporting limit should be re-evaluated .	.
Procedure Blank (PB) (also called method blank)	Per batch	Less than Reporting Limit If PB and samples are >RL, then PB must be <10% of sample concentration	Evaluate the sample results with respect to the PB results. Samples >RL and <10x's the procedure blank need re-digestion and reanalysis	Sample that are affected are redigested and reanalyzed.
Laboratory Control Standard (LCS) -	Per batch	Specification: SW-846: 80%-120% *EPA 200.8· 85-115%* Statistical: 3 standard deviations for the control limit and 2 standard deviations for the warning limit	Determine cause of problem and re-prepare and re-analyze the affected samples. If CCV passed, determine if LCS solution is compromised.	Samples must be redigested if no known source of failure exists.

Matrix Spike / Matrix Spike Duplicate (MS/MSD) – (concentration 20 to 50 percent of calibration range)	Per batch	Specification: 75%-125% 3 standard deviations for the control limit and 2 standard deviation for the warning limit	Evaluate the LCS with respect to the MS/MSD. If the MS/MSD failed and the LCS was acceptable, evaluate the sample for the presence of matrix interferences	Case narrative issued for corresponding sample noting unacceptable recovery obtained.
Duplicate	As Required	Specification RPD <20 If sample concentration is <5 times RL, then acceptance criteria is ± RL	If the duplicate failed, evaluate sample homogeneity.	Reanalyze samples as determined by this evaluation and/or flag data as appropriate.
Serial Dilution*	Per batch on the same sample chosen for MS/MSD, when MS/MSD fails	Dilution prepared @ a 5x should have 10% reproducibility	Qualify MS/MSD sample data accordingly	Case narrative issued for corresponding sample.
Post Spike* (concentration is 20 to 50% of calibration range.)	Per batch on same sample chosen for MS/MSD, when MS/MSD fails	Specification: 75-125%	Qualify MS/MSD sample data accordingly	Case narrative issued for corresponding sample.
A Procedure Blank and a Laboratory Control Standard are required only if the sample is "prepared".				
*Method recommends the analysis of a sample using serial dilution when a new or unusual matrix is analyzed. A post-digestion spike would not need to be performed if the MS/MSD spike recovery meets acceptance criteria.				

QC Table Notes:

1. Detection Limit

- Detection limit shall be initially determined for the compounds of interest in each test method in a matrix in which there are not target analytes nor must interferences at a concentration that would impact the results or the detection limit are determined in the matrix of interest.
- Detection limits must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
- All sample processing steps of the analytical method shall be included in the determination of the detection limit.

2. If a QCI fails to meet accept criteria, the analyst will prepare a case narrative documenting the failure and the associated decisions regarding reanalysis vs. acceptance of the data. The case narrative will be added to the project file. Project management will review case narratives during the preparation of the final report and make final decisions regarding data flagging requirements.

3. Definition of Method Blank: (per NELAC Glossary 2002 Standard) a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentration that impact the analytical results for sample analyses. Synonymous with procedure blank (PB).

4. Definition of Batch: (per NELAC Glossary 2002 Standard) environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting

the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

5. Definition of Matrix: (per NELAC Glossary 2002 Standard) the substrate of a test sample.

- Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source Includes surface water, groundwater, effluents, and TCLP or other extracts.
- Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
- Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.
- Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

5.2. Linear Dynamic Range Analysis (LDR)

The upper limit of the linear dynamic range must be established for each analyte by determining the signal responses from three to five different concentration standards across the range. The data is evaluated and the range of analysis determined by the analyst.

A standard at the upper limit analyzed and quantitated against the normal calibration must be within 10% of the true value.

5.3. Method Performance

5.3.1. Method performance data can be found in EPA 200.8R5.4, Tables 9, 10, & 11. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

5.3.2. Prior to the use of this method on analytical samples, the method must be validated with an Initial Demonstration of Method Performance (IDMP) (also known as an Initial Demonstration of Capability (IDC)) and a Method Detection Limit Study (MDL). The IDMP and MDL requirements are summarized in section Table 5 of this SOP. The determinative procedure in this SOP must be used for the associated IDMP and MDL. The IDMP and MDL are detailed in SOP #106 and #109 respectively.

5.3.3. Refer to SOP #129, "Quality Control Indicators – Inorganics & Organics". This SOP is for training purposes and method requirements supersedes information provided int this training document.

5.4. QC Packages

Details regarding the use of data flags are found in the bench reference titled "Rules for use of Flags for Metals Analyses & Metals Data Evaluation." (File name madre/company file/word files/sop/metals/rules metals flags.doc)

6. Notes

6.1. Regulatory / Method Compliance

6.1.1. The method (6020) states in section 9.3. that "if the blank is less than 5% of the MDL Check Sample, less than 5% of the regulatory limit, or less than 5% of the lowest sample concentration for each analyte, whichever is greater, then the method blank is considered acceptable." This SOP requires that the procedure blank be less than the reporting limit. If the procedure blank is greater than the reporting limit and the samples are greater than the reporting limit, the procedure blank is considered acceptable if the samples are greater than 10 times the procedure blank.

6.1.2. The method (6020) states in section 10.3.3. that the MDL check sample must be analyzed after the completion of the MDL study and on a quarterly basis to demonstrate detection capability. This SOP requires that the MDL check sample be analyzed only after the completion of the MDL study that is performed annually.

6.1.3. The method (6020) states in section 10.3.4 that the upper limit of the linear dynamic range should be verified every six months. This SOP requires that the upper limit of the linear dynamic range be verified annually.

6.1.4. The method (6020) states in section 10.4.2. that "the resulting curve must then be verified with mid-lev and low level calibration verification standards." This SOP allows for verification of the low range of analy by analyzing a low level verification standard daily.

6.1.5. The method (6020) states in section 5.6. that "the ICS is used to verify that the interference levels are corrected by the data system within quality control limits." But limits are not provided defining the quality control limits. Method 200.8 excludes discussion regarding use of ICS. This SOP excludes the use of ICS. The internal standard provides an indication of potential interferences. Serial dilution can be utilized to further define the extent of the interference.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to Section 20 of the Quality Assurance Manual.

Quality Control Standard (QCS) = Initial Calibration Verification (ICV)
Continuing Calibration Verification (CCV)
Laboratory Reagent Blank (LRB) = Procedure Blank (PB)
Laboratory Control Standard (LCS) = Laboratory Fortified Blank (LFB)
Matrix Spike (MS) = Laboratory Fortified Matrix (LFM)
Interelement Check Standard (ICSA/ICSAB) = Spectral Performance Check (SPC)

8. Safety

The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemic should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

Copies of specific MSDS can be obtained from various websites on an as needed basis.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan, SOP #901, "Sample Disposal," and SOP #902, "Waste Disposal."

11. References

The analyst is required to have read and understood various supporting documents including regulatory method references, First Environmental's Quality Assurance Manual, First Environmental's Chemical Hygiene Plan, and non-method SOPs that support QA activities.

SOP #106, "Initial Demonstration of Capability / Initial Demonstration of Method Performance."
SOP #129, "Summary of Quality Control Indicators – Inorganics & Organics" Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.
SOP #109, "Method Detection Limits."
SOP #112, "Statistical Control."
SOP #118, "Measurement Traceability & Calibration."
SOP #123, "Sample Instructions & Materials."
SOP #901, "Sample Disposal"
SOP #902, "Waste Disposal"
Bench references for metals digestion
First Environmental's Quality Assurance Manual
First Environmental's Chemical Hygiene Plan
"Inductively Coupled Plasma-Mass Spectrometry", U.S. EPA SW-846 Method 6020, Second Update, September 1994, Revision 0.
ELAN 9000 Hardware Manual, 1995, Perkin-Elmer Corporation.
ELAN 9000 ICP-MS Software Manual, 1995, Perkin-Elmer Corporation.
Method 6020, "Inductively Coupled Plasma – Mass Spectrometry" from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, December 1996 and it's updates.
Method 200.8, "Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry", Revision 5.4, EPA/600/R-94/111.

12. Approvals

Reviewed for Technical Accuracy by: _____
Donna O'Connell

Reviewed for Quality Assurance Compliance by: _____
Lorrie Franklin

Implementation Date: 08/16/06

End Use Date: _____

Analytes and Associated Internal Standards

Analyte	Internal Standard
Be	Li
B	Li
Al	Sc
V	Sc
Cr	Sc
Mn	Sc
Co	Sc
Ni	Sc
Cu	Sc
Zn	Ge
As	Ge
Se	Ge
Mo	In
Ag	In
Cd	In
Sn	In
Sb	In
Ba	Tb
Tl	Tb
Pb	Tb
Na	Sc-1
Mg	Sc-1
K	Sc-1
Ca	Sc-1
Fe	Sc-1

Table 2

First Environmental Laboratories

Standard Operating Procedure

Title: ICP Metals

Matrices: wastewater, drinking water, groundwater, soil/sediment, wastes

Regulatory References: EPA 600/R-94/111 May 1994, Method 200.7 (Revision 4.4)
SW-846, 3rd Edition, December 1996, Method 6010B

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

For the determination of dissolved analytes, the sample must be filtered through a 0.45-um membrane filter at the time of collection prior to preservation. If filtering cannot be done in the field, it should be done in the laboratory as soon as practicably possible.

Preservation: HNO_3 pH<2.

If samples are not preserved at the time of collection, they should be preserved within two weeks of collection. Following acidification, the sample should be mixed, held for sixteen hours, and then verified to be pH <2. If pH is verified to be >2, more acid must be added and the sample held for sixteen hours until verified to be pH <2.

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples may be stored prior to analysis at 4°C or room temperature.

Container: 250 or 500 cc plastic or 16 oz jar (use 500cc plastic if Hg analysis is also required)

Single Analysis Sample Volume: 50 mL / 0.5 g

Holding Time: 6 months

(Range) Reporting Limit - Upper End: analyte specific. See Table 1, Compound List and Analytical Range.

Summary of Method: The instrument used by First Environmental Laboratories, Inc. for performing ICP metals analyses is a Trace 61E TJA ICP. If necessary, samples are digested prior to analysis. Samples are nebulized and the resulting aerosol is transported to the plasma torch. A radio-frequency inductively coupled plasma produces element specific emission spectra. The spectra are dispersed by a grating spectrometer, and the intensities of the line spectra are monitored at specific wavelengths by photomultipliers. Photocurrents from the photomultipliers are processed and controlled by a computer system. Background correction is required to compensate for variable background contribution to the determination of the analytes.

SDWA Requirement

If sample(s) have turbidity >1.0 NTU, then the sample must be digested utilizing the appropriate procedure.

The nomenclature used in method 200.7 differs from that used in this SOP.

Compound List and Analytical Range
Methods 200.7R4.4/6010C
Instrument – Trace 61E TJA ICP

Table 1

Analyte	Reporting Limit Aqueous mg/L	Reporting Limit Non-Aqueous mg/kg	High End of Range mg/L
Arsenic	0.002	0.2	25
Aluminum	0.05	5.0	1000
Antimony	0.006	1.0	25
Barium	0.001	0.1	5
Beryllium	0.001	0.1	2
Cadmium	0.001	0.1	25
Calcium	0.1	10	1000
Chromium	0.001	0.1	75
Cobalt	0.001	0.1	75
Copper	0.001	0.1	75
Iron	0.01	1.0	300
Lead	0.002	0.2	75
Magnesium	0.1	10	1000
Manganese	0.001	0.1	25
Molybdenum	0.01	1.0	25
Nickel	0.001	0.1	75
Potassium	0.1	10	25
Selenium	0.002	0.2	25
Silver	0.001	0.1	10
Sodium	0.1	10	75
Thallium *	0.01 (0.002)	1.0	75
Vanadium	0.01	1.0	25
Zinc	0.005	0.5	5

Thallium: the most stringent objective established by current TACO revision is 0.002 mg/L

The range may be extended by introducing a dilution.

1. Instrumentation / Apparatus / Glassware

1.1. See Section 6 of EPA Method 200.7

1.2. 61E TJA Trace ICP

1.3. Part numbers for replacement parts and consumables can be found in the TJA and EE catalogs.

1.4. Argon Gas Supply – High purity grade (99.99%)

1.5. Disposable sample tubes

2. Reagents

All reagents should be prepared from reagent grade materials using deionized water and volumetric glassware.

2.1. Concentrated Nitric Acid

2.2. Concentrated Hydrochloric Acid

3. Calibration Standards & Spiking Solutions

3.1. Details regarding the preparation of solutions used to perform analyses are found in the bench reference titled "ICPSTD". All standards should be prepared from reagent grade materials using deionized water and volumetric glassware. See the attachment to this SOP.

3.2. Recommended source for PE samples is ERA.

4. Analytical Procedure

4.1. Interferences

4.1.1. Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra.

4.1.2. Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. Another problem that can occur with high dissolved solids is salt buildup

at the tip of the nebulizer and the tip of the injection tube on the torch. This may affect aerosol flow rate and cause instrumental drift.

4.1.3. Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Chemical interferences are highly dependent on matrix type and the specific analyte.

4.1.4. Memory interferences result when analytes in a previous sample contribute to the signals measured in a new sample. Memory effects can result from sample deposition on the uptake tubing to the nebulizer and from the build up of sample material in the plasma torch and spray chamber.

4.1.5. Silver is only slightly soluble in the presence of chloride unless there is a sufficient chloride concentration to form the soluble chloride complex. Low recoveries of silver may occur in samples, spiked samples and even the LCS when determined by direct analysis. Sample digestion should reduce this interference.

4.1.6. Method 6010C, Section 4., contains extensive information regarding interferences and appropriate means for minimizing and correcting interferences. This section should be read and understood by the analyst.

4.2. Instrument Startup

The following information guides instrument startup from the *Plasma Control Panel:*

1. Set the argon tank to 75 PSI.

2. Turn on the vent and circulator

3. Check tubing. It should not be flat, hard, worn, or discolored.

4. Check nebulizer for clogs

5. If running samples using the autosampler, attach both tubing cartridges. The red tubing cartridge pumps acidified rinse water to the autosampler (bottom position), while the orange tubing cartridge pumps sample to the instrument (top position). The tubing from the red cartridge should be in acidified D.I. H_2O (2% HNO_3/5%HCl).

6. Press *F1* = startup
   - Ignition may take a couple of attempts.
   - Plasma startup default levels are as follows:
     Purge Time = 90
     RF Power = 950

7. Press *F9* = continue

8. Press *F2* = levels
   - Change pump rate to 130 (RPM)

9. Set the tension on the orange tubing cartridge by aspirating acidified rinse water and increasing the tension until the flow starts. Increase tension by one more notch. The pump must be off to perform this adjustment.

10. Check the sample nebulization. The flow should be even, not pulsing.

11. Press *F9* = done keep

12. Press *esc* to return to the main menu. Allow 30 minutes for instrument warm-up.

4.3. Profile

After 30 minute warm-up, to profile the instrument choose *Analysis* from the main menu and choose *profile* from the sub menu.

1. Aspirate a 5 ppm arsenic solution. It will take about 40 seconds for the solution to reach the torch.

2. Press *F3* = automatic
   - (Default settings for initial profile are as follows:)
     Flush time = 40 seconds
     Pre-integration time = 0 seconds
     Integration time = 0.5 seconds

3. Press *F1* = Run

4. If peak offset is within ±0.02, hit done/keep (*F9*), if not,

5. Press *F1* = Calc SS

6. Enter the vernier position (normally lists the previous position).

7. Press *enter*

8. Instrument will calculate the new vernier position. Set the monocrometer to this position.

9. Press *esc* (don't save), *enter*

10. Repeat the above steps until the peak offset is within ±0.02. When acceptable, press *F9* = done/keep and exit the screen.

11. Record information in Daily Optimization Record.

4.4. Autosampler

To setup the autosampler table, choose *Operation* from the main menu, and choose *autosample setup* from the sub menu.

1. Enter autosampler table name. The name is usually the date.

2. Press *enter*

3. Run autosampler macro = *control* + *F3*. Enter macro name, "*AS*."
   - Enter digestion or sample information on comment line.
   - Verify operator ID.
   - Verify auto rinse setting = yes
   - Verify rinse time = 10.0 seconds
   - Enter number of unknowns (usually 24)
   - If appropriate, enter default sample name.
   - If necessary, enter "yes" for auto increment.
   - Verify limit check table default = range

4. *F1* = Edit samples
   - Enter sample laboratory identification.
   - Ensure that the cursor is in position #1 prior to inserting QC.
   - Run calibration macro = *control* + *F3*. Enter macro name, "*CAL*."
   - Move cursor 10 samples.
   - Run QC macro = *control* + *F3*. Enter macro name, "*QC*." Enter calibration standard reference IDs from metals calibration standards log / standards containers.
   - Repeat inserting QC macro for every group of 10 samples.
   - After last sample, run end QC macro = *control* + *F3*. Enter macro name, "*END*."
   - Unless required, delete end ICSA, ICSAB.

5. Verify that the check table entry correspond with the correct sample type.

Sample Type	Check Table Entry
Samples	Range
CCV	CCV
CCB	Blank
CCV2	CCV2
STD-1	Blank
ICSA	ICSA
ICSAB	ICSAB
PB	PB
LCS (soil)	LCSSO
LCS (water)	LCS
LLCVS	LLCVS
HLCVS	HLCVS

Note: The QC label must match exactly otherwise it is treated as a different QC sample.

QC tables and sample tables are used to flag data automatically. The use of these tables are built into the method.

4.5. Queue

Calibration Standards
ICV
ICB
Low Level Verification Standard
ICSA
ICSAB
PB
LCS
MS
MSD
10 samples
Rerun CCV and CCB every ten samples and at the end of the run
High Level Verification Standard

Note: all QC standards & MS/MSD, except for calibration standard(s), are prepared from a second source stock standard.

4.6. Sample Analysis

4.6.1. All samples are digested except for dissolved metals, provided silver and selenium are not required, and drinking water samples. Samples requiring dissolved silver and/or

dissolved selenium must be digested. Refer to the digestion bench references for details regarding the actual digestion procedures.

4.6.2. Samples requiring dissolved metals must be filtered through a 0.45-um membrane filter at the time of collection prior to preservation. If filtering cannot be done in the field, it will be done in the laboratory as soon as practicably possible.

4.6.3. SDWA samples require digestion if the turbidity of the sample is greater than 1 NTU.

4.6.4. To run samples choose *Operation* from the main menu, and choose *Analysis* from the sub menu.

1. Enter the method name, normally this will be "*HSL*".

2. Press *F9* = autosampler

3. Enter table name, this will normally be the date.

4. Press *F1* = run

4.6.5. All analytes are processed simultaneously in a single run on the instrument.

4.7. Shutdown

To shutdown the instrument choose *Setup* from the main menu and choose *Plasma Control Panel* from the sub menu.

1. Flush the sample tubing with acidified D.I. water (2% HNO_3/5%HCl) and then completely drain the tubing by aspirating air until the tubing is clear of sample.

2. Press *F7* = Shutdown

3. Unhook tubing cartridges.

4. Shut off vent fan, argon, and circulator.

4.8. Calculations

The calculation module automatically calculates the concentration of the samples in mg/L (in solution). The analyst must include factors resulting from sample preparation and/or the need to analyze the sample at a dilution.

4.9. Calculation of Hardness

ppm Ca x 2.497 + ppm Mg x 4.118 = Total Hardness (ppm)

4.10. Reporting Limits

4.9.1. The routine reporting limits are listed in Table 1, Compound List and Analytical Range.

4.9.2. Reporting limits are normally 2-3 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

4.9.3. Soils should be expressed on a dry weight basis as mg/kg.

4.9.4. Information regarding significant figures and rounding can be found in the following file: madre/word/forms/qa/rounding sig fig.doc.

4.9.5. Information regarding auto-calculation spreadsheets can be found in SOP #115, "Electronic Data Management." madre/word/sop/qa/approval forms auto calc.doc

4.11. Record Keeping

Results of MS/MSD are calculated via the calculation program used for control charting. This data sheet is printed and kept in the QC file. Evaluation of the acceptability of all QCIs must be performed prior to releasing data.

QC data is filed by date, while sample data is filed chronologically by client.

5. Quality Control

5.1. Each quality control indicator (QCI) must be assessed for compliance with the following criterion on a real time basis. Failure to meet the criterion fails the batch. When applicable, the percent recovery and/or the relative percent difference (RPD) is also recorded on the raw data/lab book form.

DAILY

Quality Control Indicator (QCI)	Frequency	Control Limit (Interim)	Control Limit (Statistical)	Initial Corrective Action
Initial Calibration (Calibration Blank and Single Point Standard)	Daily	NA	NA	NA
Initial Calibration Verification Standard 2nd source (concentration is mid level)	After calibration check	90-110%	NA	Re-evaluate the calibration to verify that all criteria have been met. If necessary, re-calibrate the instrument.
Low Level Calibration Verification Standard	Daily	80-120%		The laboratory's sample result cannot be reported lower than the lowest calibration standard unless a low level calibration verification standard is analyzed. If the percent recovery does not meet acceptance criteria, the reporting limit should be re-evaluated or flagged as appropriate
Reagent Blank / Continuing Calibration Blanks	Daily at the beginning, end, and after every 10 samples	Less than the reporting limit	NA	Check for contamination problems and/or instrument drift. Re-run the CCB and evaluate the sample results with respect to the CCB. Reanalyze samples as determined by this evaluation.

Quality Control Indicator (QCI)	Frequency	Control Limit (Interim)	Control Limit (Statistical)	Initial Corrective Action
Continuing Calibration Verification Standard 2nd source	after every 10 samples and at the end	90%-110%	NA	Re-run the CCVS and evaluate the sample results with respect to the CCVS result. Reanalyze samples as determined by this evaluation.
Interference Check Standard	At the beginning of the run batch	80%-120%	NA	Data for the effected analytes cannot be reported. Effected samples must be re-analyzed.
Procedure Blank (PB) (also called method blank)	Per batch	Less than Reporting Limit If PB and samples are >RL, then PB must be <10% of sample concentration	NA	Evaluate the sample results with respect to the PB results. Samples >RL and <10x's the procedure blank need re-digestion and reanalysis.
Laboratory Control Standard (LCS) -	Per batch	80%-120% - SW-846 *85-115% - EPA 200.7*	3 standard deviations for the control limit and 2 standard deviations for the warning limit	Determine cause of problem and re-prepare and re-analyze the affected samples. If CCV passed, determine if LCS solution is compromised.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) – (concentration 20 to 50 percent of calibration range)	Per batch	±25%R RPD <20	3 standard deviations for the control limit and 2 standard deviation for the warning limit	Evaluate the LCS with respect to the MS/MSD. If the MS/MSD failed and the LCS was acceptable, evaluate the sample for the presence of matrix interferences.
Duplicate	As Required	RPD <20 If sample concentration is <5 times RL, then acceptance criteria is ± RL	NA	If the duplicate failed, evaluate sample homogeneity. Reanalyze samples as determined by this evaluation and/or flag data as appropriate.
Serial Dilution*	Per batch on the same sample chosen for MS/MSD	Dilution prepared @ a 5x should have 10% reproducibility	NA	Qualify MS/MSD sample data accordingly

Quality Control Indicator (QCI)	Frequency	Control Limit (Interim)	Control Limit (Statistical)	Initial Corrective Action
Post Spike* (concentration is 20 to 50% of calibration range.)	Per batch on same sample chosen for MS/MSD	75-125%	NA	Qualify MS/MSD sample data accordingly
High Level Calibration Verification Standard	Daily Only required when reporting results greater than the highest calibration standard (method)	80-120%		The laboratory's sample result cannot be reported greater than the highest calibration standard unless a high level calibration verification standard is analyzed. If the percent recovery does not meet acceptance criteria, the sample should be diluted in the calibration range and re-analyzed.
A Procedure Blank and a Laboratory Control Standard are required only if the sample is "prepared".				
A batch of samples is defined as one to twenty environmental samples of the same matrix that are prepared together with the same process and personnel, using the same lot of reagents with a maximum time between the start of processing of the first sample and the start of processing of the last sample being 24 hours.				
*Method recommends the analysis of a sample using serial dilution when a new or unusual matrix is analyzed. A post-digestion spike would not need to be performed if the MS/MSD spike recovery meets acceptance criteria.				

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Quality Control Indicator (QCI)	Frequency	Control Limit (Interim)	Control Limit (Statistical)	Initial Corrective Action
Method Detection Limit (MDL) Study	Annual Digested and Undigested	Calculated MDL must be less than 1/10 the spike concentration / target percent recovery greater than 50%	NA	NA
MDL Check Sample concentration is approximately 2-3x the MDL	After MDL Study	Analyte must be detected	NA	If the analyte is not detected, re-evaluate the MDL data.
IEC Verification	Annual	See 5.3.2	NA	If the IEC cannot be verified, then it must be re-determined.
Linear Dynamic Range (LDR) - concentration is at upper limit	Annual Verification	±10%	NA	If the LDR cannot be verified, then the LDR must be re-determined.

5.2. Background Correction

Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra. Compensation for background emission and stray light can usually be conducted by subtracting the background emission determined by measurements adjacent to the analyte wavelength peak. Background correction points are established during initial instrument validation and method development.

Reference Method 6010C and the instrument manual for detailed information.

5.3. Interelement Correction Factor(s)

Compensation for spectral overlaps may be made using interelement correction. Instruments that use interelement correction require that the interfering elements be analyzed at the same time as the element of interest.

5.3.1. Initial Determination of IEC(s)

Analyze single element 10 ppm standards. Evaluate all analytes that have a result greater than the absolute value of three times the reporting limit.

The criterion for determining that an interelement spectral interference is present is an apparent positive or negative concentration for the analyte that falls beyond +/- three times the reporting limit from zero.

5.3.2. After determining the IEC(s) evaluate the correction routine.

"If the correction routine is operating properly, the determined apparent analyte(s) concentration from analysis of each interference solution should fall within a specific concentration range around the calibration blank. The concentration range is calculated by multiplying the concentration of the interfering element by the value of the correction factor being tested and dividing by 10. If after the subtraction of the calibration blank the apparent analyte concentration fall outside of this range, in either a positive or negative direction, a change in the correction factor of more than 10% should be suspected. The cause of the change should be investigated and the correction factor(s) should be updated."

5.3.3. Daily Verification of IEC

The interference correction factors for Al, Ca, Mg, and Fe on the following analytes are verified daily by the analysis of the interference check standards:
Ag, As, B, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, and Zn

Recovery for all analytes must be within 20% of the true value.

5.3.4. Periodic Verification of IECs

The entire interference correction routine must be verified annually.

5.4. Linear Dynamic Range Analysis (LDR)

The upper limit of the linear dynamic range must be established for each analyte by determining the signal responses from three to five different concentration standards across the range. The data is evaluated and the range of analysis determined by the analyst.

A standard at the upper limit analyzed and quantitated against the normal calibration must be within 10% of the true value.

5.5. Method Detection Limits

MDLs are verified annually digested and undigested. Reference SOP #109

5.6. Method of Standard Additions

If matrix interferences are determined to be severe, the method of standard additions (MSA) can be used to determine analyte concentration. Refer to the method for detailed instructions on how to perform MSA.

5.7. Method Performance

Method performance data can be found in Method 6010C, Section 13.0. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP)."

5.8. Refer to SOP #107, "Inorganic QC" for additional information regarding QCIs.

5.9. QC Packages

Details regarding the use of data flags are found in the bench reference titled "Rules for use of Flags for Metals Analyses & Metals Data Evaluation." (File name madre/company file/word files/sop/metals/rules metals flags.doc)

6. Notes

6.1. Regulatory / Method Compliance

6.1.1. The method states in section 9.3. that "if the blank is less than 5% of the MDL Check Sample, less than 5% of the regulatory limit, or less than 5% of the lowest sample concentration for each analyte, whichever is greater, then the method blank is considered acceptable." This SOP requires that the procedure blank be less than the reporting limit. If the procedure blank is greater than the reporting limit and the samples are greater than the reporting limit, the procedure blank is considered acceptable if the samples are greater than 10 times the procedure blank.

6.1.2. The method states in section 10.3.3. that the MDL check sample must be analyzed after the completion of the MDL study and on a quartly basis to demonstrate detection capability. This SOP requires that the MDL check sample be analyzed only after the completion of the MDL study that is performed annually.

6.1.3. The method states in section 10.1.3.6. that the interelement interfence correction routine must be verifed every six months. This SOP requires that the interelement interference correction routine be verified annually.

6.1.4. The method states in section 10.1.3.6. that the "criterion for determining that an interelement spectral interference is present is an apparent positive or negative concentration for the analyte that falls beyond ± one reporting limit from zero". This SOP sets the criterion at an apparent positive or negative concentration for the analytes that fall beyond three times the reporting limit from zero.

6.1.5. The method states in section 10.3.4 that the upper limit of the linear dynamic range should be verified every six months. This SOP requires that the upper limit of the linear dynamic range be verified annually.

6.1.6. The method states in section 10.4.2. that "sample values that are measured above the high standard must be diluted in the calibration range and reanalyzed." This SOP allows for verification of the upper range of analysis by analyzing a high level verification standard daily.

6.1.6. The method states in section 10.4.2. that "the resulting curve must then be verifed with mid-level and low level calibration verification standards." This SOP allows for verification of the low range of analysis by analyzing a low level verification standard daily.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to the SOP #104 titled, Analytical Definitions & Acronyms.

Instrument Performance Check = Readback of Standards
Quality Control Standard (QCS) = Initial Calibration Verification (ICV)
Continuing Calibration Verification (CCV)
Laboratory Reagent Blank (LRB) = Procedure Blank (PB)
Laboratory Control Standard (LCS) = Laboratory Fortified Blank (LFB)
Matrix Spike (MS) = Laboratory Fortified Matrix (LFM)
Interelement Check Standard (ICSA/ICSAB) = Spectral Performance Check (SPC)

8. Safety

The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan.

11. References

"MDL", SOP #109
"IDC / IDMP", SOP #106
"Summary of Quality Control Indicators-Inorganics Analyses", SOP #107

"Statistical Control", SOP #112
"Calibration Curves, Inorganics", SOP #102
"Measurement Traceability and Calibration", SOP #118
"Analytical Definitions & Acronyms", SOP #104

12. Approvals

Reviewed for Technical Accuracy by: William Mottashed

Reviewed for Quality Assurance Compliance by: Lorrie Franklin

Implementation Date: 03/26/03

End Use Date: _____

First Environmental Laboratories

Standard Operating Procedure

Title: Mercury

Regulatory References:
EPA 600/R-94/111, Method 245.1 Rev. 3 (SDWA approved method source)
SW-846, Third Edition, Method 7470A

Matrices: aqueous, drinking water, saline/estuarine, solids, chemical waste

Regulatory Limits: SDWA 0.0020 mg/L
RCRA TCLP 0.200 mg/L

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

Preservation: pH<2 with HNO_3 for aqueous samples and 4°C for non-aqueous samples.

If samples are not preserved at the time of collection, they will be preserved within two weeks of collection. Following acidification, the sample will be mixed, held for sixteen hours, and then verified to be pH <2. If pH is verified to be >2, more acid must be added and the sample held for sixteen hours until verified to be pH <2.

Shipment: Samples shall be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples may be stored prior to analysis at 4°C or room temperature.

Container: 500 cc plastic or 4 oz glass jar

Single Analysis Sample Volume: 100 mL or 1g

Holding Time: 28 days

(Range) Reporting Limit - Upper End: 0.0002 - 0.050 mg/L The range can be extended by diluting the sample prior to preparation.

Summary of Method:

Prior to analysis, the samples must be digested in order to oxidize organic mercury compounds and reduce mercury to the elemental state. The flameless AA procedure is a physical method based on the absorption of radiation at 253.7nm. The mercury is released from the elemental state into a vapor form and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance is measured as a function of mercury concentration.

1. Instrumentation / Apparatus / Glassware

1.1. Water bath maintained @ a constant temperature of 90-95°C .

1.2. BOD bottles

1.3. Bacharach MAS-50D Mercury Analyzer - Analyzer consists of: mercury light source, photo detector, absorption cell, pump, drying tube, and sample aerator.

1.4. Magnesium perchlorate drying tube.

1.5. Maintenance is performed in accordance with procedures documented in the appropriate maintenance log book/file.

2. Reagents

All reagents will be prepared from reagent grade materials using deionized water and volumetric glassware.

2.1. Nitric acid, concentrated: Reagent grade
NFPA Diamond Safety Information for Nitric Acid (HNO_3): Health (blue) 3 / Hazard (white) oxidizer.

2.2. Sulfuric acid, concentrated: : Reagent grade
NFPA Diamond Safety Information for Sulfuric Acid (H_2SO_4): Health (blue) 3 / Reactivity (yellow) 2 /Hazard (white) no-water

2.3. Sodium Chloride - Hydroxylamine hydrochloride solution: Dissolve 120g NaCl and 120g of [$(NH_2OH)_2$*HCl] in DI water and dilute to 1 L. Expiration Date: 1 month
NFPA Diamond Safety Information for Sodium Chloride-hydroxylamine hydrochloride: (H_2SO_4): Health (blue) 3 / Reactivity (yellow) 2 / Flammability (Red) 2 / Hazard (white) 3 - contact

2.4. Stannous chloride: Add 50g $SnCl_2$*$2H_2O$ and 25 mL concentrated H_2SO_4 to DI water, and dilute to 500 mL. Expiration Date: 1 month
NFPA Diamond Safety Information for Stannous Chloride ($SnCl_2$*$2H_20$): (H_2SO_4): Health (blue) 2 / Reactivity (yellow) 2 / Hazard (white) 2 - contact

2.5. Potassium persulfate, 5% solution: Dissolve 50g of $K_2S_2O_8$ in DI water and dilute to 1L. Expiration Date: 1 month
NFPA Diamond Safety Information for potassium persulfate ($K_2S_2O_8$): Health (blue) 3 / Reactivity (yellow) 3 / Hazard (white) 3 - contact

2.6. Potassium permanganate, 5% solution: Dissolve 50g of $KMnO_4$ in DI water and dilute to 1 L. Expiration Date: 1 month
NFPA Diamond Safety Information for potassium permanganate ($KMnO_4$): Health (blue) 3 / Reactivity (yellow) 3 / Hazard (white) 3 - contact

3. Standards

3.1. All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and al' working standards used more than one day, <u>must</u> be traceable to their source and method of preparation. Log

books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the appropriate Standards Tracking Log. This unique number will also be applied to the label and the calibration certificate. The calibration certificate documents the traceability to national standards of measurement and is retained for reference.

3.2. 1000 mg/L Stock Standard: Purchased as a prepared standard. Expiration Date: per manufacturer's instructions.
NFPA Diamond Safety Information for mercury (Hg): Health (blue) 3 / Reactivity (yellow) 1 / Hazard (white) 3 - contact

3.3. 1000 mg/L Second Source Stock Standard: Purchased as a prepared standard. A different vendor will be selected. Expiration Date: per manufacturer's instructions.

3.4. 1 mg/L Intermediate Standard: 100 uL of 1000 mg/L Stock Standard diluted to 100 mL and acidified with 2.5 mL of concentrated HNO_3 Expiration Date: 1 month. Store in a amber glass bottle. This solution is used to prepare the standards used to construct a calibration curve.

3.5. 1 mg/L Second Source Intermediate Standard: 100 uL of 1000 mg/L Stock Standard diluted to 100 mL and acidified with 2.5 mL of concentrated HNO_3 Expiration Date: 1 month. Store in an amber glass bottle. This solution is used to prepare the ICV and CCV standards used to verify a curve and to verify instrument calibration.

3.6. Calibration Curve (The curve "uncooked") – all reagents are added to the calibration curve standards in the same concentration and amounts added to the samples, but the standards are not heated.

Final Concentration	mL of Intermediate Solution (1 mg/L)	Final Volume (FV)
0.0002 mg/L	20 uL	100 mL
0.0005 mg/L	50 uL	100 mL
0.0010 mg/L	100 uL	100 mL
0.0020 mg/L	200 uL	100 mL
0.0030 mg/L	300 uL	100 mL
0.0040 mg/L	400 uL	100 mL
0.0050 mg/L	500 uL	100 mL

Update information on the calibration curve spreadsheet used to plot the calibration curve.The average response factor from two seven point calibration curves prepared on different days is used to calculate results on a daily basis.

3.7. ICVS: a 2nd source standard must be used to verify the calibration curve immediately after a calibration curve is prepared. The ICVS will be prepared at a concentration equal to the middle of the range of the curve. The ICVS is "uncooked".

3.8. CCVS: a 2nd source standard must be used to verify the calibration curves on a daily basis. The CCVS will be prepared at a concentration equal to 20%- 50% of the range of the curve. The CCVS is "uncooked".

3 9. LCS: a 2nd source standard must be used to verify method performance on a daily basis. The LCS will be prepared at a concentration equal to 20%- 50% of the range of the curve. The LCS is processed along with samples through all stages of sample analysis including heating.

3.10. Recommended source for PE sample is ERA.

4. Analytical Procedures

4.1. Interferences

4.1.1. Unpreserved aqueous samples may lose up to 20 percent of their mercury content within 10 minutes by container absorption. This absorption process can be reversed or prevented by acidification of the sample with 0.5% nitric acid or 0.05% potassium dichromate solution. Mercury lost may be almost completely recovered if acidification is performed within 24 hours of sample collection. At least a 20 minute recovery time is required.

4.1.2. Seawater, brines, and industrial effluents high in chlorides require additional permanganate (as much as 25 mL) because, during the oxidation step, chlorides are converted to free chlorine, which also absorbs radiation at 253.7nm. Care must be taken to ensure that free chlorine is absent before the mercury is reduced and swept into the cell. This may be accomplished by using an excess of hydroxylamine hydrochloride. Also, the dead air space in the BOD bottle must be purged before adding stannous chloride. Both inorganic and organic mercury spikes have been quantitatively recovered from seawater using this technique.

4.1.3. Certain volatile organic materials that absorb at this wavelength may also cause interference. If this interference is suspected, a preliminary run without reagents would determine if the source of the interference is actually volatile organic material.

4.1.4. Copper has been reported to interfere; however, copper concentrations as high as 10 mg/L had no effect on recovery of mercury from spiked samples.

4.2. Sample Preparation

4.2.1. A 100 mL aliquot of DI water processed through all the preparative step, except heating, serves as the calibration blank (CB) and demonstrates that the reagents are contaminant free and that the instrument has a stable baseline. Frequency: Beginning, end and every 10 samples.

4.2.2. A 100 mL aliquot of 0.0025 mg/L CCVS processed through all the preparative steps, except heating, demonstrates the acceptability of the instrument calibration. Prepare by adding 250uL of 1.0 mg/L intermediate standard to a BOD bottle containing 100 mL DI water. Frequency: Beginning, end and every 10 samples. The source of the standard will be different than the source used to prepare the curve.

4.2.1. A 100 mL aliquot of DI water processed through all the preparative steps serves as the procedure blank (PB) and demonstrates that the procedure is free of contamination. Frequency: per batch of 20 or fewer samples processed together.

4.2.2. A 100 mL aliquot of 0.0025 mg/L LCS processed through all the preparative steps demonstrates the efficiency of the entire procedure. Prepare by adding 250uL of 1.0 mg/L intermediate standard to a BOD bottle containing 100 mL DI water. Frequency: per batch of 20 or fewer samples processed together. The source of the standard will be different than the source used to prepare the curve.

4.2.3. 0.0020 mg/L Matrix Spike / Matrix Spike Duplicate Prepare by adding 200uL of 1.0 mg/L intermediate standard to a BOD bottle containing 100 mL of the sample to be spiked. Repeat for duplicate spike. Frequency: per batch / every 20 samples.

4.2.5. Using a graduated cylinder, measure a 100 mL aliquot of sample and transfer it into a BOD bottle. For pourable sludge samples, use 5-10 g sample, for soils use 1 g and dilute to a final volume of 100 mL.

4.2.6. Add 2.5 mL of nitric acid and swirl bottle to mix.

4.2.7. Add 5 mL of sulfuric acid and swirl bottle to mix.

4.2.8. Add 5 mL of potassium permanganate solution and swirl bottle to mix. Ensure purple color is maintained for at least 5 minutes. If the sample becomes clear at any point during the digestion, add additional potassium permanganate in 5 mL increments until the purple color is maintained. (Do not exceed 15 mL. If more than 15 mL is required, then a dilution will be prepared.)

4.2.9. Add 2.5 mL of potassium persulfate and swirl bottle to mix. (If additional potassium permanganate was added, a proportionate amount of potassium persulfate will be added.)

4.2.10. Cap each bottle and place them in 90-95°C waterbath for 2 hours.

4.2.11. Analysis will be completed within 48 hours of digestion.

4.3 Instrument Operation

4.3.1. Turn the power on and make sure the pilot light glows. Attach drying tube to sparger. Attach sparger to unit. Allow at least 30 minutes for the light source to warm up. Turn on pump just prior to beginning determinative procedure.

4.3.2. Close shutter , set to 0% T.

4.3.3. With shutter open, set to 100% T.

4.3.4. Once instrument is stabilized, switch to absorbance mode.

4.4. Determinative Procedure

4.4.1. Add 2 mL of hydroxlyamine hydrochloride solution to reduce the excess potassium permanganate. If the samples do not become clear, add additional solution in 1 mL increments until the samples remain clear. Samples must be at room temperature prior to analysis.

Note: From this point the directions are for processing one sample at a time.

4.4.2. Purge the headspace in the BOD bottle for 30 seconds.

4.4.3. Add 5 mL of stannous chloride and immediately cap the bottle with the sparger. Once the stannous chloride is added, elemental Hg is in vapor form and extreme care will be taken to avoid loss of Hg during the transfer of the sparger.

4.4.4. Leave the sparger in the bottle until the maximum absorbance is obtained. Record the maximum absorbance, remove and rinse the aerator with DI water and place on a clean surface.

4.4.5. Allow the meter indicator to return to zero and repeat the process with each sample, ensuring that t instrument baseline returns to zero between each sample.

4.5. Calculation

The calculation is based on a seven point referenced curve, that is validated at the time of preparation with a second source initial calibration verification standard. For details regarding the preparation of calibration curves, see the Calibration Curve SOP.

Include factors resulting from sample preparation and/or the need to analyze the sample at a dilution. The formula provided below assumes the sample was a clean water not requiring dilution.

$$\text{Absorbance X RF} = \text{mg/L of Hg}$$

Where: response factor = $\frac{\text{concentration of standard}}{\text{absorbance of standard}}$ = 1/slope

The slope is obtained from the calculation of the correlation coefficient, where m = slope. This calculation is based on the relationship, x = my + b.

4.6. Reporting Limits

4.6.1. Automated calculations worksheet generates final results. Evaluate results against client requirements.

4.6.2. The routine reporting limit for aqueous samples and TCLP extracts is 0.0005 mg/L. Project specifi requirements for groundwaters and wastewaters are frequently 0.0002 mg/L.

4.6.3. The routine reporting limit for a non-aqueous sample is 0.05 mg/kg

4.6.4. Soils will be expressed on a dry weight basis as mg/kg. The exception would be a solid material submitted for RCRA compliance, in which case the results will be expressed on a wet weight basis.

4.6.5. Reporting limits are normally 3-10 times the method detection limit. During method validation, regulatory criteria are also compared to the proposed reporting limit to ensure that the reporting limit meets the regulatory criteria. Refer to the SOP titled, "Method Detection Limit" (#109) for details regarding the determination of the method detection limit.

5.1. Each quality control indicator (QCI) must be assessed for compliance with the following criterion on a real time basis. When applicable, the percent recovery and/or the relative percent difference (RPD) is also recorded on the raw data/lab book form.

Quality Control Indicator (QCI)	**Frequency**	**Acceptance Criteria (Specification or Statistical Requirement)**	**Initial Corrective Action**	**Final Action / Data Qualification**
Method Detection Limit Study (MDL) See MDL SOP #109 for details See QC Table Notes 1	Initial method validation and each time there is a significant change in the test method that affects how the test is performed., or when a change in instrumentation occurs that affects the sensitivity of the analysis, provided the reporting limit is equal to the low standard in the calibration curve, or a reporting limit verification standard is run daily.	The calculated MDL must be greater than 1/10th the MDL spiking concentration and greater than "0", and the MDL spiking concentration must be greater than the calculated MDL. Minimum of 7 replicates.	Re-analyze and re-process MDL for analytes that fail to meet acceptance criteria.	Do not report results below the MDL.
Initial Demonstration of Capability (IDC) See IDC/IDMP SOP #106 for details	Initial method validation and each time there is a significant change in the instrumentation, personnel, matrix or test method that affects the sensitivity of the analysis.	The source and concentration of IDC may vary depending on the purpose of the study. %R = 80-120	Re-analyze and re-process IDC for analytes that fail to meet acceptance criteria.	IDC/IDMP criteria must be met prior to sample analysis.
Calibration Curve See Calibration Curves Inorganic #102 for details and validation file for historic performance	Referenced Low standard in curve should equal reporting limit *SDWA requires calibration prior to the analysis of samples*	cc = 0.995, back calculation of percent recovery within 10% of true value	Identify problem(s) and re-analyze the calibration curve.	Sample analysis must not begin until criteria are met.
Initial Calibration Verification (2nd source)	Immediately following the curve	7470A ± 10% *245.1* ± 5%	Re-evaluate the calibration curve to verify that all criteria have been met.	Data can only be released for analytes that have passed the ICVS criteria.
Reagent Blank / Continuing Calibration Blanks	Daily at the beginning, end, and after every 10th samples	Less than the reporting limit. If RB/CCB and samples have concentrations >RL, then the RB/CCB <10% of the sample	Check for contamination problems and/or instrument drift. Re -run the CCB and evaluate the sample results with respect to	The data may be reported with the appropriate data qualifier. Flag samples that have analyte concentrations less than 10

		concentration.	the CCB. Reanalyze samples as determined by this evaluation.	times the concentration found in the applicable blank..
Continuing Calibration Standard (CCVS) - concentration middle of range	Daily at the beginning, end, and after every 10th samples	Specification 7470A: ± 20% *Specification 245.1 ± 10%* Statistical Control: 3 standard deviations for the control limit and 2 standard deviations for the warning limit	Re-run the CCVS and evaluate the sample results with respect to the CCVS result.. Reanalyze samples as determined by this evaluation.	Data can only be released for analytes that have passed the CCVS criteria
Reporting Limit Verification Standard - concentration equaling the reporting limit	Daily at the beginning @ a concentration 2 times the reporting limit	Specification: ± 25	Re-run the RLVS and evaluate the sample results with respect to the RLVS. Reanalyze samples as determined by this evaluation.	Results for positive samples can be reported. Results of non-detect samples need to be documented in the case narrative prepared by the analyst and included in the project file
Procedure Blank (PB) (or Method Blank) See Table Notes 3	Per batch See Table Note 4	Less than the reporting limit. If PB and samples have concentrations >RL, then the PB must be <10% of the sample concentration.	Check for contamination problems. Evaluate the sample results with respect to the PB. Reanalyze samples as determined by this evaluation.	If samples are not reprocessed, the data may be reported with the appropriate data qualifier. Flag samples that have analyte concentrations less than 10 times the concentration found in the applicable blank.
Laboratory Control Standard (LCS) - concentration upper end of range	Per batch See Table Note 4	Specification 7470A: ± 20% *Specification 245.1: ± 15%* Statistical Control: 3 standard deviations for the control limit and 2 standard deviations for the warning limit	Determine cause of problem and re-prepare and re-analyze the affected samples..	Results of analytes failing to meet acceptance criteria need to be documented in the case narrative prepared by the analyst and included in the project file.

Matrix Spike / Matrix Spike Duplicate (MS/MSD) - concentration 20 to 50 percent of range See Table Note 5 ***SDWA Compliant Requirement: Matrix Spike / Matrix Spike Duplicate (MS/MSD) concentration 20 to 50 percent of range.***	Per batch Selection of sample for MS/MSD is arbitrary See Table Note 4 ***Per batch, where a batch is defined as every 10 samples***	Specification 7470A: ±25% Recovery and RPD <20 Statistical Control: 3 standard deviations for the control limit and 2 standard deviation for the warning limit ***Specification 245.1±30% Recovery and RPD <20***	Evaluate the LCS with respect to the MS/MSD. If the LCS was acceptable, evaluate sample for matrix interferences.. Examine the sample for homogeneity. Evaluate the spike concentration vs. native analyte concentration. If the concentration of analyte is >4x the spike concentration, then the spiking level is insignificant to the sample. Evaluate the sample for the presence of interferences by re-analyzing the sample and the MS at a dilution. Acceptable spike recovery indicates the presence of interference.	The information from the MS/MSD is sample/matrix specific and is not normally used to determine the validity of an entire batch. No action is taken on out of control MS/MSD data alone to qualify an entire batch

QC Table Notes:

1. Detection Limit

- Detection limit shall be initially determined for the compounds of interest in each test method in a matrix in which there are not target analytes nor interferences at a concentration that would impact the results or the detection limit must be determined in the matrix of interest.
- Detection limits must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
- All sample processing steps of the analytical method shall be included in the determination of the detection limit.

2. If a QCI fails to meet accept criteria, the analyst will prepare a case narrative documenting the failure and the associated decisions regarding reanalysis vs. acceptance of the data. The case narrative will be added to the project file. Project management will review case narratives during the preparation of the final report and make final decisions regarding data flagging requirements.

3. Definition of Method Blank: (per NELAC Glossary 2002 Standard) a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentration that impact the analytical results for sample analyses. Synonymous with procedure blank (PB).

4. Definition of Batch: (per NELAC Glossary 2002 Standard) environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

5. Definition of Matrix: (per NELAC Glossary 2002 Standard) the substrate of a test sample.

- Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.
- Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
- Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.
- Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

5.2. Method Performance

Method performance data can be found in EPA 600/R-94/111, Method 245.1 Rev. 3 Section 13.0. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

Prior to the use of this method on analytical samples, the method must be validated with an Initial Demonstration of Method Perfromance (IDMP) (also known as an Initial Demonstration of Capability (IDC)) and a Method Detection Limit Study (MDL). The IDMP and MDL requirements are summarized in section 5 of this SOP. The determinative procedure in this SOP must be used for the associated IDMP and MDL. Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP).

5.3. Refer to SOP #129, "Summary of Quality Control Indicators – Inorganics & Organics" for additional information regarding QCIs. This SOP is for training purposes and method requirements supercede information provided in this training document.

6. Notes

6.1. Tips and Hints

If the analyzer is not used in a hood, a bypass can be included in the system to pass the vapor through an absorbing media, such as: a) equal volumes of 0.1N $KMNO_4$ and 10% H_2SO_4, b) 0.25% iodine in a 3% KI solution.

6.2. Discussion - Regulatory Compliance

6.2.1. Reduced amounts of potassium permanganate, potassium persulfate, and hydroxylamine hydrochloride are used in this method. All method validation was performed using the reduced amounts, and all validation documentation remains on file for reference.

6.2.2. A referenced curve is used rather than a daily curve. The response factor is calculated from a seven point curve. The curve is validated using a second source initial calibration verification standard immediately following the analysis of the curve. On a daily basis (per run) the curve is verified using a second source continuing calibration verfication standard (CCVS). The CCVS is reanalyzed after every 10 samples to verify the calibration.

6.2.3. All reagents are added to the calibration standards in the same amounts and concentrations as those used to perform sample analyses, except the standards are not heated. This complies with method 245.1. Method 7470A from SW-846 recommends that the curve be heated.

6.2.4. Stannous chloride is prepared using 25 mL of H_2SO_4 rather than 14 mL as specified in the two method references. The source of this change is experience. The increased acid concentration decreases the precipitation of stannous chloride.

6.2.5. Flow diagrams and graphs can be found in SW-846, 3rd Edition, December 1996 and it's updates, Method 7470A, Page 6.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to Section 20 of the Quality Assurance Manual.

8. Safety

The toxicity or carcinogenicity of each reagent used in this method have not been fully established. Each chemical will be regarded as a potential health hazard and exposure to these compounds will be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents will be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

Mercury compounds are highly toxic if swallowed, inhaled, or absorbed through the skin. Analyses will be conducted in a laboratory exhaust hood. The analyst will use chemical resistant gloves when handling concentrated mercury standards.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan.

Samples and standards having concentrations greater than 0.2 ppm of mercury should either be returned to the client or lab packed for proper disposal.

11. References

The analyst is required to have read and understood various supporting documents including regulatory method references, First Environmental's Quality Assurance Manual, First Environmental's Chemical Hygiene Plan, and non-method SOPs that support QA activities.
SOP #102, "Calibration Curves – Inorganics." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOP, the method SOP takes precedence.
SOP #106, "Initial Demonstration of Capability / Initial Demonstration of Method Performance."
SOP #129, "Summary of Quality Control Indicators – Inorganics and Organics." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOP, the method SOP takes precedence.

SOP #109, "Method Detection Limits."
SOP #112, "Statistical Control."
SOP #114, "Calibration Curves – Organics." Note: this is a training document, therefore, if information in this document conflicts with information in the method SOPs, the method SOP takes precedence.
SOP #118, "Measurement Traceability & Calibration."
SOP #123, "Sample Instructions & Materials."
SOP #901, "Sample Disposal"
SOP #902, "Waste Disposal"
First Environmental's Quality Assurance Manual
First Environmental's Chemical Hygiene Plan

12. Approvals

Reviewed for Technical Accuracy by: _____
Kim Neises

Reviewed for Quality Assurance Compliance by: _____
Lorrie Franklin

Implementation Date: 03/08/06

End Use Date: _____

First Environmental Laboratories

Standard Operating Procedure

Title: pH, Potentiometric Electrode with Temperature Correction

Matrices: wastewater, drinking water, groundwater, soil/sediment, wastes

Regulatory References:
EPA 600/4-79-020, Method 150.1
SW-846, 3rd Edition, Dec.1996, Method 9040B(aqueous)
SW-846, 3rd Edition, Dec. 1996, Method 9045C (soils)
Standard Methods, 18th, 19th, and 20th Editions, Method 4500H+ A (The 18th Edition is currently approved for drinking water compliance samples.)

Regulatory Limits: RCRA, pH <2.00 or >12.5 is considered hazardous

Sample Collection, Preservation, Shipment, and Storage

Sample Collection: All samples shall be collected using an appropriate sampling plan and properly preserved containers. The volume collected should be sufficient to insure a representative sample, allow for replicate analysis (if required), and minimize waste disposal.

Preservation: Cool, 4°C

Shipment: Samples should be shipped in a manner permitting continuation of storage at 4°C.

Storage: Samples are stored prior to analysis at 4°C.

Container: 250 cc plastic / 4 oz jar

Single Analysis Sample Volume: 50 mL / 10g
Holding Time: Immediately or as soon as possible. Under no conditions will the time prior to analysis exceed 24 hours from sample receipt (for aqueous samples). Ideally, this analysis is performed at the time of collection in the field. Soil samples should be analyzed as soon as possible.

(Range) Reporting Limit - Upper End: 0-14 pH units

Summary of Method: The pH of the sample is determined electrometrically using a combination electrode with automatic temperature compensation. The pH meter is

calibrated using a series of standard solutions of known pH. Sample preparation is included for non-aqueous samples.

1. Instrumentation / Apparatus / Glassware

1.1. pH meter capable of automatic temperature compensation

1.2. Combination electrode incorporating both measuring and referenced functions. Recommendation: Always keep a new backup electrode on hand

1.3. Disposable beaker cups

1.4. Analytical balance capable of weighing to 0.01g.

1.5. Table top shaker / magnetic stirrer

2. Reagents

All reagents should be prepared from reagent grade materials using deionized water and volumetric glassware.

NA

3. Standards

3.1. Buffer solutions having pH of 4.00, 7.00, and 10.00 are required for instrument / electrode calibration. Colored solutions are available in bulk and are convenient. Note: Never put anything, including the pH electrode, into the original container for the buffer solutions. Expiration Date: The purchased buffer solution is good for 1 year or per manufacturer's instructions. If an aliquot of the buffer solution is put into another bottle instrument / electrode calibration, the aliquot is only good for 1 month.

3.2. Recommended source for ICVS / PE is ERA.

4. Analytical Procedures

<u>4.1. Interferences</u>

4.1.1. The glass electrode, in general, is not subject to solution interferences from color, turbidity, colloidal matter, oxidants, reductants, or high salinity.

4.1.2. At the low and high ends of the pH scale, the standard glass pH electrode does not perform accurately. Specialty electrodes are available from some manufacturers. At pH greater than 10, sodium affects pH, yielding an erroneously low result. At pH less than 1, a standard glass electrode will yield erroneously high results.

4.1.3. Coatings of oily material or particulate matter can impair electrode response. Remove coatings by gently wiping and rinsing with DI water. An additional treatment with hydrochloric acid (1+10) or methanol may be necessary.

4.1.4 Temperature effects on the electrometric determination of pH are caused by the change in electrode output at various temperatures. For this reason, instruments having temperature compensation are preferred. This interference can also be compensated for by calibrating the electrode / instrument with buffers at the same temperature as the samples. Another source of temperature effect is the change of pH due to changes in the sample as the temperature changes. This error is sample dependent and cannot be controlled. Therefore, the sample temperature should be noted at the time of analysis.

4.1.5. The pH paper method is not a substitute for the electrode method except in those cases in which the sample will adversely affect or damage the electrode. Use this method only for oily organic materials, inks, paints and spot tests for complete unknowns.

4.2. Sample Preparation

4.2 1. If the sample is a soil or other non-aqueous solid prepare a 1:10 dilution. Weigh 10g of material and dilute with 90 mL of DI water.

4 2.2. Either stir, shake or tumble the sample for 30 minutes.

4.2.3. Let the soil suspension stand for about 1 hour to allow the suspended clay to settle

4.2.4. When obtaining the measurement, the electrode tip should be immersed just deep enough into the clear supernate solution to establish a good electrical contact.

4.3. Instrument / Electrode System Calibration

4.3 1. Two or three buffer solutions, 4.00, 7.00, and 10.00 are used to calibrate the electrode system. (We routinely use two buffer solutions to calibrate the electrode system. Buffer 7.00) Pour a fresh aliquot of each into a beaker cup. The volume should be sufficient to cover the sensing elements of the electrode.

4.3.2. Power on the meter. Select pH **mode** (indicated by a τ).

4.3.3. Remove the electrode from the storage solution, rinse, and blot dry with a tissue. Uncover the hole on the probe, drain the filling solution from the probe, and add fresh Ag/AgCl filling solution to within 1/4 inch of the hole.

4.3.4. Place the electrodes (pH and temperature compensation probes) into pH 7 buffer and stir slowly.

4.3.5. Press the **2nd key** and the press **cal** to begin calibration. The date and time of the last calibration will be displayed. **"P1"** is also displayed indicating meter is ready for the first buffer.

4.3.6. When **"Ready"** is displayed beside the reading, indicating electrode stability, the reading will flash. Press **yes**. The meter switches to buffer two, indicated by **"P2"** on the display.

4.3.7. Remove electrodes from first buffer and rinse. Place electrodes into second buffer and stir slowly.

4.3.8. Again, when the **"Ready"** is displayed, press "**yes**". Press **measure** to end calibration.

4.3.9. The electrode slope is calculated and displayed for 5 seconds. Record the slope on the raw data record. Note: the slope is routinely falls in the range of 96-99.

4.4. Determinative Procedure

4.4.1. Each calibration must be verified with a buffer solution from an independent source.

4.4.2. Verify continued electrode system calibration by reanalyzing one of the calibration solutions. Choose that buffer that is closest to the pH of the samples being analyzed. Frequency: After every tenth sample and at the end of the run.

4.4.3. Duplicate aliquots of sample are analyzed to monitor the precision of the procedure for a specific matrix. Frequency: 1/10 samples or less.

4.4.4. Pour an aliquot of sample into a beaker cup. Immerse the electrodes into the sample and gently stir at a constant rate to provide homogeneity and suspension of solids. If desired, a magnetic stirrer can be used to stir the sample. Wait until a stable reading is obtained. Record the sample pH to two digits to the right of the decimal.

4.4.5. Rinse the electrode between each sample measurement with DI water. After completing the analysis, cover the hole on the probe.

4.5. Reporting Format

4.6.1. The routine reporting format for an aqueous sample is pH @ 25°C X.XX units.

4.6.2. The routine reporting format for a non- aqueous sample is pH @ 25°C, 1:10 X.XX units.

5. Quality Control Indicator Assessment

5.1. Each quality control indicator (QCI) must be assessed for compliance with the following criterion on a real time basis. Failure to meet the criterion fails the batch. When applicable, the percent recovery and/or the relative percent difference (RPD) is also recorded on the raw data/lab book form.

Quality Control Indicator (QCI)	Frequency	Control Limit (Interim)	Control Limit (Statistical)	Initial Corrective Action
Method Detection Limit Study (MDL)	NA	NA	NA	NA
Initial Demonstration of Capability (IDC)	Method Validation / per analyst or work cell	See IDC SOP #106	NA	NA
Initial Calibration Verification (ICVS) 2nd source	Immediately following calibration	± 0.10 pH units of the theoretical value	As supplied by manufacturer 95% confidence limit	Re-evaluate the calibration to verify that all criteria have been met. Verify the acceptability of the slope.
Continuing Calibration Standard (CCVS) - concentration middle of range / 2nd source	Daily at the beginning (ICVS), end, and after every 10 samples	± 0.10 pH units of the theoretical value	NA	Re-run the CCVS. If the re-run fails, re-calibrate the meter and reanalyze samples following the last in control CCVS.
Duplicate ***SDWA Compliant Requirement***	At a minimum one per batch, usually 1/10 samples ***Per batch, where a batch is defined as every 10 samples***	RPD 20	3 standard deviations for the control limit and 2 standard deviation for the warning limit	No action is taken on out of control duplicate data alone to qualify an entire batch. Examine the sample for homogeneity. Re-analyze the duplicate sample.

A batch of samples is defined as one to twenty environmental samples of the same matrix that are prepared together with the same process and personnel, using the same lot of reagents with a maximum time between the start of processing of the first sample and the start of processing of the last sample being 24 hours
QCI failures that are unresolved and affect data quality will be documented in a case narrative prepared by the analyst and included in the data file.

5.2. Method Performance

Method performance data can be found in SW-846, 3rd Edition, December 1996 and it's updates, Method 9040B and 9045C Section 9.0. Internal performance data will be collected in accordance with SOP #112, "Statistical Control".

Method validation was performed in accordance with the guidance provided in SOP #106, "Initial Demonstration of Capability (IDC) / Initial Demonstration of Method Performance (IDMP)."

5.3. Refer to SOP #107, "Inorganic QC" for additional information regarding QCIs.

6. Notes

6.1. Tips and Hints

6.1.1. If the ICVS or continuing calibration cannot be met, perform probe maintenance routine including cleaning and replacement of the filling solution.

6.1.2. Probe maintenance is critical:

The internal solution level must be maintained above the internal element at all times. Fill whenever low.

The sensing bulb and junction must not be allowed to dry out. Electrode must be stored at all times when not in use in electrode storage solution or pH 7.0 buffer. Refer to the product manual for the recovery procedure should you need to recover a dried-out electrode.

Any pH maintenance, change in electrode or abnormalities should be written in pH maintenance log book.

6.1.3. Some pH electrodes have extremely fragile tips. Care should be taken that the electrode is not struck by the stir bar.

6.1.4. The ATC probe is stored in air.

The preparation of soils detailed in method 9045C suggests preparing a 1:1 slurry of sample to DI water. The SOP lists a 1:10 dilution ration of sample to DI water. Requests for analyses for RCRA waste permits generally require that sample analysis be performed at a ratio of 1:10. The dilution ratio is noted on the Analytical Report.

7. Definitions

Where appropriate, definitions have been provided in this SOP. If additional clarification is required, refer to the SOP #104 titled, Analytical Definitions & Acronyms.

8. Safety

The toxicity or carcinogenicity of each reagent used in this method have not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable. Material Safety Data Sheets (MSDS) are available for review. All reagents should be appropriately labeled. Always wear safety glasses for eye protection, protective clothing and observe proper mixing when working with chemicals and potentially hazardous samples. Additional information can be found in the laboratories' Chemical Hygiene Plan.

9. Pollution Prevention

Pollution prevention is defined in EPA documents as any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. First Environmental Laboratories, Inc. uses reduced volume procedures, where feasible, in order to comply with EPA guidance. The laboratory continuously assesses new technology that assists in the reduction or elimination of waste.

10. Waste Management

The analysis of samples inevitably produces various wastes. When possible, First Environmental Laboratories, Inc. minimizes all releases from hoods and bench operations. Wastes, which cannot be neutralized or made innocuous, are collected and disposed of in an appropriate manner. Additional information can be found in the laboratories' Chemical Hygiene Plan.

"Measurement Traceability and Calibration", SOP #118
"Analytical Definitions & Acronyms", SOP #104

12. Approvals

Reviewed for Technical Accuracy by: _____

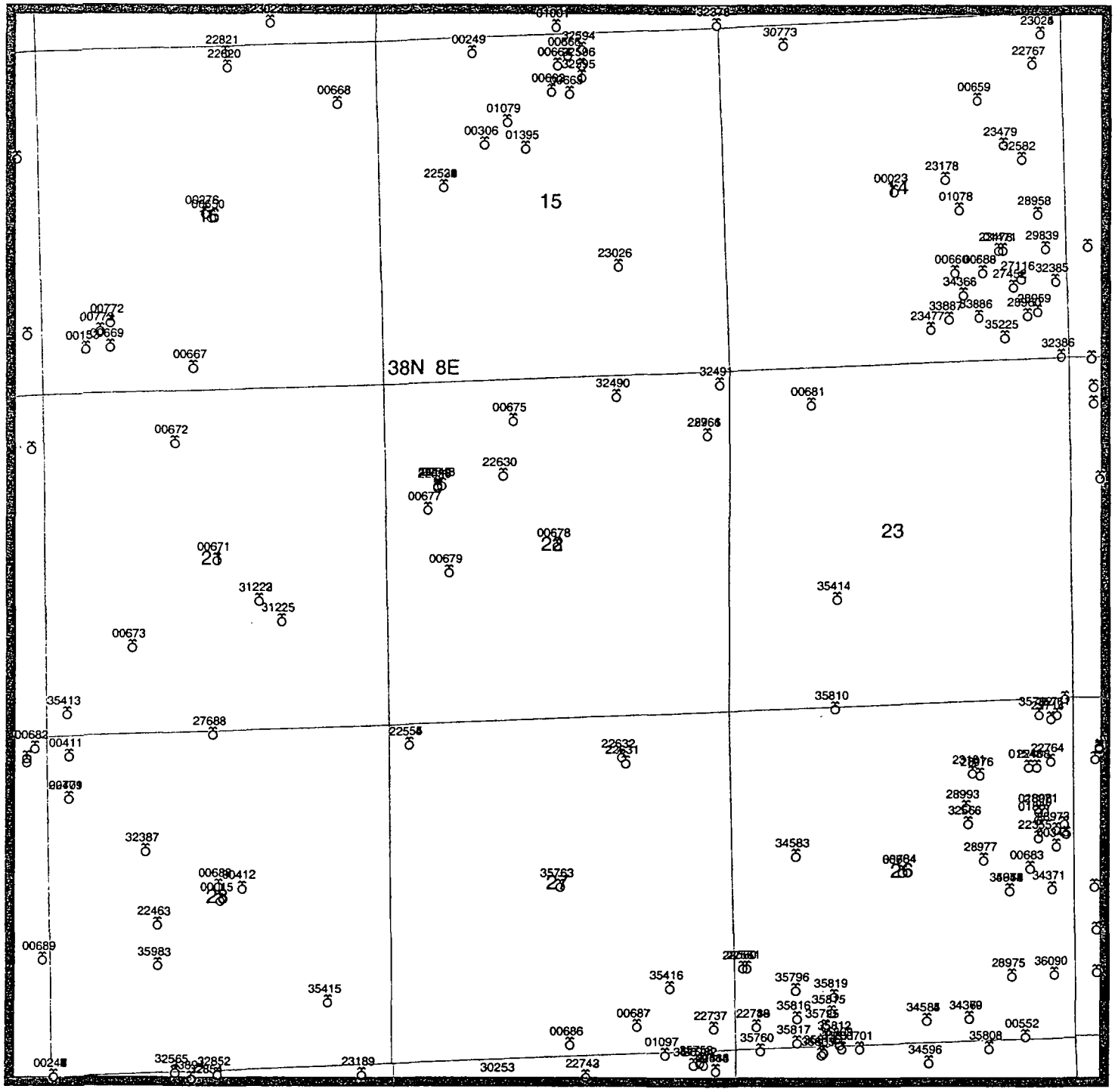
Reviewed for Quality Assurance Compliance by: _____

Implementation Date: 03/13/03

End Use Date: _____

APPENDIX H – WELL SURVEY REPORT

Map Area: 38N-8E-29 m3 to 38N-8E-13 m3



Explanation

Oil	Gas Injection	Junked
Oil & Gas	Gas Storage	Temporarily Abandoned
Gas	Salt Water Disposal	Observation
D&A - Oil Show	Water Injection	Other Injection
D&A - Gas Show	Water Supply	Confidential
D&A - Oil & Gas Show	Permit	Other Well Type
D&A	Water	Status Unknown

/ through any symbol indicates well is currently plugged

N

0 2245 4490 ft

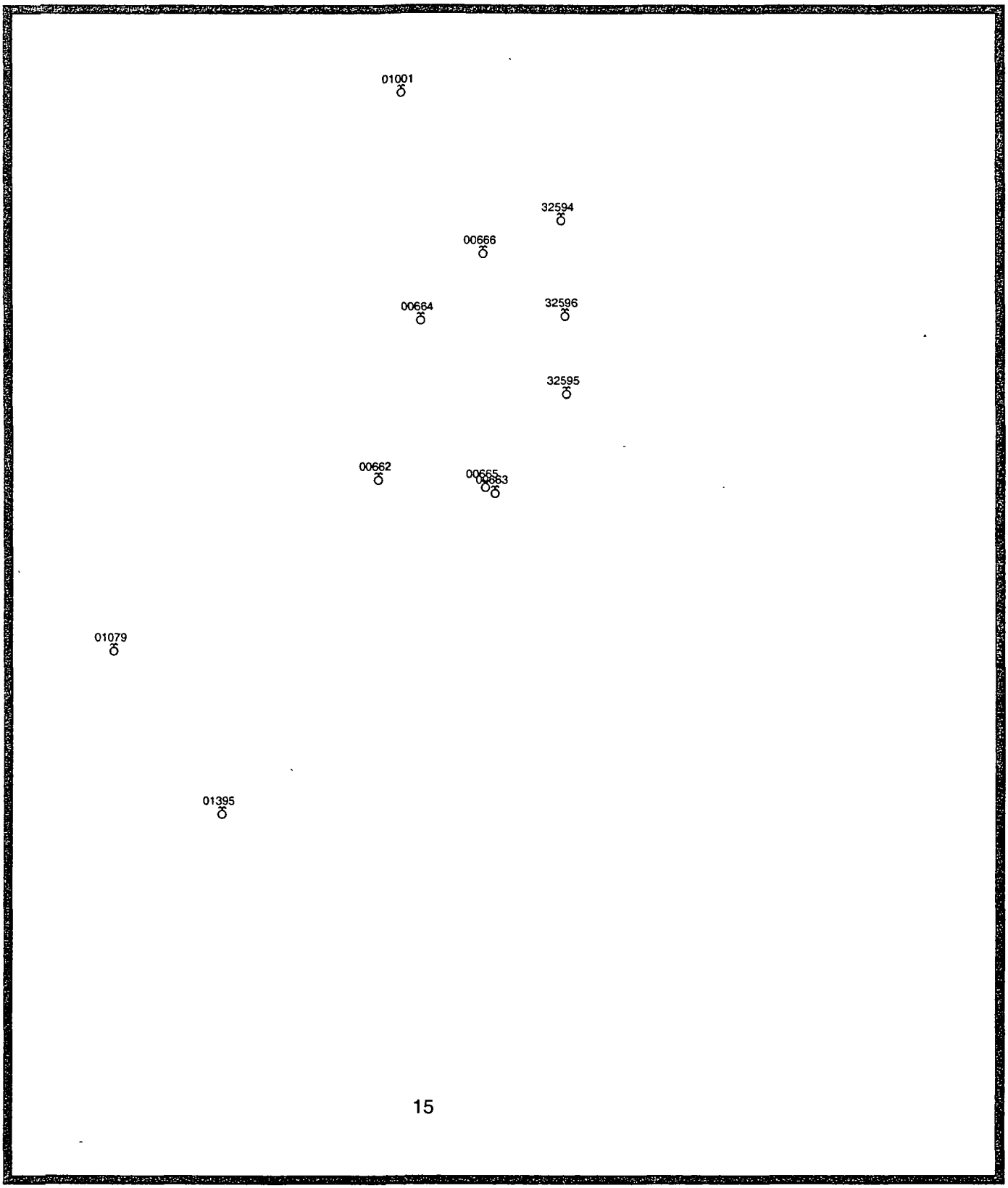
Illinois State Geological Survey

QuEStoR: Custom Map

Date: 14-AUG-06 Scale: 1:26940

Displayed data is based upon information supplied to the Illinois State Geological Survey (ISGS) and are not field verified. The ISGS does not guarantee the validity, accuracy or completeness of these data.

Map Area: 38N-8E-15 m3 to 38N-8E-10 m3



Explanation

Oil	Gas Injection	Junked
Oil & Gas	Gas Storage	Temporarily Abandoned
Gas	Salt Water Disposal	Observation
D&A - Oil Show	Water Injection	Other Injection
D&A - Gas Show	Water Supply	Confidential
D&A - Oil & Gas Show	Permit	Other Well Type
D&A	Water	Status Unknown

/ through any symbol indicates well is currently plugged

N

0 363 726 ft

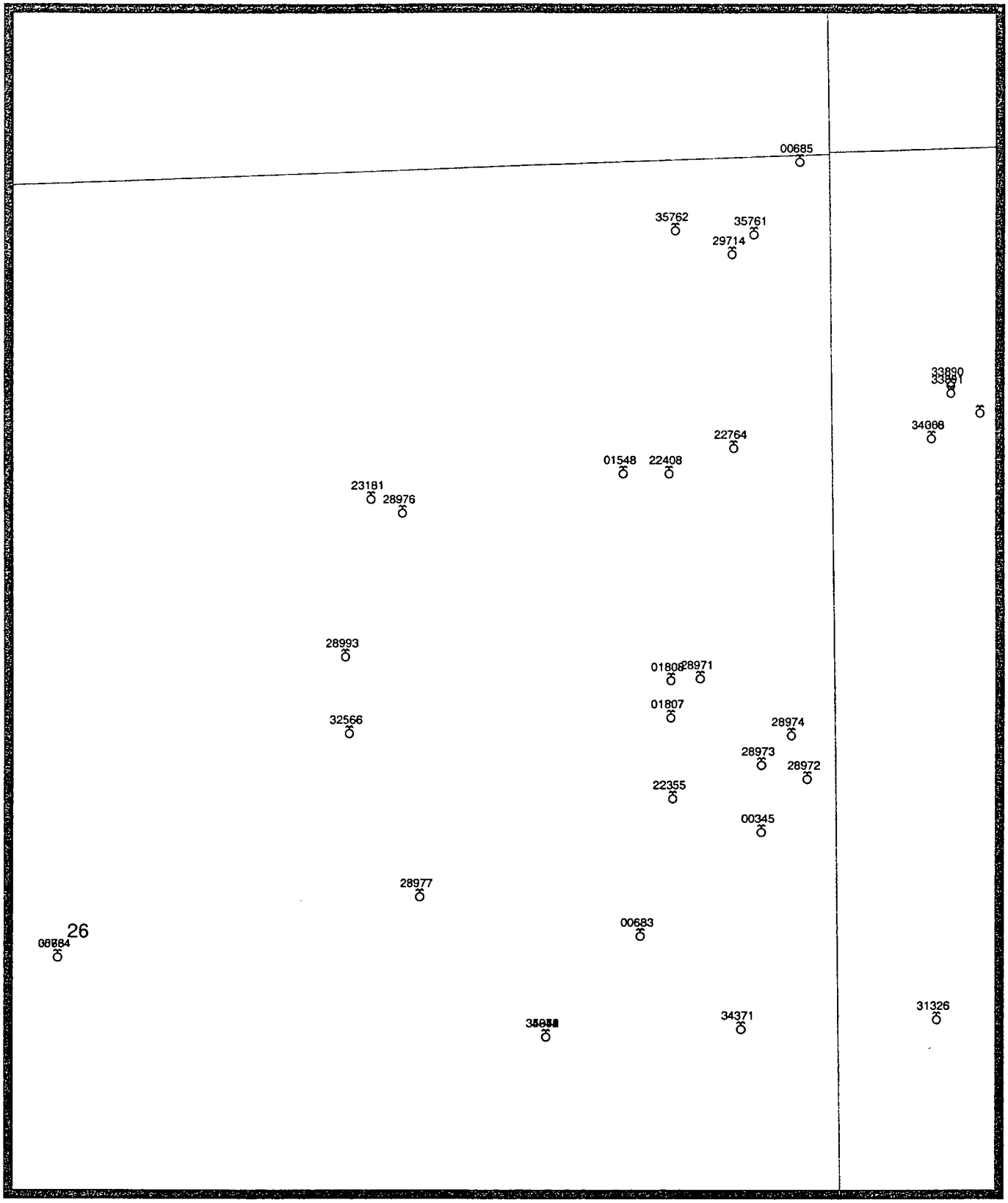
Illinois State Geological Survey

QuEStoR: Custom Map

Date: 14-AUG-06 Scale: 1:4356

Displayed data is based upon information supplied to the Illinois State Geological Survey (ISGS) and are not field verified. The ISGS does not guarantee the validity, accuracy or completeness of these data

Map Area: 38N-8E-26 m3 to 38N-8E-24 m3



Explanation

Oil	Gas Injection	Junked
Oil & Gas	Gas Storage	Temporarily Abandoned
Gas	Salt Water Disposal	Observation
D&A - Oil Show	Water Injection	Other Injection
D&A - Gas Show	Water Supply	Confidential
D&A - Oil & Gas Show	Permit	Other Well Type
D&A	Water	Status Unknown

/ through any symbol indicates well is currently plugged

N

0 478 956 ft

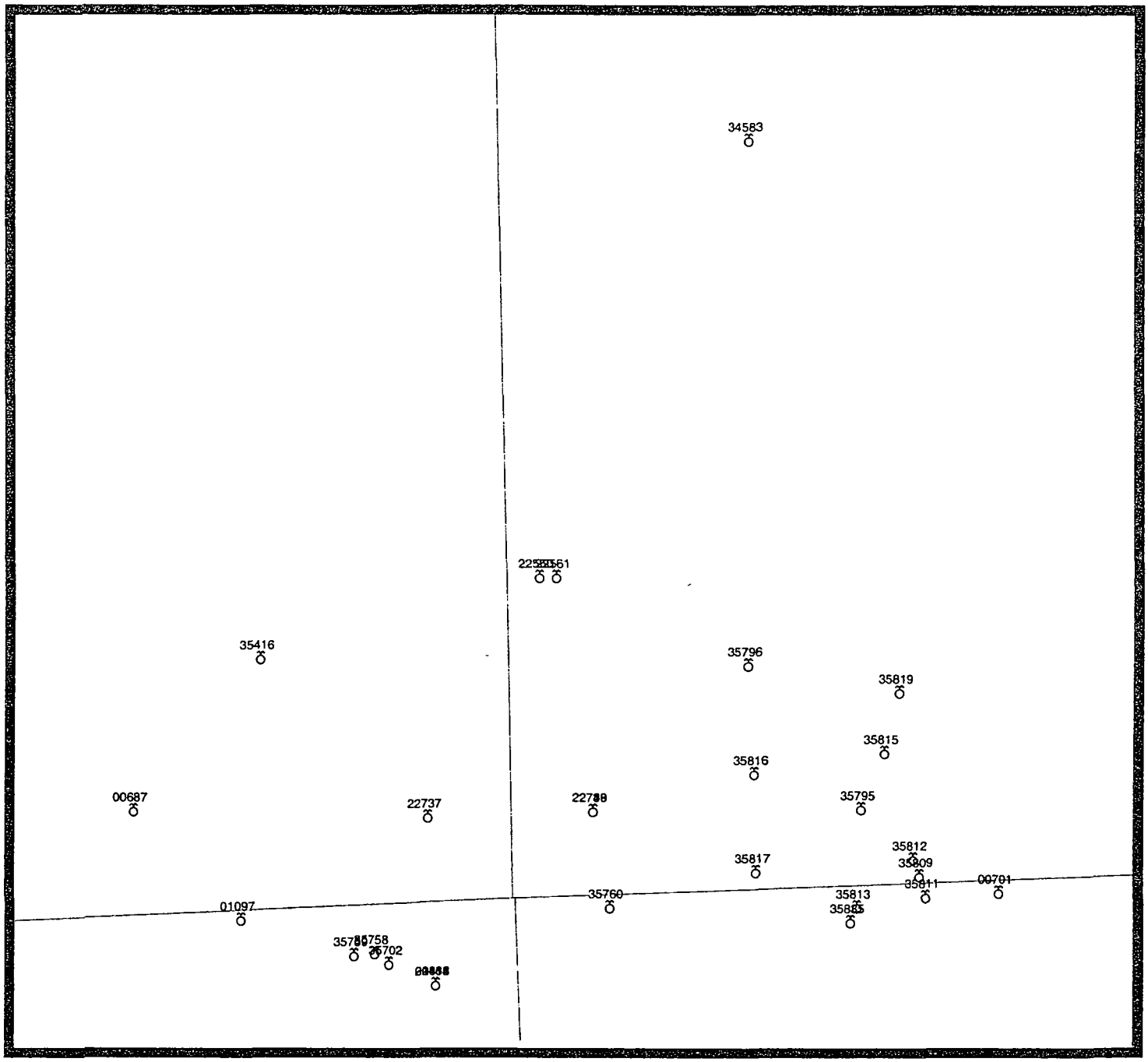
Illinois State Geological Survey

QuEStoR: Custom Map

Date: 14-AUG-06 Scale: 1:5736

Displayed data is based upon information supplied to the Illinois State Geological Survey (ISGS) and are not field verified. The ISGS does not guarantee the validity, accuracy or completeness of these data.

Map Area: 38N-8E-34 m3 to 38N-8E-26 m3



Explanation

Oil	Gas Injection	Junked
Oil & Gas	Gas Storage	Temporarily Abandoned
Gas	Salt Water Disposal	Observation
D&A - Oil Show	Water Injection	Other Injection
D&A - Gas Show	Water Supply	Confidential
D&A - Oil & Gas Show	Permit	Other Well Type
D&A	Water	Status Unknown

/ through any symbol indicates well is currently plugged

N

0 592 1184 ft

Illinois State Geological Survey

QuEStoR: Custom Map

Date: 14-AUG-06 Scale: 1:7104

Displayed data is based upon information supplied to the Illinois State Geological Survey (ISGS) and are not field verified The ISGS does not guarantee the validity, accuracy or completeness of these data.

Non Oil and Gas - Wells

120892302200 Layne Western Co., Inc. 9-38N- 8E
Kane Mntl Handicapped Sch B-2
Status: ENG SE SW SE Elev: 700GL
permit: 0 permit date: comp. date: 02/01/69
Lambert X: 3318623 Lambert Y: 3186796 td: 11
producing formation: td formation:
latitude: 41.782316 longitude: 88.326684

120892302300 Layne Western Co., Inc. 9-38N- 8E
Kane Mntl Handicapped Sch B-3
Status: ENG SE SW SE Elev: 700GL
permit: 0 permit date: comp. date: 02/01/69
Lambert X: 3318623 Lambert Y: 3186796 td: 11
producing formation: td formation:
latitude: 41.782316 longitude: 88.326684

120890100100 Geltz, N. H. 10-38N- 8E
Kane Geneva Constr 1
Status: WATER 100 SL 2500 EL Elev: 0
permit: 0 permit date: comp. date: 06/01/70
Lambert X: 3323031 Lambert Y: 3186733 td: 175
producing formation: td formation:
latitude: 41.781985 longitude: 88.310457

120893237800 IL Dept. of Transportation 10-38N- 8E
Kane Illinois Dept of Transportation
Status: ENG 20 SL 20 EL Elev: 709GL
permit: permit date: comp. date:
Lambert X: 3325510 Lambert Y: 3186759 td: 65
producing formation: td formation:
latitude: 41.781967 longitude: 88.301328

120890028800 Geltz, N. H. 13-38N- 8E
Kane Bentz John 1
Status: WATER SW NW SW Elev: 0
permit: 0 permit date: comp. date: 07/01/67
Lambert X: 3331246 Lambert Y: 3183366 td: 136
producing formation: td formation:
latitude: 41.772405 longitude: 88.280376

120892276700 Layne Western Co., Inc. 14-38N- 8E
Kane Apartment Structure B-1
Status: ENG 800 NL 475 EL Elev: 712GL
permit: 0 permit date: comp. date: 03/01/69
Lambert X: 3330356 Lambert Y: 3186160 td: 21
producing formation: td formation:
latitude: 41.780138 longitude: 88.283514

120892302400 Layne Western Co., Inc. 14-38N- 8E
Kane Belles Terres Apts B-1
Status: ENG NE NE NE Elev: 706GL
permit: 0 permit date: comp. date: 04/01/70
Lambert X: 3330486 Lambert Y: 3186635 td: 21
producing formation: td formation:
latitude: 41.781443 longitude: 88.283012

120892302500 Layne Western Co., Inc. 14-38N- 8E
Kane Belles Terres Apts B-7

Status: ENG NE NE NE Elev: 710GL
permit: 0 permit date: comp. date: 04/01/70
Lambert X: 3330486 Lambert Y: 3186635 td: 16
producing formation: td formation:
latitude: 41.781443 longitude: 88.283012

120893388600 14-38N- 8E
Kane Breazeale Mobile Home Par 1
Status: WATER 650 N 1400 W SEc Elev: 685
permit: permit date: comp. date:
Lambert X: 3329552 Lambert Y: 3182277 td: 700
producing formation: td formation:
latitude: 41.769466 longitude: 88.286666

120893388700 14-38N- 8E
Kane Breazeale Mobile Home Par 2
Status: WATER 650 N 1850 W SEc Elev: 685
permit: permit date: comp. date:
Lambert X: 3329103 Lambert Y: 3182259 td: 805
producing formation: td formation:
latitude: 41.769433 longitude: 88.288319

120893077300 Knierim, Phil 14-38N- 8E
Kane Brouch, Lee
Status: WATER NE NW NW Elev: 0
permit: permit date: 12/17/92 comp. date: 12/22/92
Lambert X: 3326531 Lambert Y: 3186455 td: 220
producing formation: td formation:
latitude: 41.781092 longitude: 88.297583

120892347700 Geltz, N. H. 14-38N- 8E
Kane Cannonball Express 1
Status: WATER 500 SL 2150 EL Elev: 685GL
permit: 0 permit date: comp. date: 08/01/76
Lambert X: 3328808 Lambert Y: 3182096 td: 240
producing formation: td formation:
latitude: 41.768995 longitude: 88.289413

120892711600 Neely, Mark S. 14-38N- 8E
Kane D & D Senord
Status: WATER 110 NL 50 EL NW SE SE Elev: 0
permit: 126116 permit date: 08/20/86 comp. date: 09/02/86
Lambert X: 3330225 Lambert Y: 3182870 td: 260
producing formation: td formation:
latitude: 41.771076 longitude: 88.284159

120893258200 IL Dept. of Transportation 14-38N- 8E
Kane Eagle Supermarket B-6
Status: ENG 2250 NL 650 EL Elev: 710GL
permit: permit date: comp. date:
Lambert X: 3330226 Lambert Y: 3184704 td: 25
producing formation: td formation:
latitude: 41.776130 longitude: 88.284065

120893238500 IL Dept. of Transportation 14-38N- 8E
Kane Farnsworth Rd Br over RR Tracks SB-16
Status: ENG 1170 SL 200 EL Elev: 693GL
permit: permit date: comp. date:
Lambert X: 3330734 Lambert Y: 3182847 td: 41
producing formation: td formation:
latitude: 41.770994 longitude: 88.282286

120893238600 IL Dept. of Transportation 14-38N- 8E
Kane Farnsworth Rd Br over RR Tracks SB-5
Status: ENG SL 125 EL Elev: 689GL
permit: permit date: comp. date:
Lambert X: 3330846 Lambert Y: 3181681 td: 41
producing formation: td formation:
latitude: 41.767776 longitude: 88.281931

120890002300 Geltz, N. H. 14-38N- 8E
Kane Geltz N H 1
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/57
Lambert X: 3328256 Lambert Y: 3184219 td: 130
producing formation: td formation:
latitude: 41.774866 longitude: 88.291342

120893058000 Knierim, Phil 14-38N- 8E
Kane Ivie, Mike R.
Status: WATER SE Elev: 0
permit: permit date: 10/28/91 comp. date: 11/08/91
Lambert X: 3329614 Lambert Y: 3182954 td: 140
producing formation: td formation:
latitude: 41.771330 longitude: 88.286404

120890065800 Neely Warren J 14-38N- 8E
Kane Kluber H & E
Status: WATER SE Elev: 0
permit: 0 permit date: comp. date: 12/01/39
Lambert X: 3329614 Lambert Y: 3182954 td: 133
producing formation: td formation:
latitude: 41.771330 longitude: 88.286404

120892983900 Knierim, Phil 14-38N- 8E
Kane Lawrence, Ray
Status: WATER SE NE SE Elev: 0
permit: 011035 permit date: 05/02/89 comp. date: 05/11/89
Lambert X: 3330590 Lambert Y: 3183327 td: 200
producing formation: td formation:
latitude: 41.772322 longitude: 88.282793

120890065900 Neely&Schimelpfening 14-38N- 8E
Kane Lix Margaret
Status: WATER NE Elev: 0
permit: 0 permit date: comp. date: 01/01/39
Lambert X: 3329529 Lambert Y: 3185598 td: 61
producing formation: td formation:
latitude: 41.778620 longitude: 88.286587

120893436600 14-38N- 8E
Kane Margaret's Hi-Acre MHP Well 1
Status: WATER NE SW SE Elev: 0
permit: permit date: comp. date: 01/01/00
Lambert X: 3329296 Lambert Y: 3182609 td: 700
producing formation: td formation:
latitude: 41.770391 longitude: 88.287592

120890147100 Geltz, N. H. 14-38N- 8E
Kane Margarets Hi Acre 3
Status: WATER SW NE SE Elev: 0
permit: 0 permit date: comp. date: 12/01/72
Lambert X: 3329933 Lambert Y: 3183299 td: 1025
producing formation: td formation:
latitude: 41.772269 longitude: 88.285213

120892745200 Pitz, John W. 14-38N- 8E
Kane McCue, Robert
Status: WATER 1100 SL 860 EL Elev: 690GL
permit: 129875 permit date: 03/11/87 comp. date: 03/16/87
Lambert X: 3330077 Lambert Y: 3182749 td: 0
producing formation: td formation:
latitude: 41.770748 longitude: 88.284710

120892347800 Knierim Company, Inc. 14-38N- 8E
Kane Moore Shirley
Status: WATER 1650 SL 1050 EL Elev: 0
permit: 0 permit date: comp. date: 10/01/77
Lambert X: 3329871 Lambert Y: 3183291 td: 200
producing formation: td formation:
latitude: 41.772249 longitude: 88.285441

120892317800 Knierim Company, Inc. 14-38N- 8E
Kane Omalley T S
Status: WATER 2500 NL 1850 EL Elev: 0
permit: 0 permit date: comp. date: 02/01/76
Lambert X: 3329036 Lambert Y: 3184400 td: 160
producing formation: td formation:
latitude: 41.775336 longitude: 88.288461

120892895800 Ward, Delbert G. 14-38N- 8E
Kane Prather, Don
Status: WATER 2200 SL 450 EL Elev: 700GL
permit: 109412 permit date: 09/14/83 comp. date: 09/26/83
Lambert X: 3330453 Lambert Y: 3183865 td: 280
producing formation: td formation:
latitude: 41.773810 longitude: 88.283270

120892895900 Knierim, Phillip E. 14-38N- 8E
Kane Ries, Lester
Status: WATER 700 SL 500 EL Elev: 680GL
permit: 95054 permit date: 07/23/80 comp. date: 07/24/80
Lambert X: 3330449 Lambert Y: 3182365 td: 300
producing formation: td formation:
latitude: 41.769676 longitude: 88.283359

120892896000 Knierim, Phillip E. 14-38N- 8E
Kane Scroggins, Dave
Status: WATER 650 SL 650 EL Elev: 690GL
permit: 93970 permit date: 05/20/80 comp. date: 05/21/80
Lambert X: 3330301 Lambert Y: 3182309 td: 220
producing formation: td formation:
latitude: 41.769527 longitude: 88.283907

120890066000 Geltz, N. H. 14-38N- 8E
Kane Seidelman John M 2
Status: WATER 15 SL 440 EL SE NW SE Elev: 0
permit: 0 permit date: comp. date: 01/01/66
Lambert X: 3329175 Lambert Y: 3182950 td: 702
producing formation: td formation:
latitude: 41.773094 longitude: 88.287253

120892347900 K & K Well Drilling 14-38N- 8E
Kane Shadle R
Status: WATER 2000 NL 950 EL Elev: 0
permit: 0 permit date: comp. date: 05/01/77
Lambert X: 3329919 Lambert Y: 3184940 td: 150

producing formation: td formation:
latitude: 41.776792 longitude: 88.285184

120893522500 Brown, Darwin 14-38N- 8E
Kane Thaites, Jack/Walsh Constr.
Status: WATER SW SE SE Elev: 0
permit: permit date: 03/11/03 comp. date: 10/24/03
Lambert X: 3329975 Lambert Y: 3181976 td: 400
producing formation: td formation:
latitude: 41.768621 longitude: 88.285123

120890107800 Geltz, N. H. 14-38N- 8E
Kane Windling Michael 1
Status: WATER NE NW SE Elev: 0
permit: 0 permit date: comp. date: 11/01/70
Lambert X: 3329254 Lambert Y: 3183931 td: 155
producing formation: td formation:
latitude: 41.774036 longitude: 88.287681

120890024900 Neely&Schimelpfening 15-38N- 8E
Kane Alba Manufacturingco
Status: WATER 250 NL 1500 WL Elev: 660
permit: 0 permit date: comp. date: 08/01/49
Lambert X: 3321776 Lambert Y: 3186330 td: 1380
producing formation: td formation:
latitude: 41.780919 longitude: 88.315097

120890139500 Layne-Western Co. 15-38N- 8E
Kane Aurora Bleachery Co C-405E
Status: WATER 1750 S 2250 E NWc NW Elev: 0
permit: 18388 permit date: comp. date: 08/14/72
Lambert X: 3322558 Lambert Y: 3184863 td: 1368
producing formation: td formation:
latitude: 41.776848 longitude: 88.312289

120890066400 Geiger, S. B. & Son 15-38N- 8E
Kane Aurora City 11
Status: WATER SW NW NW NE Elev: 641GL
permit: 0 permit date: comp. date: 01/01/31
Lambert X: 3323080 Lambert Y: 3186141 td: 2253
producing formation: td formation:
latitude: 41.780351 longitude: 88.310305

120890066500 Cater William 15-38N- 8E
Kane Aurora City 12
Status: WATER 935 NL 2320 EL Elev: 654GL
permit: 0 permit date: comp. date: 01/01/29
Lambert X: 3323247 Lambert Y: 3185707 td: 2253
producing formation: td formation:
latitude: 41.779149 longitude: 88.309711

120890066600 Layne Western Co., Inc. 15-38N- 8E
Kane Aurora City 12-A
Status: WATER NW NW NE Elev: 661TM
permit: 0 permit date: comp. date: 01/01/35
Lambert X: 3323239 Lambert Y: 3186312 td: 2251
producing formation: td formation:
latitude: 41.780817 longitude: 88.309711

120890066200 Miller, J. P. Art. Well 15-38N- 8E
Kane Aurora City 4
Status: WATER 900 NL 2595 EL Elev: 635GL

permit: 0 permit date: comp. date:
Lambert X: 3322971 Lambert Y: 3185730 td: 2445
producing formation: td formation:
latitude: 41.779223 longitude: 88.310726

120890066300 Timmes & Beckwith 15-38N- 8E
Kane Aurora City 5
Status: WATER 950 NL 2295 EL Elev: 653GL
permit: 0 permit date: comp. date: 01/01/10
Lambert X: 3323272 Lambert Y: 3185693 td: 2250
producing formation: td formation:
latitude: 41.779110 longitude: 88.309620

120893259400 IL Dept. of Transportation 15-38N- 8E
Kane Aurora Water Treatment Plant B-1
Status: ENG 250 NL 2100 EL NE Elev: 665GL
permit: permit date: comp. date:
Lambert X: 3323442 Lambert Y: 3186401 td: 18
producing formation: td formation:
latitude: 41.781055 longitude: 88.308960

120893259500 IL Dept. of Transportation 15-38N- 8E
Kane Aurora Water Treatment Plant B-2
Status: ENG 700 NL 2100 EL NE Elev: 665GL
permit: permit date: comp. date:
Lambert X: 3323458 Lambert Y: 3185951 td: 10
producing formation: td formation:
latitude: 41.779814 longitude: 88.308922

120893259600 IL Dept. of Transportation 15-38N- 8E
Kane Aurora Water Treatment Plant B-3
Status: ENG 500 NL 2100 EL NE Elev: 665GL
permit: permit date: comp. date:
Lambert X: 3323451 Lambert Y: 3186151 td: 13
producing formation: td formation:
latitude: 41.780366 longitude: 88.308939

120890030600 Geltz, N. H. 15-38N- 8E
Kane Bohley & Rohner 1
Status: WATER NW SE NW Elev: 0
permit: 0 permit date: comp. date: 12/01/67
Lambert X: 3321958 Lambert Y: 3184941 td: 258
producing formation: td formation:
latitude: 41.777085 longitude: 88.314494

120890107900 K & K Oil, Inc. 15-38N- 8E
Kane Lari Michael
Status: WATER N W SEc SW NE NW Elev: 0
permit: 0 permit date: comp. date: 12/01/70
Lambert X: 3322279 Lambert Y: 3185284 td: 180
producing formation: td formation:
latitude: 41.778018 longitude: 88.313295

120892302600 Layne Western Co., Inc. 15-38N- 8E
Kane Miss Val Struct Stl B-3
Status: ENG SE NW SE Elev: 0
permit: 0 permit date: comp. date: 02/01/70
Lambert X: 3324000 Lambert Y: 3183048 td: 21
producing formation: td formation:
latitude: 41.771794 longitude: 88.307067

120892252900 Layne Western Co., Inc. 15-38N- 8E

Kane Northgate Shopping B-2
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 16
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

120892253000 Layne Western Co., Inc. 15-38N- 8E
Kane Northgate Shopping B-3
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 21
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

120892253100 Layne Western Co., Inc. 15-38N- 8E
Kane Northgate Shopping B-4
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 20
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

120892253200 Layne Western Co., Inc. 15-38N- 8E
Kane Northgate Shopping B-5
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 23
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

120892253300 Layne Western Co., Inc. 15-38N- 8E
Kane Northgate Shopping B-6
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 22
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

✓120892252800 Layne Western Co., Inc. 15-38N- 8E
Kane Northgate Shpng Ctr B-1
Status: ENG SE SW NW Elev: 0
permit: 0 permit date: comp. date: 04/01/66
Lambert X: 3321314 Lambert Y: 3184257 td: 19
producing formation: td formation:
latitude: 41.775223 longitude: 88.316898

120892282000 Layne Western Co., Inc. 16-38N- 8E
Kane Aurora City B-1
Status: ENG NW NW NE Elev: 700GL
permit: 0 permit date: comp. date: 03/01/71
Lambert X: 3317972 Lambert Y: 3186113 td: 11
producing formation: td formation:
latitude: 41.780457 longitude: 88.329114

120892282100 Layne Western Co., Inc. 16-38N- 8E
Kane Aurora City Fire Station B-2
Status: ENG 100 NL 2350 EL Elev: 702GL
permit: 0 permit date: comp. date: 03/01/71
Lambert X: 3317925 Lambert Y: 3186340 td: 16
producing formation: td formation:
latitude: 41.781084 longitude: 88.329276

120890015300 Layne Western Co., Inc. 16-38N- 8E
Kane City Of Aurora 17
Status: WATER SW SW Elev: 680TM
permit: 0 permit date: comp. date: 12/01/58
Lambert X: 3315768 Lambert Y: 3181767 td: 2152
producing formation: td formation:
latitude: 41.768557 longitude: 88.337434

120890077200 Neely & Etal 16-38N- 8E
Kane Cook M
Status: WATER 1075 SL 1050 WL Elev: 688GL
permit: 0 permit date: comp. date: 01/01/42
Lambert X: 3316149 Lambert Y: 3182197 td: 70
producing formation: td formation:
latitude: 41.769729 longitude: 88.336011

120890066700 Morey A W Co 16-38N- 8E
Kane Dans-Aurora Co
Status: WATER SE SE SW Elev: 685GL
permit: 0 permit date: comp. date:
Lambert X: 3317421 Lambert Y: 3181492 td: 95
producing formation: td formation:
latitude: 41.767741 longitude: 88.331361

120890065000 Geltz, N. H. 16-38N- 8E
Kane Ebey Mary 1
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/49
Lambert X: 3317696 Lambert Y: 3183802 td: 58
producing formation: td formation:
latitude: 41.774098 longitude: 88.330240

120890077300 Neely & Etal 16-38N- 8E
Kane Fuller Earl
Status: WATER 950 SL 900 WL Elev: 690GL
permit: 0 permit date: comp. date: 01/01/41
Lambert X: 3316002 Lambert Y: 3182067 td: 73
producing formation: td formation:
latitude: 41.769376 longitude: 88.336558

120890066800 Neely & Etal 16-38N- 8E
Kane Mombleau Et Al
Status: WATER 950 NL 620 EL Elev: 695GL
permit: 0 permit date: comp. date: 01/01/41
Lambert X: 3319673 Lambert Y: 3185546 td: 171
producing formation: td formation:
latitude: 41.778834 longitude: 88.322878

120890066900 Neely & Etal 16-38N- 8E
Kane Smith Conrad
Status: WATER 700 SL 1050 WL Elev: 685GL
permit: 0 permit date: comp. date: 01/01/42
Lambert X: 3316159 Lambert Y: 3181822 td: 55
producing formation: td formation:
latitude: 41.768695 longitude: 88.335992

120890027600 Geltz, N. H. 16-38N- 8E
Kane Walker Process Equip 1
Status: WATER 2550 NL 2550 WL Elev: 690GL
permit: 0 permit date: comp. date: 01/01/67
Lambert X: 3317608 Lambert Y: 3183880 td: 150
producing formation: td formation:

latitude: 41.774316 longitude: 88.330560

120892253500 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-1
Status: ENG NE SE NE Elev: 0
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120892253600 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-2
Status: ENG NE SE NE Elev: 0
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120892253700 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-3
Status: ENG NE SE NE Elev: 0
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120892253800 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-4
Status: ENG NE SE NE Elev: 0
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120892253900 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-5
Status: ENG NE SE NE Elev: 0
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120892254000 Layne Western Co., Inc. 17-38N- 8E
Kane Aurora Schl Dist B-6
Status: ENG NE SE NE Elev: 690GL
permit: 0 permit date: comp. date: 07/01/66
Lambert X: 3314709 Lambert Y: 3184693 td: 21
producing formation: td formation:
latitude: 41.776659 longitude: 88.341195

120893259100 IL Dept. of Transportation 17-38N- 8E
Kane McCleery Elementary School B-1
Status: ENG 900 SL 220 EL Elev: 680GL
permit: permit date: comp. date: 08/12/96
Lambert X: 3314885 Lambert Y: 3181982 td: 15
producing formation: td formation:
latitude: 41.769181 longitude: 88.340674

120892702900 Pitz, John W. 20-38N- 8E
Kane McEnroe, John
Status: WATER 180 NL 210 EL SE NE NE Elev: 0
permit: 125048 permit date: 07/03/86 comp. date: 07/18/86

Lambert X: 3314924 Lambert Y: 3180243 td: 0
producing formation: td formation:
latitude: 41.764387 longitude: 88.340612

120890067100 Neely & Etal 21-38N- 8E
Kane All Steel Equipment
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/40
Lambert X: 3317791 Lambert Y: 3178546 td: 253
producing formation: td formation:
latitude: 41.759608 longitude: 88.330139

120893541300 IL State Geological Survey 21-38N- 8E
Kane Aurora 1
Status: STRAT SW SW SW Elev: 677GL
permit: permit date: comp. date: 05/26/04
Lambert X: 3315502 Lambert Y: 3176159 td: 35
producing formation: td formation:
latitude: 41.753110 longitude: 88.338677

120890067200 Geiger, S. B. & Son 21-38N- 8E
Kane Aurora City 10
Status: WATER 800 NL 2000 WL Elev: 682GL
permit: 0 permit date: comp. date: 01/01/24
Lambert X: 3317133 Lambert Y: 3180354 td: 2299
producing formation: td formation:
latitude: 41.764615 longitude: 88.332475

120893122200 Rock & Soil Drilling Co. 21-38N- 8E
Kane Knomark Inc. MW-20
Status: MONIT NW SE Elev: 0
permit: none permit date: comp. date: 02/17/94
Lambert X: 3318459 Lambert Y: 3177912 td: 15
producing formation: td formation:
latitude: 41.757837 longitude: 88.327710

120893122300 Rock & Soil Drilling Co. 21-38N- 8E
Kane Knomark Inc. MW-30
Status: MONIT NW SE Elev: 0
permit: none permit date: comp. date: 02/17/94
Lambert X: 3318459 Lambert Y: 3177912 td: 14
producing formation: td formation:
latitude: 41.757837 longitude: 88.327710

120893122500 Rock & Soil Drilling Co. 21-38N- 8E
Kane Knomark Inc. MW-50
Status: MONIT SE NW SE Elev: 0
permit: none permit date: comp. date: 02/18/94
Lambert X: 3318794 Lambert Y: 3177596 td: 15
producing formation: td formation:
latitude: 41.756954 longitude: 88.326492

120890067300 Neely & Etal 21-38N- 8E
Kane Oatman Dairy Co
Status: WATER SW Elev: 685GL
permit: 0 permit date: comp. date: 01/01/41
Lambert X: 3316485 Lambert Y: 3177183 td: 331
producing formation: td formation:
latitude: 41.755898 longitude: 88.335010

120890067500 Heflin Jo 22-38N- 8E
Kane American Well Works

Status: WATER NE NW Elev: 640TM
permit: 0 permit date: comp. date:
Lambert X: 3322394 Lambert Y: 3180683 td: 701
producing formation: td formation:
latitude: 41.765333 longitude: 88.313093

120890067700 No Company 22-38N- 8E
Kane Aurora Ice Cream Co
Status: WATER SW NW Elev: 660TM
permit: 0 permit date: comp. date: 03/01/20
Lambert X: 3321083 Lambert Y: 3179320 td: 620
producing formation: td formation:
latitude: 41.761624 longitude: 88.317985

120890067800 Geltz, N. H. 22-38N- 8E
Kane Aurora Packing Co 1
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/65
Lambert X: 3323078 Lambert Y: 3178744 td: 150
producing formation: td formation:
latitude: 41.759965 longitude: 88.310669

120892254800 Layne Western Co., Inc. 22-38N- 8E
Kane Grace Luth Church B-1
Status: ENG 1605 NL 870 WL Elev: 0
permit: 0 permit date: comp. date: 12/01/65
Lambert X: 3321284 Lambert Y: 3179689 td: 21
producing formation: td formation:
latitude: 41.762634 longitude: 88.317227

120892254900 Layne Western Co., Inc. 22-38N- 8E
Kane Grace Luth Church B-2
Status: ENG 1590 NL 810 WL Elev: 0
permit: 0 permit date: comp. date: 12/01/75
Lambert X: 3321223 Lambert Y: 3179702 td: 23
producing formation: td formation:
latitude: 41.762672 longitude: 88.317451

120892255000 Layne Western Co., Inc. 22-38N- 8E
Kane Grace Luth Church B-3
Status: ENG 1625 NL 810 WL Elev: 676GL
permit: 0 permit date: comp. date: 12/01/65
Lambert X: 3321224 Lambert Y: 3179667 td: 26
producing formation: td formation:
latitude: 41.762575 longitude: 88.317449

120893249100 IL Dept. of Transportation 22-38N- 8E
Kane High Street Br over Reising St K-203
Status: ENG 200 NL 150 EL Elev: 660GL
permit: permit date: comp. date: 05/22/78
Lambert X: 3325567 Lambert Y: 3181262 td: 20
producing formation: td formation:
latitude: 41.766814 longitude: 88.301385

120893249000 IL Dept. of Transportation 22-38N- 8E
Kane Ill Rte 25 over Indian Creek K-202
Status: ENG 350 NL 1750 EL Elev: 639GL
permit: permit date: comp. date: 08/09/88
Lambert X: 3323968 Lambert Y: 3181049 td: 13
producing formation: td formation:
latitude: 41.766285 longitude: 88.307282

120892276600 Layne Western Co., Inc. 22-38N- 8E
Kane Kroeler Et Al B-2
Status: ENG SE NE NE Elev: 690GL
permit: 0 permit date: comp. date: 03/01/69
Lambert X: 3325387 Lambert Y: 3180473 td: 14
producing formation: td formation:
latitude: 41.764646 longitude: 88.302086

120892263000 Layne Western Co., Inc. 22-38N- 8E
Kane Leriviera Apts B-3
Status: ENG 1500 NL 1825 WL Elev: 655GL
permit: 0 permit date: comp. date: 04/01/67
Lambert X: 3322236 Lambert Y: 3179832 td: 25
producing formation: td formation:
latitude: 41.762994 longitude: 88.313716

120892896100 Knierim, Phillip E. 22-38N- 8E
Kane Merk, Wendel
Status: WATER SE NE NE Elev: 0
permit: 111511 permit date: 03/09/84 comp. date: 03/09/84
Lambert X: 3325387 Lambert Y: 3180473 td: 140
producing formation: td formation:
latitude: 41.764646 longitude: 88.302086

120890067900 Gray Well Drilling 22-38N- 8E
Kane Tivoli Theatre
Status: WATER NE NW SW Elev: 645GL
permit: 0 permit date: comp. date: 01/01/40
Lambert X: 3321428 Lambert Y: 3178351 td: 1414
producing formation: td formation:
latitude: 41.758941 longitude: 88.316761

120893541400 IL State Geological Survey 23-38N- 8E
Kane Aurora 2
Status: STRAT SW NE SW Elev: 700GL
permit: permit date: comp. date: 05/26/04
Lambert X: 3327375 Lambert Y: 3177932 td: 51
producing formation: td formation:
latitude: 41.757571 longitude: 88.294892

120890068100 Geiger, S. B. & Son 23-38N- 8E
Kane Aurora City 9
Status: WATER 600 NL 1250 WL Elev: 675GL
permit: 0 permit date: comp. date: 01/01/24
Lambert X: 3326968 Lambert Y: 3180920 td: 2260
producing formation: td formation:
latitude: 41.765821 longitude: 88.296244

120892896500 Knierim, Phillip E. 24-38N- 8E
Kane Achilli, Joe Builders
Status: WATER 500 NL 350 WL Elev: 710GL
permit: 96392 permit date: 10/03/80 comp. date: 10/04/80
Lambert X: 3331324 Lambert Y: 3181212 td: 160
producing formation: td formation:
latitude: 41.766466 longitude: 88.280195

120890059200 Neeley, Harry C. 24-38N- 8E
Kane Crest James 1
Status: WATER 75 NL 310 EL NW NW NW Elev: 0
permit: 0 permit date: comp. date: 09/01/69
Lambert X: 3331312 Lambert Y: 3181637 td: 170
producing formation: td formation:
latitude: 41.767637 longitude: 88.280218

120892896700 Weirich, William Theodore 24-38N- 8E
Kane Fidis, Marcial 1
Status: WATER 1900 NL 450 WL Elev: 705GL
permit: 98681 permit date: 03/11/81 comp. date:
Lambert X: 3331435 Lambert Y: 3179817 td: 140
producing formation: td formation:
latitude: 41.762617 longitude: 88.279855

120892318000 Dupage Pump 24-38N- 8E
Kane Wierich Bill
Status: WATER 750 NL 350 WL Elev: 0
permit: 0 permit date: comp. date: 09/01/76
Lambert X: 3331326 Lambert Y: 3180962 td: 200
producing formation: td formation:
latitude: 41.765776 longitude: 88.280200

120893458200 25-38N- 8E
Kane Allen School
Status: WATER NW SW SW Elev: 0
permit: permit date: comp. date:
Lambert X: 3331394 Lambert Y: 3172213 td: 0
producing formation: td formation:
latitude: 41.741661 longitude: 88.280382

120893577200 Meadow Equipment 25-38N- 8E
Kane Bigelow Homes
Status: WATER SW NW SW Elev: 0
permit: permit date: 07/23/04 comp. date: 09/15/04
Lambert X: 3331386 Lambert Y: 3172865 td: 140
producing formation: td formation:
latitude: 41.743458 longitude: 88.280379

120893400600 Matherly, Hubert 25-38N- 8E
Kane HOA President/Wermes Subd.
Status: WATER SW NW NW Elev: 0
permit: permit date: 11/12/98 comp. date: 01/20/99
Lambert X: 3331355 Lambert Y: 3175476 td: 250
producing formation: td formation:
latitude: 41.750655 longitude: 88.280364

120893132600 Dietzman, Gerald E. 25-38N- 8E
Kane Martinez, Juan
Status: WATER NW NW SW Elev: 0
permit: permit date: 06/10/94 comp. date: 08/22/94
Lambert X: 3331379 Lambert Y: 3173518 td: 160
producing formation: td formation:
latitude: 41.745258 longitude: 88.280373

120893436800 25-38N- 8E
Kane Wermes SBDV 3
Status: WATER SW NW NW Elev: 0
permit: permit date: comp. date: 01/01/98
Lambert X: 3331355 Lambert Y: 3175476 td: 200
producing formation: td formation:
latitude: 41.750655 longitude: 88.280364

120893389000 25-38N- 8E
Kane Wermes Subdivisio 1
Status: WATER 800 S 400 E NWc Elev: 720
permit: permit date: comp. date: 01/01/23
Lambert X: 3331420 Lambert Y: 3175658 td: 216

producing formation: td formation:
latitude: 41.751155 longitude: 88.280116

120893389100 25-38N- 8E
Kane Wermes Subdivisio 2
Status: WATER 825 S 400 E NWc Elev: 720
permit: permit date: comp. date: 01/01/56
Lambert X: 3331420 Lambert Y: 3175633 td: 253
producing formation: td formation:
latitude: 41.751086 longitude: 88.280117

120892897600 Weirich, William Theodore 26-38N- 8E
Kane Achilli Builders, Inc. 1
Status: WATER 1150 NL 1450 EL Elev: 730GL
permit: 106019 permit date: 01/12/83 comp. date: 02/10/83
Lambert X: 3329575 Lambert Y: 3175227 td: 173
producing formation: td formation:
latitude: 41.750035 longitude: 88.286927

120892897100 Knierim, Phillip E. 26-38N- 8E
Kane Achilli, Joe
Status: WATER 1750 NL 450 EL Elev: 705GL
permit: 86457 permit date: 06/08/79 comp. date: 07/03/79
Lambert X: 3330581 Lambert Y: 3174665 td: 180
producing formation: td formation:
latitude: 41.748449 longitude: 88.283253

120892897400 Knierim, Phillip E. 26-38N- 8E
Kane Achilli, Joe
Status: WATER 1950 NL 150 EL Elev: 705GL
permit: 98336 permit date: 02/02/81 comp. date: 02/17/81
Lambert X: 3330884 Lambert Y: 3174477 td: 140
producing formation: td formation:
latitude: 41.747919 longitude: 88.282147

120892899300 Knierim, Phillip E. 26-38N- 8E
Kane Achilli, Joe
Status: WATER NE SW NE Elev: 0
permit: 86456 permit date: 06/08/79 comp. date: 06/11/79
Lambert X: 3329385 Lambert Y: 3174739 td: 180
producing formation: td formation:
latitude: 41.748697 longitude: 88.287651

120892897200 Knierim, Phillip E. 26-38N- 8E
Kane Achilli, Joe Builders
Status: WATER 2100 NL 100 EL Elev: 0
permit: 97870 permit date: 12/16/80 comp. date: 12/22/80
Lambert X: 3330935 Lambert Y: 3174329 td: 120
producing formation: td formation:
latitude: 41.747510 longitude: 88.281967

120892897300 Knierim, Phillip E. 26-38N- 8E
Kane Achilli, Joe Builders
Status: WATER 2050 NL 250 EL Elev: 710GL
permit: 97989 permit date: 12/24/80 comp. date: 01/02/81
Lambert X: 3330785 Lambert Y: 3174373 td: 140
producing formation: td formation:
latitude: 41.747636 longitude: 88.282516

120892897500 Weirich, William Theodore 26-38N- 8E
Kane Achilli, Joe Builders Inc.
Status: WATER NW SE SE Elev: 0

permit: 103708 permit date: 06/08/82 comp. date: 06/09/82
Lambert X: 3330077 Lambert Y: 3172155 td: 0
producing formation: td formation:
latitude: 41.741549 longitude: 88.285231

120890180700 K & K Well Drilling 26-38N- 8E
Kane Adesso Homes
Status: WATER 1875 NL 550 EL Elev: 720GL
permit: 0 permit date: comp. date: 01/01/72
Lambert X: 3330483 Lambert Y: 3174536 td: 160
producing formation: td formation:
latitude: 41.748097 longitude: 88.283620

120890180800 K & K Well Drilling 26-38N- 8E
Kane Adesso Homes
Status: WATER 1750 NL 550 EL Elev: 720GL
permit: 0 permit date: comp. date: 01/01/72
Lambert X: 3330482 Lambert Y: 3174661 td: 160
producing formation: td formation:
latitude: 41.748441 longitude: 88.283617

120893458300 26-38N- 8E
Kane Alibi
Status: WATER SE SW NW Elev: 0
permit: permit date: comp. date:
Lambert X: 3326765 Lambert Y: 3173986 td: 0
producing formation: td formation:
latitude: 41.746717 longitude: 88.297329

120893576100 26-38N- 8E
Kane Aurora Phillips Park Boring ML-5
Status: ENG 260 NL 255 EL Elev: 0
permit: permit date: comp. date:
Lambert X: 3330760 Lambert Y: 3176162 td: 0
producing formation: td formation:
latitude: 41.752568 longitude: 88.282520

120893576200 26-38N- 8E
Kane Aurora Phillips Park Boring ML-6
Status: ENG 235 S 520 W NEc Elev: 0
permit: permit date: comp. date:
Lambert X: 3330494 Lambert Y: 3176177 td: 0
producing formation: td formation:
latitude: 41.752619 longitude: 88.283498

120893576400 26-38N- 8E
Kane Aurora Phillips Park Borings ML-9
Status: ENG Elev: 0
permit: permit date: comp. date:
Lambert X: 3328413 Lambert Y: 3173723 td: 0
producing formation: td formation:
latitude: 41.745932 longitude: 88.291278

120892273800 Layne Western Co., Inc. 26-38N- 8E
Kane Aurora Schl Dist B-2
Status: ENG SW SW SW Elev: 660GL
permit: 0 permit date: comp. date: 11/01/68
Lambert X: 3326157 Lambert Y: 3171352 td: 26
producing formation: td formation:
latitude: 41.739480 longitude: 88.299695

120892273900 Layne Western Co., Inc. 26-38N- 8E

Kane Aurora Schl Dist B-3
Status: ENG SW SW SW Elev: 660GL
permit: 0 permit date: comp. date: 11/01/68
Lambert X: 3326157 Lambert Y: 3171352 td: 45
producing formation: td formation:
latitude: 41.739480 longitude: 88.299695

120892274000 Layne Western Co., Inc. 26-38N- 8E
Kane Aurora Schl Dist B-5
Status: ENG SW SW SW Elev: 660GL
permit: 0 permit date: comp. date: 11/01/68
Lambert X: 3326157 Lambert Y: 3171352 td: 46
producing formation: td formation:
latitude: 41.739480 longitude: 88.299695

120893256600 IL Dept. of Transportation 26-38N- 8E
Kane Aurora, City of TH-5-87
Status: WTST 3335 SL 1635 EL Elev: 720GL
permit: permit date: comp. date: 02/13/87
Lambert X: 3329399 Lambert Y: 3174485 td: 196
producing formation: td formation:
latitude: 41.747996 longitude: 88.287612

120890034500 K & K Well Drilling 26-38N- 8E
Kane Chicago Savings
Status: WATER 2275 NL 250 EL Elev: 710GL
permit: 0 permit date: comp. date: 03/01/68
Lambert X: 3330787 Lambert Y: 3174148 td: 135
producing formation: td formation:
latitude: 41.747016 longitude: 88.282520

120890068300 Touvell Albert R 26-38N- 8E
Kane Emmons Robert C F742
Status: WATER N E SWc SE SE NE Elev: 0
permit: 0 permit date: comp. date: 01/01/66
Lambert X: 3330384 Lambert Y: 3173798 td: 82
producing formation: td formation:
latitude: 41.746066 longitude: 88.284020

120892240800 Palmer, A. L. 26-38N- 8E
Kane Forman Roy
Status: WATER 1050 NL 550 EL Elev: 730GL
permit: 0 permit date: comp. date: 02/01/75
Lambert X: 3330474 Lambert Y: 3175361 td: 178
producing formation: td formation:
latitude: 41.750371 longitude: 88.283612

120893594500 Weirich, William Theodore 26-38N- 8E
Kane Francisco, Ramirez & Maria 1
Status: WATER NW NE SE Elev: 0
permit: permit date: 05/03/05 comp. date: 05/18/05
Lambert X: 3330060 Lambert Y: 3173460 td: 260
producing formation: td formation:
latitude: 41.745132 longitude: 88.285208

120892256000 Layne Western Co., Inc. 26-38N- 8E
Kane Gates School B-5
Status: ENG 1250 SL 125 WL Elev: 662GL
permit: 0 permit date: comp. date: 05/01/67
Lambert X: 3325937 Lambert Y: 3172267 td: 16
producing formation: td formation:
latitude: 41.742010 longitude: 88.300460

120892256100 Layne Western Co., Inc. 26-38N- 8E
Kane Gates School B-9
Status: ENG 1250 SL 196 WL Elev: 664GL
permit: 0 permit date: comp. date: 08/01/67
Lambert X: 3326008 Lambert Y: 3172270 td: 51
producing formation: td formation:
latitude: 41.742015 longitude: 88.300199

120892235500 K & K Well Drilling 26-38N- 8E
Kane Hutchinson Randy
Status: WATER 2150 NL 550 EL Elev: 715GL
permit: 0 permit date: comp. date: 01/01/75
Lambert X: 3330486 Lambert Y: 3174262 td: 140
producing formation: td formation:
latitude: 41.747342 longitude: 88.283622

120893458400 26-38N- 8E
Kane Johns Beef & Beer
Status: WATER SW SW SE Elev: 0
permit: permit date: comp. date:
Lambert X: 3328776 Lambert Y: 3171453 td: 0
producing formation: td formation:
latitude: 41.739662 longitude: 88.290053

120893581600 26-38N- 8E
Kane Lake Mastodon Project SHT#9
Status: ENG 450 N 960 E SWc Elev: 0
permit: permit date: comp. date: 05/07/04
Lambert X: 3326787 Lambert Y: 3171500 td: 3
producing formation: td formation:
latitude: 41.739865 longitude: 88.297370

120893436900 26-38N- 8E
Kane Margaret's Park View Est 1
Status: WATER SE SW SE Elev: 0
permit: permit date: comp. date: 01/01/00
Lambert X: 3329430 Lambert Y: 3171478 td: 208
producing formation: td formation:
latitude: 41.739707 longitude: 88.287645

120893437000 26-38N- 8E
Kane Margaret's Park View Est 2
Status: WATER SE SW SE Elev: 0
permit: permit date: comp. date: 01/01/00
Lambert X: 3329430 Lambert Y: 3171478 td: 210
producing formation: td formation:
latitude: 41.739707 longitude: 88.287645

120893579500 26-38N- 8E
Kane Mastodon Lake Project BHT#2
Status: ENG 295 N 1380 E SWc Elev: 0
permit: permit date: comp. date: 05/11/04
Lambert X: 3327210 Lambert Y: 3171361 td: 14
producing formation: td formation:
latitude: 41.739466 longitude: 88.295820

120893579600 26-38N- 8E
Kane Mastodon Lake Project BHT#3
Status: ENG 880 N 945 E SWc Elev: 0
permit: permit date: comp. date: 05/11/04
Lambert X: 3326763 Lambert Y: 3171929 td: 11
producing formation: td formation:

latitude: 41.741048 longitude: 88.297437

120893580900 26-38N- 8E
Kane Mastodon Lake Project BHT#F-2
Status: ENG 20 N 1600 E SWc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3327435 Lambert Y: 3171095 td: 8
producing formation: td formation:
latitude: 41.738725 longitude: 88.295005

120893581200 26-38N- 8E
Kane Mastodon Lake Project BHT#F-5
Status: ENG 85 N 1580 E SWc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3327414 Lambert Y: 3171159 td: 8
producing formation: td formation:
latitude: 41.738902 longitude: 88.295079

120893581000 26-38N- 8E
Kane Mastodon Lake Project BHT#F3
Status: ENG 30 S 1605 E NWc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3327338 Lambert Y: 3176262 td: 0
producing formation: td formation:
latitude: 41.752969 longitude: 88.295110

120893581700 26-38N- 8E
Kane Mastodon Lake Project SHT#4
Status: ENG 65 N 960 E SWc Elev: 0
permit: permit date: comp. date: 05/06/04
Lambert X: 3326794 Lambert Y: 3171115 td: 3
producing formation: td formation:
latitude: 41.738803 longitude: 88.297363

120893581500 26-38N- 8E
Kane Mastodon Lake Project SHVL#8
Status: ENG 510 N 1475 E SWc Elev: 0
permit: permit date: comp. date: 05/07/04
Lambert X: 3327300 Lambert Y: 3171580 td: 4
producing formation: td formation:
latitude: 41.740067 longitude: 88.295478

120893581900 26-38N- 8E
Kane Mastodon Lake Project SP#4
Status: ENG 750 N 1530 E SWc Elev: 0
permit: permit date: comp. date: 04/23/04
Lambert X: 3327351 Lambert Y: 3171822 td: 5
producing formation: td formation:
latitude: 41.740732 longitude: 88.295279

120892318100 Knierim Company, Inc. 26-38N- 8E
Kane Mdrn Am Mrtge Co
Status: WATER 1100 NL 1550 EL Elev: 0
permit: 0 permit date: comp. date: 02/01/76
Lambert X: 3329475 Lambert Y: 3175273 td: 200
producing formation: td formation:
latitude: 41.750165 longitude: 88.287293

120892897700 Neely, Mark S. 26-38N- 8E
Kane Novotny, Mrs. Ed
Status: WATER 2450 NL 1400 EL Elev: 730GL
permit: 99667 permit date: 05/14/81 comp. date: 05/18/81

Lambert X: 3329640 Lambert Y: 3173930 td: 185
producing formation: td formation:
latitude: 41.746458 longitude: 88.286752

120892276400 Layne Western Co., Inc. 26-38N- 8E
Kane Prop. Apartment Bldg. B-2
Status: ENG SE NE NE Elev: 720GL
permit: 0 permit date: comp. date: 12/01/69
Lambert X: 3330693 Lambert Y: 3175441 td: 21
producing formation: td formation:
latitude: 41.750583 longitude: 88.282802

120893609000 Brown, Darwin 26-38N- 8E
Kane Rio, Douglas A./Amazing, Inc.
Status: WATER NE SE SE Elev: 0
permit: permit date: 10/18/05 comp. date: 11/02/05
Lambert X: 3330732 Lambert Y: 3172181 td: 140
producing formation: td formation:
latitude: 41.741581 longitude: 88.282798

120893437100 26-38N- 8E
Kane SBDV WTR Trust 1
Status: WATER NE NE SE Elev: 0
permit: permit date: comp. date: 01/01/42
Lambert X: 3330716 Lambert Y: 3173484 td: 250
producing formation: td formation:
latitude: 41.745189 longitude: 88.282814

120893437300 26-38N- 8E
Kane SBDV WTR Trust No 1 2
Status: WATER NW NE SE Elev: 0
permit: permit date: comp. date: 01/01/46
Lambert X: 3330060 Lambert Y: 3173459 td: 180
producing formation: td formation:
latitude: 41.745144 longitude: 88.285229

120893437200 26-38N- 8E
Kane SBDV WTR Trust No 1 3
Status: WATER NW NE SE Elev: 0
permit: permit date: comp. date: 01/01/50
Lambert X: 3330060 Lambert Y: 3173459 td: 196
producing formation: td formation:
latitude: 41.745144 longitude: 88.285229

120893405400 Senffner, Alan James 26-38N- 8E
Kane Saldana, Rafael
Status: WATER NW NE SE Elev: 0
permit: permit date: 01/18/01 comp. date: 01/22/01
Lambert X: 3330060 Lambert Y: 3173459 td: 160
producing formation: td formation:
latitude: 41.745144 longitude: 88.285229

120890055200 Neeley, Harry C. 26-38N- 8E
Kane Schuler A A 1
Status: WATER 12 SL 110 EL SW SE SE Elev: 0
permit: 0 permit date: comp. date: 01/01/69
Lambert X: 3330306 Lambert Y: 3171197 td: 245
producing formation: td formation:
latitude: 41.738901 longitude: 88.284436

120890154800 K & K Well Drilling 26-38N- 8E
Kane Swafford Willie

Status: WATER 1050 NL 700 EL Elev: 730GL
permit: 0 permit date: comp. date: 11/01/72
Lambert X: 3330324 Lambert Y: 3175355 td: 160
producing formation: td formation:
latitude: 41.750360 longitude: 88.284165

120893458500 26-38N- 8E
Kane Swoney's Drive Inn
Status: WATER SW SW SE Elev: 0
permit: permit date: comp. date:
Lambert X: 3328776 Lambert Y: 3171453 td: 0
producing formation: td formation:
latitude: 41.739662 longitude: 88.290053

120890068400 Neely & Etal 26-38N- 8E
Kane Tadewald Norbert
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/42
Lambert X: 3328413 Lambert Y: 3173723 td: 138
producing formation: td formation:
latitude: 41.745932 longitude: 88.291278

120890068500 Neely & Etal 26-38N- 8E
Kane Valentine Darwin C
Status: WATER 20 NL 100 EL Elev: 0
permit: 0 permit date: comp. date: 06/01/41
Lambert X: 3330912 Lambert Y: 3176408 td: 137
producing formation: td formation:
latitude: 41.753240 longitude: 88.281949

120892971400 Stanley, Charles Joseph 26-38N- 8E
Kane Westcott, Rebecca
Status: WATER NE NE NE Elev: 0
permit: 91146 permit date: 11/01/79 comp. date: 11/12/79
Lambert X: 3330685 Lambert Y: 3176093 td: 113
producing formation: td formation:
latitude: 41.752381 longitude: 88.282800

120893541600 IL State Geological Survey 27-38N- 8E
Kane Aurora 4
Status: STRAT NW SE SE Elev: 675GL
permit: permit date: comp. date: 05/24/04
Lambert X: 3324826 Lambert Y: 3171951 td: 50
producing formation: td formation:
latitude: 41.741179 longitude: 88.304564

120890068600 No Company 27-38N- 8E
Kane Aurora City
Status: WATER 180 SL 2540 EL Elev: 662GL
permit: 0 permit date: comp. date:
Lambert X: 3323295 Lambert Y: 3171087 td: 2100
producing formation: td formation:
latitude: 41.738853 longitude: 88.310239

120893576300 27-38N- 8E
Kane Aurora Phillips Park Borings ML-7
Status: ENG Elev: 0
permit: permit date: comp. date:
Lambert X: 3323147 Lambert Y: 3173514 td: 0
producing formation: td formation:
latitude: 41.745548 longitude: 88.310667

120892273700 Layne Western Co., Inc. 27-38N- 8E
Kane Aurora Schl Dist B-1
Status: ENG SE SE SE Elev: 660GL
permit: 0 permit date: comp. date: 10/01/68
Lambert X: 3325500 Lambert Y: 3171326 td: 45
producing formation: td formation:
latitude: 41.739432 longitude: 88.302114

120890068700 Geltz, N. H. 27-38N- 8E
Kane Diederich John 1
Status: WATER 400 N 1500 W SEc Elev: 0
permit: 0 permit date: comp. date: 01/01/49
Lambert X: 3324330 Lambert Y: 3171350 td: 29
producing formation: td formation:
latitude: 41.739541 longitude: 88.306418

120892255400 Layne Western Co., Inc. 27-38N- 8E
Kane Jennings Terrace B-1
Status: ENG NW NW NW Elev: 670GL
permit: 0 permit date: comp. date: 06/01/66
Lambert X: 3320806 Lambert Y: 3175705 td: 21
producing formation: td formation:
latitude: 41.751671 longitude: 88.319177

120892255500 Layne Western Co., Inc. 27-38N- 8E
Kane Jennings Terrace B-2
Status: ENG NW NW NW Elev: 670GL
permit: 0 permit date: comp. date: 06/01/66
Lambert X: 3320806 Lambert Y: 3175705 td: 21
producing formation: td formation:
latitude: 41.751671 longitude: 88.319177

120892263100 Layne Western Co., Inc. 27-38N- 8E
Kane St Pauls Church B-4
Status: ENG 750 NL 1625 EL Elev: 678GL
permit: 0 permit date: comp. date: 10/01/67
Lambert X: 3324125 Lambert Y: 3175416 td: 16
producing formation: td formation:
latitude: 41.750755 longitude: 88.306976

120892263200 Layne Western Co., Inc. 27-38N- 8E
Kane St Pauls Church B-5
Status: ENG 670 NL 1690 EL Elev: 678GL
permit: 0 permit date: comp. date: 11/01/67
Lambert X: 3324058 Lambert Y: 3175494 td: 26
producing formation: td formation:
latitude: 41.750972 longitude: 88.307219

120893598300 Meadow Equipment 28-38N- 8E
Kane Advance Material Services
Status: WATER SW NE SW Elev: 0
permit: permit date: 05/03/05 comp. date: 07/08/05
Lambert X: 3316899 Lambert Y: 3172281 td: 160
producing formation: td formation:
latitude: 41.742357 longitude: 88.333699

120893541500 IL State Geological Survey 28-38N- 8E
Kane Aurora 3
Status: STRAT NW SE SE Elev: 655GL
permit: permit date: comp. date: 05/25/04
Lambert X: 3319545 Lambert Y: 3171732 td: 21
producing formation: td formation:
latitude: 41.740765 longitude: 88.324007

120890068800 Geiger, S. B. & Son 28-38N- 8E
Kane Aurora City 7
Status: WATER 2400 NL 2600 WL Elev: 630GL
permit: 0 permit date: comp. date: 01/01/15
Lambert X: 3317823 Lambert Y: 3173517 td: 2163
producing formation: td formation:
latitude: 41.745746 longitude: 88.330259

120892246300 Geltz, N. H. 28-38N- 8E
Kane Aurora Dulpmnt Co 2
Status: WATER NW NE SW Elev: 0
permit: 0 permit date: comp. date: 11/01/74
Lambert X: 3316886 Lambert Y: 3172935 td: 250
producing formation: td formation:
latitude: 41.744176 longitude: 88.333735

120890001500 Geltz, N. H. 28-38N- 8E
Kane Aurora Laundry 2
Status: WATER Elev: 0
permit: 0 permit date: comp. date: 01/01/56
Lambert X: 3317870 Lambert Y: 3173301 td: 200
producing formation: td formation:
latitude: 41.745149 longitude: 88.330097

120892768800 Layne-Western Company, Inc. 28-38N- 8E
Kane Aurora Test Hole 5-84
Status: WATER 75 NL 2750 EL Elev: 0
permit: 0 permit date: comp. date: 12/05/84
Lambert X: 3317725 Lambert Y: 3175839 td: 60
producing formation: td formation:
latitude: 41.752150 longitude: 88.330510

120893256500 IL Dept. of Transportation 28-38N- 8E
Kane Montgomery, Village of TH-1-87
Status: ENG SL 1880 WL Elev: 630GL
permit: permit date: comp. date: 02/11/87
Lambert X: 3317163 Lambert Y: 3170654 td: 90
producing formation: td formation:
latitude: 41.737879 longitude: 88.332824

120890041200 Palmer R L & Sons 28-38N- 8E
Kane Pettibone Westrac Co.
Status: WATER 2800 SL 2300 EL Elev: 640GL
permit: 0 permit date: comp. date: 08/01/68
Lambert X: 3318208 Lambert Y: 3173496 td: 125
producing formation: td formation:
latitude: 41.745675 longitude: 88.328844

120892240900 Knierim Company, Inc. 28-38N- 8E
Kane Rains Leslie
Status: WATER SW NW NW Elev: 0
permit: 0 permit date: comp. date: 07/01/74
Lambert X: 3315526 Lambert Y: 3174847 td: 100
producing formation: td formation:
latitude: 41.749493 longitude: 88.338650

120890041100 Pitz, N. L. 28-38N- 8E
Kane Runkle H 1
Status: WATER NW NW NW Elev: 0
permit: 0 permit date: comp. date: 01/01/68
Lambert X: 3315512 Lambert Y: 3175502 td: 136

producing formation: td formation:
latitude: 41.751299 longitude: 88.338671

120890077100 Geltz, N. H. 28-38N- 8E
Kane Swadar Plastic Co 1
Status: WATER SW NW NW Elev: 650GL
permit: 0 permit date: comp. date: 01/01/50
Lambert X: 3315526 Lambert Y: 3174847 td: 77
producing formation: td formation:
latitude: 41.749493 longitude: 88.338650

120893238700 IL Dept. of Transportation 28-38N- 8E
Kane culvert at Gilman Trail Route 31 K-157
Status: ENG 3400 SL 1500 WL Elev: 639GL
permit: permit date: comp. date: 08/08/86
Lambert X: 3316712 Lambert Y: 3174036 td: 17
producing formation: td formation:
latitude: 41.747216 longitude: 88.334323

120890068200 Layne Western Co., Inc. 29-38N- 8E
Kane Aurora City Of 15
Status: WATER 164 NL 175 EL Elev: 670GL
permit: 0 permit date: comp. date: 01/01/50
Lambert X: 3315003 Lambert Y: 3175647 td: 2150
producing formation: td formation:
latitude: 41.751717 longitude: 88.340537

120890068900 Touvell Albert R 29-38N- 8E
Kane Fox Valley Platers 2
Status: WATER 160 NL 120 EL SE NE SE Elev: 0
permit: 0 permit date: comp. date: 01/01/66
Lambert X: 3315127 Lambert Y: 3172378 td: 195
producing formation: td formation:
latitude: 41.741755 longitude: 88.341745

120892348200 K & K Well Drilling 29-38N- 8E
Kane Gierhart Tim
Status: WATER 400 NL 300 EL Elev: 0
permit: 0 permit date: comp. date: 07/01/77
Lambert X: 3314883 Lambert Y: 3175407 td: 90
producing formation: td formation:
latitude: 41.751059 longitude: 88.340990

120893284100 Dietzman, Gerald E. 29-38N- 8E
Kane Parro, John
Status: WATER NE NE NE Elev: 0
permit: permit date: 10/20/98 comp. date: 10/22/98
Lambert X: 3314855 Lambert Y: 3175478 td: 180
producing formation: td formation:
latitude: 41.751256 longitude: 88.341090

120893458700 29-38N- 8E
Kane Stoney's Tavern
Status: WATER NE NE NE Elev: 0
permit: permit date: comp. date:
Lambert X: 3314855 Lambert Y: 3175478 td: 0
producing formation: td formation:
latitude: 41.751256 longitude: 88.341090

120890024100 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township B
Status: WATER S E NWc Elev: 606GL

permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 14
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024200 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township C
Status: WATER S E NWc Elev: 607GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 11
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024300 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township D
Status: WATER S E NWc Elev: 617GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 28
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024400 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township E
Status: WATER S E NWc Elev: 618GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 56
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024500 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township F
Status: WATER S E NWc Elev: 609GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 18
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024600 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township G
Status: WATER S E NWc Elev: 612GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 44
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024700 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township H
Status: WATER S E NWc Elev: 617GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 14
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120890024800 Vogt Ivers & Assoc 33-38N- 8E
Kane Aurora Township J
Status: WATER S E NWc Elev: 632GL
permit: 0 permit date: comp. date: 01/01/61
Lambert X: 3315298 Lambert Y: 3170578 td: 24
producing formation: td formation:
latitude: 41.737735 longitude: 88.339690

120893285200 M. Kauzlarich 33-38N- 8E

Kane Aurora, City of TH 5-84
Status: WATER 75 S 2750 W NEc Elev: 0
permit: permit date: comp. date:
Lambert X: 3317822 Lambert Y: 3170606 td: 60
producing formation: td formation:
latitude: 41.737723 longitude: 88.330401

120892318900 Knierim Company, Inc. 33-38N- 8E
Kane Fox Rvr Vly Park
Status: WATER 150 NL 500 EL Elev: 0
permit: 0 permit date: comp. date: 10/01/76
Lambert X: 3320071 Lambert Y: 3170622 td: 150
producing formation: td formation:
latitude: 41.737687 longitude: 88.322125

120893389400 Moretrench American Corp. 33-38N- 8E
Kane Montgomery, Village o 11
Status: WATER 120 S 3150 W NEc Elev: 622
permit: permit date: comp. date: 07/30/87
Lambert X: 3317426 Lambert Y: 3170545 td: 59
producing formation: td formation:
latitude: 41.737569 longitude: 88.331861

120892263300 Layne Western Co., Inc. 34-38N- 8E
Kane Aurora Office Bldg. B-3
Status: ENG NE NE NE Elev: 664GL
permit: 0 permit date: comp. date: 09/01/67
Lambert X: 3325535 Lambert Y: 3170668 td: 26
producing formation: td formation:
latitude: 41.737617 longitude: 88.302017

120893570200 34-38N- 8E
Kane Aurora Phillips Park Borings ML-1
Status: ENG 240 S 515 W NEc Elev: 0
permit: permit date: comp. date:
Lambert X: 3325347 Lambert Y: 3170753 td: 0
producing formation: td formation:
latitude: 41.737858 longitude: 88.302705

120893575800 34-38N- 8E
Kane Aurora Phillips Park Borings ML-2
Status: ENG 200 S 570 W NEc Elev: 0
permit: permit date: comp. date:
Lambert X: 3325290 Lambert Y: 3170791 td: 0
producing formation: td formation:
latitude: 41.737965 longitude: 88.302913

120893575900 34-38N- 8E
Kane Aurora Phillips Park Borings ML-3
Status: ENG 205 S 655 W NEc Elev: 0
permit: permit date: comp. date:
Lambert X: 3325206 Lambert Y: 3170782 td: 0
producing formation: td formation:
latitude: 41.737943 longitude: 88.303222

120890109700 K & K Well Drilling 34-38N- 8E
Kane Desmond Albert
Status: WATER 50 NL 1100 EL Elev: 663GL
permit: 0 permit date: comp. date: 07/01/70
Lambert X: 3324754 Lambert Y: 3170918 td: 120
producing formation: td formation:
latitude: 41.738335 longitude: 88.304879

120890181400 K & K Well Drilling 34-38N- 8E
Kane Fair Realty
Status: WATER NE NE NE Elev: 0
permit: 0 permit date: comp. date: 09/01/72
Lambert X: 3325535 Lambert Y: 3170668 td: 120
producing formation: td formation:
latitude: 41.737617 longitude: 88.302017

120893025300 Weirich, William Theodore 34-38N- 8E
Kane Raimo, Dennis 1
Status: WATER NW NE NW Elev: 0
permit: 017394 permit date: 04/02/90 comp. date: 05/03/90
Lambert X: 3322233 Lambert Y: 3170531 td: 130
producing formation: td formation:
latitude: 41.737359 longitude: 88.314174

120892274200 Layne Western Co., Inc. 34-38N- 8E
Kane Volkshaf Inc. B-2
Status: ENG NW NW NE Elev: 658GL
permit: 0 permit date: comp. date: 02/01/71
Lambert X: 3323554 Lambert Y: 3170586 td: 36
producing formation: td formation:
latitude: 41.737463 longitude: 88.309310

120892274300 Layne Western Co., Inc. 34-38N- 8E
Kane Volkshaf Inc. B-3
Status: ENG NW NW NE Elev: 658GL
permit: 0 permit date: comp. date: 02/01/71
Lambert X: 3323554 Lambert Y: 3170586 td: 51
producing formation: td formation:
latitude: 41.737463 longitude: 88.309310

120893046500 Senffner, Alan James 34-38N- 8E
Kane Westphal, Danielle
Status: WATER NE NE NE Elev: 0
permit: 020376 permit date: 05/28/91 comp. date: 06/04/91
Lambert X: 3325535 Lambert Y: 3170668 td: 130
producing formation: td formation:
latitude: 41.737617 longitude: 88.302017

120890070100 No Company 35-38N- 8E
Kane Aurora City Park
Status: WATER 60 NL 1900 WL Elev: 695TM
permit: 0 permit date: comp. date: 01/01/09
Lambert X: 3327749 Lambert Y: 3171027 td: 2480
producing formation: td formation:
latitude: 41.738526 longitude: 88.293853

120893576000 35-38N- 8E
Kane Aurora Phillips Park Boring ML-4
Status: ENG 55 S 370 E NWc Elev: 0
permit: permit date: comp. date:
Lambert X: 3326222 Lambert Y: 3170973 td: 0
producing formation: td formation:
latitude: 41.738433 longitude: 88.299474

120893581100 35-38N- 8E
Kane Lake Mastodon Project BHT#F-4
Status: ENG 67 S 1610 E NWc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3327460 Lambert Y: 3171009 td: 4
producing formation: td formation:

latitude: 41.738487 longitude: 88.294917

120893581300 35-38N- 8E
Kane Lake Mastodon Project BHT#F-6
Status: ENG 95 S 1335 E NWc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3327187 Lambert Y: 3170970 td: 8
producing formation: td formation:
latitude: 41.738389 longitude: 88.295924

120893580800 35-38N- 8E
Kane Mastodon Lake Project BHT#F1
Status: ENG 160 S 1345 W NEc Elev: 0
permit: permit date: comp. date: 08/04/04
Lambert X: 3329739 Lambert Y: 3171003 td: 5
producing formation: td formation:
latitude: 41.738387 longitude: 88.286531

120893583500 35-38N- 8E
Kane Mastodon Lake Project Main
Status: STRAT 140 NL 1290 WL Elev: 663ES
permit: permit date: comp. date: 09/01/04
Lambert X: 3327162 Lambert Y: 3170913 td: 10
producing formation: td formation:
latitude: 41.738233 longitude: 88.296018

120893459600 35-38N- 8E
Kane Rudy's Place
Status: WATER NW NW NE Elev: 0
permit: permit date: comp. date:
Lambert X: 3328805 Lambert Y: 3170792 td: 0
producing formation: td formation:
latitude: 41.737840 longitude: 88.289979