Lees Lane Landfill Sampling Report
April 1, 2013 Sampling Event

Lees Lane

Louisville, Jefferson County, Kentucky

AI # 46333

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1.0 Introduction

On April 1, 2013, the Kentucky Division of Waste Management (KDWM) conducted a sampling event at the Lees Lane Superfund Site in Louisville, Kentucky. KDWM sampled at twenty-eight (28) locations across the site.

The sampling event was conducted in accordance with the Quality Assurance Project Plan, *"Site Specific Quality Assurance Project Plan (QAPP) for Lees Lane Landfill"* dated March 2013 (Appendix E). The primary objective of this investigation was to determine the nature and extent of contamination that might be present in surface and subsurface soils in the North, Central, and Southern tracts of the Lees Lane Landfill. Results from this investigation will also allow for more fully informed decision making in regards to human health and the environment, and the risk for potential exposures. This report details the results from the samples collected by KDWM.

2.0 Background

2.1 General

The property is located approximately 4.5 miles south of downtown Louisville, Kentucky. It consists of approximately 112 acres of wooded and open land where waste was accepted from the late 1940s to April 1975. The surface is primarily covered with well-established vegetation ranging from brush to woodlands. Construction debris, tires, medical waste, and household waste have been observed on the landfill surface. The site is divided into the Northern Tract, the Central Tract, and the Southern Tract. Locally, the site can be accessed by vehicle from Lees Lane behind a locked gate maintained by the Louisville Metropolitan Sewer District (MSD). Geographic coordinates at the Lees Lane entrance are Latitude 38° 11′ 39.5″degrees north and Longitude 85° 52′ 40″degrees west.

The site is situated adjacent to and west of a neighborhood known as the Riverside Gardens and is bordered by an industrial area to the north, and the Cane Run Power Plant to the south.

2.2 History

The site history is provided below, and can also be found in the 5-year reviews, for the Record of Decision (ROD) for 1993, 1998, 2003, and 2008.

In March 1975, homeowners in Riverside Gardens reported flash fires around their water heaters. A subsequent investigation detected explosive levels of methane gas and seven (7)

families were evacuated from their homes near the site. These homes were eventually purchased by the Jefferson County Housing Authority. In 1978, extensive monitoring was conducted to define the gas migration problem. A soil gas venting system was installed in October 1980.

In February 1980, the Kentucky Department of Hazardous Materials and Waste Management (HMWM) discovered approximately 400 drums on a terrace located about 100 feet from the Ohio River Bank. Over 50 chemicals were identified, including phenolic resins, benzene, and relatively high concentrations of copper, cadmium, nickel, lead, and chromium. In September and October 1981, the drums were removed by the Lees Lane Landfill owners under court order. The hazardous wastes were removed from the drums and transported to an approved hazardous waste disposal facility. The remaining non-hazardous materials and the empty drums were buried on-site.

In early 1981, the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) [now the Energy and Environment Cabinet] installed shallow groundwater monitoring wells at the site. The results of analysis showed high concentrations of heavy metals and aluminum. However, the analytical report stated that many of the sample concentrations were probably elevated due to excessive sediment in the samples caused by poor well construction.

The Lees Lane Landfill was placed on the National Priorities List in December 1982. In April 1986 EPA completed its Remedial Investigation/Feasibility Study (RIFS) at the site. The RI report identified the following four (4) contaminants of concern: arsenic, chromium, lead, and benzene. The study was conducted by NUS Corporation. In September 1986, EPA issued an Explanation of Significant Difference (ESD). In September 1986, EPA issues a Record of Decision (ROD).

EPA conducted response actions at the site in accordance with the ROD between March and December 1987 which included the installation of security gates and cautionary signs, capping "hot spots" with clay, the burial of empty drums and drums containing non-hazardous materials on site, the removal of drums containing hazardous materials for off-site disposal, the construction of a rip-rap slope along the Ohio River bank in the Central Tract with survey monuments installed to detect slope movement, the repair of an existing drainage ditch, installation of ten (10) gas monitoring wells and two (2) groundwater monitoring wells, repair of the existing gas collection system, and installation of an alternate water supply for residents within 1,500 feet of the site.

Operational and Functional (O&F) activities were performed for one (1) year by EPA following the completion of the response activities, including inspection of the gas monitoring wells, quarterly gas and groundwater sampling and analysis, and sampling the ambient air three (3) times a year. Other activities included inspection and maintenance of the gas collection system, capped waste areas, and the rip-rap along the Ohio River bank.

On July 16, 1991, the EPA entered into an Administrative Order on Consent with Louisville Metropolitan Sewer District (MSD), under which MSD agreed to perform certain Operation and Maintenance (O&M) activities at the site for twenty-nine (29) years. The Commonwealth of Kentucky entered into an Intergovernmental Response Agreement with EPA under which Kentucky provides oversight of MSD's O&M activities. This agreement was executed on April 7, 1994.

During a December 1991 site visit, some leaking drums were observed on site. These drums were subsequently removed by KNREPC.

In 1996, Lees Lane Landfill was delisted from the NPL.

Due to concerns regarding wastes near the surface of the landfill, in 2011, a limited surface soil investigation around the pond area of the Southern Tract was conducted. While a range of constituents were detected, only one constituent, benzo(a)pyrene, exceeded the industrial regional screening levels (RSLs). Additional polycyclic aromatic hydrocarbons (PAHs) were detected above residential RSLs at one location. Arsenic was above the residential RSL in all samples, but ambient levels in Kentucky are higher than the screening level. In 2011, MSD evaluated the gas collection system, abandoned three (3) groundwater monitoring wells and installed three new gas monitoring wells.

Review of historical landfill information indicates that fill material was placed at the site to an approximate elevation of 405' above mean sea level (AMSL), or to a depth of approximately forty (40) feet below ground level; a depth that is within ten (10) feet of groundwater levels.

3.0 Methodology

3.1 Sampling Methodology

A total of thirty three (33) soil samples were collected by KDWM during the April 1, 2013 sampling event from twenty-eight (28) locations on the site. Six (6) soil samples were collected from the Northern Tract. Eleven (11) soil samples were collected from the Central Tract. Sixteen (16) soil samples were collected from the Southern Tract. Three (3) quality assurance/quality control (QA/QC) duplicates were collected and are included in these samples.

All equipment utilized during the sampling event was that of the KDWM. All soil sampling was conducted in accordance with the EPA Region 4, *"Field Branches Quality System and Technical Procedures"*, including SESDPROC-300-R2, Soil Sampling. Following these procedures, each surface sample was collected with hand augers from each location at a depth of 0-0.5 feet below ground surface (bgs). Three (3) additional samples were collected at the 0.5-2 feet bgs depth to determine if subsurface contamination is present. A PID (Photoionization Device) was used to screen the soil. In areas where a reading of 50 ppm or higher was detected in surface soil, a

subsurface soil sample was to be collected; however, no samples registered more than 0.5 ppm on the PID meter. Sample locations were recorded and can be found in Appendix D along with GPS coordinates of each sample. Samplers wore fresh nitrile gloves for each sample collection for protective purposes as well as to mitigate the potential for cross-contamination between sample locations. Soil from the auger head was deposited into a sterile stainless steel or glass bowl. A sample was collected immediately from the bowl (or directly from the auger head if possible) and placed in a sample jar for VOC analysis. A sterile stainless steel spoon was used to properly homogenize the remaining soil in accordance with applicable sections of the EPA guidance document *SESDPROC-300-R1, Soil Sampling*. If there was not enough soil to fill all required jars, additional soil was collected with the hand auger in a co-located hole. Samples were placed into new, sterile, 4 oz sampling jars and labeled appropriately. One (1) jar per analysis was filled and care was taken to leave zero-headspace in jars for which VOCs and SVOCs were analyzed. Samples were then placed on ice in a portable cooler until such time as they were delivered to the laboratory. All appropriate chain of custody forms for lab sample documentation were filled out as required.

In addition to the investigative soil samples, three (3) quality assurance/quality control (QA/QC) samples were collected. A duplicate of location N001 was labeled as "S013"; a duplicate of C006 was labeled as "N004"; and a duplicate of S014 was labeled as "S012".

All sampling equipment were decontaminated between uses utilizing the EPA document *SESDPROC-205-R2, Field Equipment Cleaning and Decontamination,* as a guide. The equipment underwent an alconox rinse/wash, a tap water rinse, and then a final rinse with deionized water to ensure that there was no potential for cross-contamination between sampling locations. Samplers wore fresh nitrile gloves for the decontamination event for protective purposes as well as to mitigate the potential for cross-contamination between sample locations. A QA/QC rinsate blank was collected after one (1) of the decontamination events. The rinsate blank was analyzed for VOCs, SVOCS, Pesticides, PCBs, and Metals. The purpose of the rinsate blank is to ensure that equipment utilized during the sampling event had been properly decontaminated.

All sample-sets underwent x-ray fluorescence (XRF) analysis in the field with a calibrated Innov-X analyzer. Confirmatory laboratory samples were collected every 10 screenings, triple the equipment-specified 5% confirmation.

All collected soil samples and associated Chain of Custody documentation were hand-delivered to Microbac Laboratories, Inc., in Louisville, Kentucky on April 2, 2013. The samples were analyzed for VOCs (SW846-8260B), SVOCs (SW846-8270C), and PCB and Pesticides (SW846-8081 & SW846-8082). Additionally, designated samples were analyzed for RCRA 8

(SW846-6010C) metals as discussed above. Laboratory analytical results were submitted from Microbac to KDEP and are discussed below. Laboratory data is provided in Appendix C.

3.2 Analytical Methodology

All collected soil samples and associated Chain of Custody documentation were hand-delivered to Microbac Laboratories, Inc., in Louisville, Kentucky, where they were analyzed for VOCs (SW846-8260B), SVOCs (SW846-8270C), and PCB and Pesticides (SW846-8081 & SW846-8082). Additionally, designated samples were analyzed for RCRA 8 metals (SW846-6010C).

The referenced RSLs can be found on-line at:
http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/ and
http://www.epa.gov/reg3hscd/risk/human/rb-concentrationtableGeneric_____Tables/index.htm.
Microbac was informed that detection limits must meet all RSL levels. A Level II Data Deliverables Package was prepared by the laboratory and submitted to KDEP.

Data validation was conducted by Microbac Laboratories. The data validation reports can be found in Appendix C.

4.0 Investigation Results

Table 1 in Appendix B summarizes the constituents from the sampling event that were detected and found to be above residential and industrial RSLs. Table 2 in Appendix B shows the XRF results from field screening accomplished during sampling on April 1, 2013.

4.1 Metals (Arsenic, Lead, Thallium, Iron, and Chromium)

The EPA Regional Screening Level (RSL) for arsenic in soil is 0.39 mg/kg. Arsenic is naturally occurring in Kentucky soils at levels much higher than the RSL. All arsenic data was evaluated using Kentucky's *Ambient Background Guidance Assessment* document. Data values ranged from 3.7-16.0 mg/kg in soil samples analyzed by Microbac Laboratories. All data collected by KDWM and analyzed by Microbac Laboratories is considered below the ambient background levels in the Bluegrass Region. XRF field screening showed arsenic levels ranging from 3-67 mg/kg. Only one sample exceeded Kentucky's ambient background levels; that sample being from location S005 and measuring 67 mg/kg.

Of the seven (7) soils sampled for lead, only one (1) contained lead at levels exceeding the residential RSL value of 400 mg/kg. At 0-0.5' "S012", the duplicate soil sample from location S014, contained lead at 1300 mg/kg. This sample also exceeded the Industrial RSL for lead of

800 mg/kg. Lead was discovered in other soil samples, but was not elevated above RSLs in any other samples collected by KDWM. Lead levels ranged from 3.7-1300 mg/kg in soil samples analyzed by Microbac Laboratories. XRF field screening revealed no lead levels above RSLs. S014 had an XRF reading of 332 mg/kg lead, which is slightly below the residential RSL for lead.

Thallium was detected above the residential RSL (0.78 mg/kg) in only one (1) soil sample SO12 (the duplicate of S014) at 2.8 mg/kg.

Iron was ubiquitous at the site in both soil samples analyzed by Microbac Laboratories and in XRF field screening data. Iron was above the residential RSL (55000 mg/kg) at S014 (94000 mg/kg) and S012 (the duplicate of S014) at 140000 mg/kg.

Chromium presently does not have an RSL. However, it was detected in all soil samples analyzed by Microbac Laboratories at levels ranging from 13-270 mg/kg. XRF field screening revealed elevated levels at sample location N001 at 3356 mg/kg at 0 to 0.5' and 4545 mg/kg at 0.5 to 2' deep. However, analysis of soil sample N001 showed chromium levels of 270 mg/kg at 0 to 0.5'; a duplicate sample of N001 ("S013") showed chromium levels of 200 mg/kg at 0 to 0.5'.

4.2 Organochlorine Pesticides and PCBs

Only one soil sample (S004) contained Dieldrin at levels exceeding the residential RSL value of 0.030 mg/kg; this soil sample contained Dieldrin at 0.040 mg/kg.

None of the twenty-one (21) samples collected contained any organochlorine pesticides above residential RSLs except the previously mentioned Dieldrin in S004. However it should be noted that several pesticides were detected in the samples below residential RSLs. These pesticides included 4,4-DDD, 4,4-DDT, 4,4-DDE, Chlordane, gamma-Chlordane, and Dieldrin.

PCB Aroclors 1248, 1254, and 1260 were detected in ten (10) soil samples. Aroclor 1248 in sample S005 is 28 mg/kg which is above the residential RSL of 0.22 mg/kg and substantially exceeds the industrial RSL of 0.74 mg/kg. Aroclor 1254 in sample C005 (0.30 mg/kg) was above the residential RSL value of 0.22 mg/kg.

4.3 SVOCs

SVOCs were detected at levels exceeding the residential RSLs in twenty (20) locations sampled and exceeding industrial RSLs in three (3) locations sampled.

The polycyclic aromatic hydrocarbon (PAH) Benzo(a)pyrene was detected in twenty-three (23) samples at levels exceeding the residential RSL value of 0.015 mg/kg. Benzo(a)pyrene was

detected in three (3) samples at levels exceeding the industrial RSL value of 0.21 mg/kg. Overall levels ranged from non-detect to 5.1 mg/kg.

The polycyclic aromatic hydrocarbon (PAH) Benzo(a)anthracene was detected in three (3) samples at levels exceeding the residential RSL value of 0.15 mg/kg. Benzo(a)anthracene was detected in two (2) samples at levels exceeding the industrial RSL value of 2.1 mg/kg. Overall levels ranged from non-detect to 5.9 mg/kg.

The polycyclic aromatic hydrocarbon (PAH) Benzo(b)fluoranthene was detected in eleven (11) samples at levels exceeding the RSL value of 0.15 mg/kg. Benzo(b)fluoranthene was detected in three (3) samples at levels exceeding the industrial RSL value of 2.1 mg/kg. Overall levels ranged from non-detect to 11.0 mg/kg.

The polycyclic aromatic hydrocarbon (PAH) Dibenzo(a,h)anthracene was detected in two (2) soil samples at levels exceeding the residential RSL value of 0.015 mg/kg. Dibenzo(a,h)anthracene was detected in one (1) soil sample at levels exceeding the industrial RSL value of 0.21 µg/kg. Overall levels in samples ranged from non-detect to 0.22 mg/kg.

The polycyclic aromatic hydrocarbon (PAH) Indeno(1,2,3-cd)pyrene was detected in three (3) samples at levels exceeding the residential RSL value of 0.15 mg/kg. No samples exceeded the industrial RSL of 2.1 mg/kg. Overall levels ranged from non-detect to 1.0 mg/kg.

The polycyclic aromatic hydrocarbon (PAH) Benzo(k)fluoranthene was detected in one (1) sample at levels exceeding the RSL value of 1.5 mg/kg. Sample "S012" (duplicate of S014) measured 2.1 mg/kg Benzo(k)fluoranthene, which is equivalent to the industrial RSL of 2.1 mg/kg.

The polyhalogenated compound Di(2-ethylhexyl)phthalate was detected in one (1) sample at levels greatly exceeding the residential RSL value of 35.0 mg/kg and the industrial RSL of 120 mg/kg. Sample S005 measured 350.0 mg/kg for Di(2-ethylhexyl)phthalate.

5.0 Conclusions

The results of KDWM's soil sampling indicate that arsenic and PAHs are virtually ubiquitous at the Lees Lane Landfill at levels above EPA Region 3 residential RSLs. Metals, including lead, thallium, and iron, were above residential RSLs in several locations (chromium does not presently have an RSL listed, but had high readings in several locations). Lead was above industrial RSLs in one sample "S012" (a duplicate for location S014). PCB Aroclor 1248 was almost 38 times industrial RSLs at sample location S005. Moreover, there were isolated examples of the pesticide (Dieldrin), and PCBs (Aroclor 1254) above residential RSLs. The polyhalogenated compound (Di(2-ethylhexyl)phthalate) was more than three times above industrial RSLs in sample S005.

As discussed above, arsenic is usually present in Kentucky soils at levels above RSLs. However, one sample was considerably higher than usual Kentucky Ambient Background levels, suggesting isolated arsenic contamination associated with the landfill.

Contamination by metals other than arsenic appears random and is likely associated with the landfill contents. PCB contamination appears scattered and is most likely attributable to the diverse contents of the landfill. Organochlorine pesticides are possibly due to landfill contents; however they may be present due to use of these chemicals on the site during landfill operations as a pesticide, or pesticides use continued on site after operations ceased. The single sample above industrial RSLs for the polyhalogenated compound Di(2-ethylhexyl)phthalate may be related to landfill contents or the burning of landfill contents by trespassers.

Based on the sample results, PAH contamination above residential RSLs, particularly by Benzo(a)pyrene, is widespread and may be attributable to burning of coal, diesel fuel emissions, possible contaminated cover material, and other anthropogenic sources. However, it is possible that the PAHs present may be attributable to the landfill contents and the frequent use of the site by trespassers using all terrain vehicles (ATVs). Many samples were taken near ATV trails.

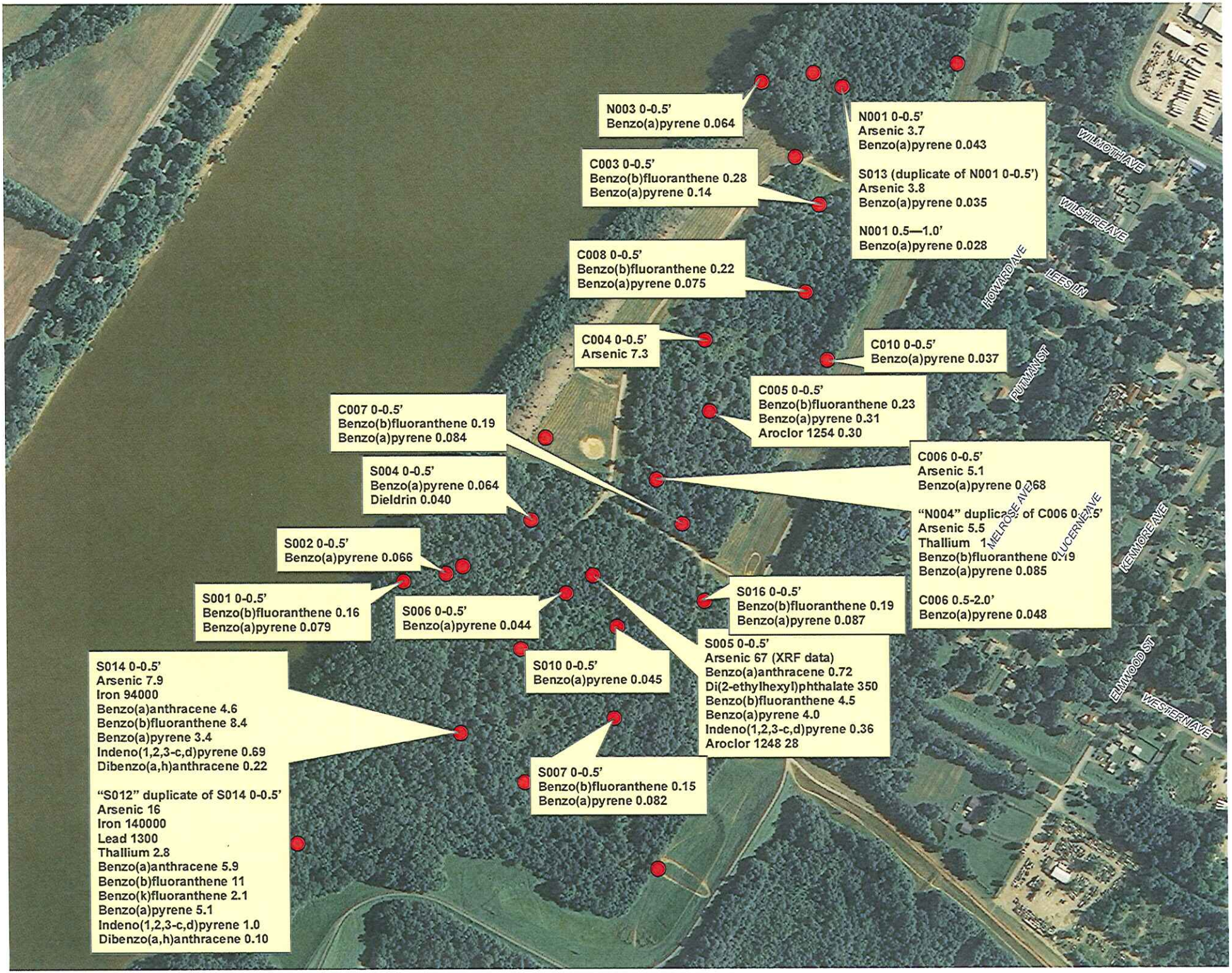
Because of results exceeding industrial RSLs at locations C005, S005, and S014, collecting additional samples to characterize the arsenic, lead, PCBs, and certain PAHs is justified in these areas.

Any conclusions drawn from one portion of this sampling may not necessarily be representative of the overall distribution of contaminants at Lees Lane Landfill. Further sampling in the region could be used to establish if off-site PAHs and other contaminants are above regional background levels.

Although levels of contamination are not extremely high, in many cases contaminants are well above residential RSLs. Therefore it would be advisable to prohibit public access to the site and enforce trespassing laws.

KDWM and USEPA Region IV are continuing to resolve issues related to the former Lees Lane Landfill.

Appendix A: Map


N003 0-0.5'
Benzo(a)pyrene 0.064
N001 0-0.5'
Arsenic 3.7
Benzo(a)pyrene 0.043
S013 (duplicate of N001 0-0.5')
Arsenic 3.8
Benzo(a)pyrene 0.035
N001 0.5—1.0'
Benzo(a)pyrene 0.028
C003 0-0.5'
Benzo(b)fluoranthene 0.28
Benzo(a)pyrene 0.14
C008 0-0.5'
Benzo(b)fluoranthene 0.22
Benzo(a)pyrene 0.075
C004 0-0.5'
Arsenic 7.3
C010 0-0.5'
Benzo(a)pyrene 0.037
C005 0-0.5'
Benzo(b)fluoranthene 0.23
Benzo(a)pyrene 0.31
Aroclor 1254 0.30
C007 0-0.5'
Benzo(b)fluoranthene 0.19
Benzo(a)pyrene 0.084
C006 0-0.5'
Arsenic 5.1
Benzo(a)pyrene 0.068
"N004" duplicate of C006 0-0.5'
Arsenic 5.5
Thallium 1
Benzo(b)fluoranthene 0.19
Benzo(a)pyrene 0.085
C006 0.5-2.0'
Benzo(a)pyrene 0.048
S004 0-0.5'
Benzo(a)pyrene 0.064
Dieldrin 0.040
S002 0-0.5'
Benzo(a)pyrene 0.066
S001 0-0.5'
Benzo(b)fluoranthene 0.16
Benzo(a)pyrene 0.079
S006 0-0.5'
Benzo(a)pyrene 0.044
S016 0-0.5'
Benzo(b)fluoranthene 0.19
Benzo(a)pyrene 0.087
S005 0-0.5'
Arsenic 67 (XRF data)
Benzo(a)anthracene 0.72
Di(2-ethylhexyl)phthalate 350
Benzo(b)fluoranthene 4.5
Benzo(a)pyrene 4.0
Indeno(1,2,3-c,d)pyrene 0.36
Aroclor 1248 28
S010 0-0.5'
Benzo(a)pyrene 0.045
S014 0-0.5'
Arsenic 7.9
Iron 94000
Benzo(a)anthracene 4.6
Benzo(b)fluoranthene 8.4
Benzo(a)pyrene 3.4
Indeno(1,2,3-c,d)pyrene 0.69
Dibenzo(a,h)anthracene 0.22
"S012" duplicate of S014 0-0.5'
Arsenic 16
Iron 140000
Lead 1300
Thallium 2.8
Benzo(a)anthracene 5.9
Benzo(b)fluoranthene 11
Benzo(k)fluoranthene 2.1
Benzo(a)pyrene 5.1
Indeno(1,2,3-c,d)pyrene 1.0
Dibenzo(a,h)anthracene 0.10
S007 0-0.5'
Benzo(b)fluoranthene 0.15
Benzo(a)pyrene 0.082
WILMOTH AVE
WILSHIRE AVE
HOWARD AVE
LEES LN
RUTMAN ST
MELROSE AVE
LUCERNE AVE
KENMORE AVE
ELMWOOD ST
WESTERN AVE

APPENDIX B

TABLE 1

Sample Location	Sample Depth (ft)	Constituent (mg/kg) in **bold** if above residential RSL and **bold and underlined** if above industrial RSL numbers.
N001	0.0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 53 **Arsenic 10** Chromium 3356 Cadmium 47 Analysis by Microbac Laboratory: Aluminum 9500 Antimony 3.4 **Arsenic 3.7** Barium 120 Beryllium 0.55 Cadmium 2.4 Chromium 270 Cobalt 12 Copper 81 Iron 23000

		Lead 43 Manganese 650 Nickel 53 Strontium 13 Vanadium 23 Zinc 180 Fluoranthene 0.093 Pyrene 0.060 Benzyl Butyl Phthalate 0.079 Benzo(a)anthracene 0.048 Chrysene 0.056 Di(2-ethylhexyl)phthalate 0.38 Benzo(b)fluoranthene 0.077 **Benzo(a)pyrene 0.043** 4,4-DDD 0.021 4,4-DDT 0.014 Aroclor 1260 0.063
N001	0.5 – 1.0	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 42 **Arsenic 12** Chromium 4545 Analysis by Microbac Laboratory:

		Di-n-Butyl Phthalate 0.044 Fluoranthene 0.065 Pyrene 0.033 Benzo(b)fluoranthene 0.051 **Benzo(a)pyrene 0.028** Aroclor 1260 0.055
N002	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 10 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.039 Fluoranthene 0.097 Pyrene 0.052 Benzo(a)anthracene 0.031 Chrysene 0.029 Di(2-ethylhexyl)phthalate 0.10 Benzo(b)fluoranthene 0.040 mg/kg
N003	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): None Detected Analysis by Microbac Laboratory: Naphthalene 0.034 Di-n-Butyl Phthalate 0.040 Fluoranthene 0.15

		Pyrene 0.094 Benzo(a)anthracene 0.064 Chrysene 0.081 Di(2-ethylhexyl)phthalate 0.050 Benzo(b)fluoranthene 0.12 Benzo(k)fluoranthene 0.036 **Benzo(a)pyrene 0.064**
"S013" (duplicate of N001)	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 33 Chromium 86 Analysis by Microbac Laboratory: Aluminum 11000 Antimony 2.9 **Arsenic 3.8** Barium 83 Beryllium 0.64 Cadmium 2.2 Chromium 200 Cobalt 12 Copper 79 Iron 22000 Lead 36

		Manganese Nickel 63 Strontium 14 Vanadium 24 Zinc 170 Pyrene 0.055 Benzyl Butyl Phthalate 0.070 Benzo(a)anthracene 0.035 Chrysene 0.043 Di(2-ethylhexyl)phthalate 0.20 Benzo(b)fluoranthene 0.072 **Benzo(a)pyrene 0.035** 4,4-DDD 0.012 Aroclor 1260 0.045
N005	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 20 Barium 316 Analysis by Microbac Laboratory: Di(2-ethylhexyl)phthalate 0.11
C001	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 13 Analysis by Microbac Laboratory:

		Di-n-Butyl Phthalate 0.039 Fluoranthene 0.13 Pyrene 0.085 Benzo(a)anthracene 0.054 Chrysene 0.060 Di(2-ethylhexyl)phthalate 0.051 Benzo(b)fluoranthene 0.11 Benzo(k)fluoranthene 0.034 **Benzo(a)pyrene 0.060 mg/kg**
C002	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): **Arsenic 15** Analysis by Microbac Laboratory: Diethyl Phthalate 0.043 Di-n-Butyl Phthalate 0.052 Di(2-ethylhexyl)phthalate 0.034
C003	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 86 Analysis by Microbac Laboratory: Hexachlorocyclopentadiene 0.18 Diethyl Phthalate 0.030 Anthracene 0.032

		Di-n-Butyl Phthalate 0.10 Fluoranthene 0.34 Pyrene 0.23 Benzo(a)anthracene 0.14 Chrysene 0.14 Di(2-ethylhexyl)phthalate 0.27 **Benzo(b)fluoranthene 0.28** Benzo(k)fluoranthene 0.087 **Benzo(a)pyrene 0.14** Indeno(1,2,3-c,d)pyrene 0.045 Aroclor 1260 0.10
C004	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 20 **Arsenic 9** Analysis by Microbac Laboratory: Aluminum 11000 Antimony 1.2 **Arsenic 7.3** Barium 69 Beryllium 0.59 Cadmium 1.7 Chromium 14

		Cobalt 8.1 Copper 14 Iron 22000 Lead 14 Manganese 470 Nickel 17 Strontium 9.0 Vanadium 22 Zinc 54 Di(2-ethylhexyl)phthalate 0.11 4,4-DDE 0.037 4,4-DDT 0.050
C005	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 110 Chromium 147 Analysis by Microbac Laboratory: Diethyl Phthalate 0.041 Di-n-Butyl Phthalate 0.12 Fluoranthene 0.22 Pyrene 0.19 Benzyl Butyl Phthalate 0.041

		Benzo(a)anthracene 0.098 Chrysene 0.11 Di(2-ethylhexyl)phthalate 0.90 **Benzo(b)fluoranthene 0.23** Benzo(k)fluoranthene 0.087 **Benzo(a)pyrene 0.31** **Aroclor 1254 0.30**
C006	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 39 **Arsenic 15** Chromium 70 Analysis by Microbac Laboratory: Aluminum 6500 Antimony 1.2 **Arsenic 5.1** Barium 50 Cadmium 1.6 Chromium 14 Cobalt 6.0 Copper 13 Iron 16000 Lead 37

		Manganese 480 Nickel 14 Strontium 7.1 Vanadium 16 Zinc 65 Di-n-Butyl Phthalate 0.11 Fluoranthene 0.15 Pyrene 0.12 Benzo(a)anthracene 0.061 Chrysene 0.073 Di(2-ethylhexyl)phthalate 0.40 Benzo(b)fluoranthene 0.14 Benzo(k)fluoranthene 0.045 **Benzo(a)pyrene 0.068** alpha-Chlordane 0.012 Chlordane 0.14 gamma-Chlordane 0.0065
"N004" duplicate of C006 @ 0 – 0.5'	0 – 0.5	No XRF screening readings. Analysis by Microbac Laboratory: Aluminum 6000 Antimony 1.0 **Arsenic 5.5**

		Barium 50 Cadmium 1.6 Chromium 13 Cobalt 6.2 Copper 13 Iron 15000 Lead 39 Manganese 470 Nickel 15 Strontium 6.6 **Thallium 1.1** Vanadium 14 Zinc 66 Di-n-Butyl Phthalate 0.081 Fluoranthene 0.19 Pyrene 0.15 Benzyl Butyl Phthalate 0.032 Benzo(a)anthracene 0.076 Chrysene 0.090 Di(2-ethylhexyl)phthalate 0.61 **Benzo(b)fluoranthene 0.19** Benzo(k)fluoranthene 0.044

		Benzo(a)pyrene 0.085 alpha-Chlordane 0.0078 Chlordane 0.10
C006	0.5 – 2.0	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 29 **Arsenic 16** Analysis by Microbac Laboratory: Diethyl Phthalate 0.035 Di-n-Butyl Phthalate 0.073 Fluoranthene 0.11 Pyrene 0.085 Benzo(a)anthracene 0.048 Chrysene 0.052 Di(2-ethylhexyl)phthalate 0.23 Benzo(b)fluoranthene 0.086 **Benzo(a)pyrene 0.048** Aroclor 1254 0.21
C007	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 8 **Arsenic 7** Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.082

		Fluoranthene 0.11 Pyrene 0.11 Benzo(a)anthracene 0.063 Chrysene 0.068 Di(2-ethylhexyl)phthalate 0.22 **Benzo(b)fluoranthene 0.19** Benzo(k)fluoranthene 0.048 **Benzo(a)pyrene 0.084**
C008	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 121 Analysis by Microbac Laboratory: Diethyl Phthalate 0.035 Di-n-Butyl Phthalate 0.073 Fluoranthene 0.37 Pyrene 0.28 Benzyl Butyl Phthalate 0.086 Benzo(a)anthracene 0.073 Chrysene 0.14 Di(2-ethylhexyl)phthalate 0.96 **Benzo(b)fluoranthene 0.22** Benzo(k)fluoranthene 0.066

		Benzo(a)pyrene 0.075 Aroclor 1260 0.037
C009	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 35 Analysis by Microbac Laboratory: 1,4-Dichlorobenzene 0.072 1,2-Dichlorobenzene 0.60 1,2,4-Trichlorobenzene 0.081 Hexachlorobenzene 0.034 Di-n-Butyl Phthalate 0.081 Di(2-ethylhexyl)phthalate 0.21 Benzo(b)fluoranthene 0.052
C010	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 42 Barium 375 Analysis by Microbac Laboratory: Diethyl Phthalate 0.038 Di-n-Butyl Phthalate 0.072 Fluoranthene 0.13 Pyrene 0.11 Benzo(a)anthracene 0.047

		Chrysene 0.047 Di(2-ethylhexyl)phthalate 0.15 Benzo(b)fluoranthene 0.074 **Benzo(a)pyrene 0.037**
S001	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 20 **Arsenic 11** Analysis by Microbac Laboratory: Naphthalene 0.040 Di-n-Butyl Phthalate 0.033 Fluoranthene 0.21 Pyrene 0.15 Benzo(a)anthracene 0.087 Chrysene 0.090 Di(2-ethylhexyl)phthalate 0.17 **Benzo(b)fluoranthene 0.16** Benzo(k)fluoranthene 0.049 **Benzo(a)pyrene 0.079**
S002	0 – 0.5	No XRF screening readings. Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.060 Fluoranthene 0.23

		Pyrene 0.13 Benzo(a)anthracene 0.078 Chrysene 0.083 Di(2-ethylhexyl)phthalate 0.27 Benzo(b)fluoranthene 0.11 Benzo(k)fluoranthene 0.035 **Benzo(a)pyrene 0.066** alpha-Chlordane 0.0072 Chlordane 0.059 gamma-Chlordane 0.0056
S003	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se) : Lead 146 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.035 Fluoranthene 0.038 Di(2-ethylhexyl)phthalate 0.11 Aroclor 1254 0.045
S003	0.5 – 2.0	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 62 Barium 389 Analysis by Microbac Laboratory:

		Di-n-Butyl Phthalate 0.032 Fluoranthene 0.038 Di(2-ethylhexyl)phthalate 0.11 Aroclor 1260 0.030
S004	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 140 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.040 Fluoranthene 0.12 Pyrene 0.079 Benzo(a)anthracene 0.072 Chrysene 0.071 Di(2-ethylhexyl)phthalate 0.12 Benzo(b)fluoranthene 0.12 Benzo(k)fluoranthene 0.040 **Benzo(a)pyrene 0.064** Chlordane 0.46 **Dieldrin 0.040** gamma-Chlordane 0.10
S005	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 271

		Arsenic 67 Analysis by Microbac Laboratory: Naphthalene 0.029 Di-n-Butyl Phthalate 0.077 Fluoranthene 0.18 Pyrene 0.44 **Benzo(a)anthracene 0.72** Chrysene 1.0 **Di(2-ethylhexyl)phthalate 350** **Benzo(b)fluoranthene 4.5** **Benzo(a)pyrene 4.0** **Indeno(1,2,3-c,d)pyrene 0.36** **Aroclor 1248 28**
S006	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 41 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.51 Fluoranthene 0.068 Pyrene 0.045 Chrysene 0.035 Di(2-ethylhexyl)phthalate 1.3 Benzo(b)fluoranthene 0.10

		Benzo(k)fluoranthene 0.035 **Benzo(a)pyrene 0.044**
S007	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 88 **Arsenic 11** Analysis by Microbac Laboratory: 1,4-Dichlorobenzene 0.045 Naphthalene 0.10 Di-n-Butyl Phthalate 0.072 Fluoranthene 0.12 Pyrene 0.11 Benzyl Butyl Phthalate 0.11 Benzo(a)anthracene 0.068 Chrysene 0.074 Di(2-ethylhexyl)phthalate 9.9 **Benzo(b)fluoranthene 0.15** Benzo(k)fluoranthene 0.052 **Benzo(a)pyrene 0.082** Aroclor 1254 0.12
S008	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 25

		Arsenic 3 Analysis by Microbac Laboratory: Naphthalene 0.031 Di-n-Butyl Phthalate 0.039 Di(2-ethylhexyl)phthalate 0.54
S009	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): No detections of RCRA 8 metals Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.032 Di(2-ethylhexyl)phthalate 0.11
S010	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 39 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.043 Fluoranthene 0.10 Pyrene 0.11 Benzo(a)anthracene 0.044 Chrysene 0.045 Di(2-ethylhexyl)phthalate 0.23 Benzo(b)fluoranthene 0.092 Benzo(k)fluoranthene 0.034 **Benzo(a)pyrene 0.045**

		Chlordane 0.015
S011	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 16 **Arsenic 8** Analysis by Microbac Laboratory: Di(2-ethylhexyl)phthalate 0.054
S014	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 332 Analysis by Microbac Laboratory: Aluminum 7600 Antimony 5.4 **Arsenic 7.9** Barium 150 Cadmium 7.4 Chromium 36 Cobalt 9.6 Copper 240 **Iron 94000** Lead 380 Manganese 680 Molybdenum 5.8 Nickel 37

		Silver 1.6 Strontium 51 Vanadium 15 Zinc 480 Naphthalene 0.18 Acenaphthene 0.53 Dibenzofuran 0.32 Fluorene 0.52 Anthracene 1.7 Di-n-Butyl Phthalate 0.055 Fluoranthene 14 Pyrene 11 **Benzo(a)anthracene 4.6** Chrysene 3.5 Di(2-ethylhexyl)phthalate 13 **Benzo(b)fluoranthene 8.4** Benzo(k)fluoranthene 1.1 **Benzo(a)pyrene 3.4** **Indeno(1,2,3-c,d)pyrene 0.69** **Dibenzo(a,h)anthracene 0.22**
S015	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se):

		None detected. Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.033 Di(2-ethylhexyl)phthalate 0.13
S016	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 56 Analysis by Microbac Laboratory: Di-n-Butyl Phthalate 0.047 Fluoranthene 0.20 Pyrene 0.17 Benzo(a)anthracene 0.091 Chrysene 0.091 Di(2-ethylhexyl)phthalate 0.55 **Benzo(b)fluoranthene 0.19** Benzo(k)fluoranthene 0.053 **Benzo(a)pyrene 0.087**
"S012" duplicate of S014	0 – 0.5	XRF screening readings for RCRA 8 metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se): Lead 284 Analysis by Microbac Laboratory: Aluminum 7900 Antimony 12 **Arsenic 16**

		Barium 150 Cadmium 10 Chromium 43 Cobalt 14 Copper 260 **Iron 140000** **Lead 1300** Manganese 910 Molybdenum 9.2 Nickel 46 Silver 1.7 Strontium 46 **Thallium 2.8** Vanadium 16 Zinc 740 Naphthalene 0.32 Acenaphthene 0.76 Dibenzofuran 0.45 Fluorene 0.66 Anthracene 1.8 Di-n-Butyl Phthalate 0.065 Fluoranthene 20

		Pyrene 15 **Benzo(a)anthracene 5.9** Chrysene 5.8 Di(2-ethylhexyl)phthalate 0.37 **Benzo(b)fluoranthene 11** **Benzo(k)fluoranthene 2.1** **Benzo(a)pyrene 5.1** **Indeno(1,2,3-c,d)pyrene 1.0** **Dibenzo(a,h)anthracene 0.10**

Appendix C: Data Validation Memo and Laboratory Data

Appendix D: Field Notes/Sampling Sheets.

Appendix E: Photos.

Appendix F: **Quality Assurance Project Plan**