ENERGY AND ENVIRONMENT CABINET

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Final Report

Investigation of Possible Lead (Pb) Contamination Utilizing X-Ray Fluorescence (XRF) Technology

L & H Tool and Die Company
534 West 12th Street
Newport, Kentucky

May 14, 2012

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Division of Waste Management
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Table of Contents

Appendices

Site Screening Investigation Results

L & H Tool & Die, Newport, Kentucky

1. Introduction

On Tuesday March 20th 2012 the Kentucky Division of Waste Management, Superfund Branch implemented the planned screening investigation into alleged lead contamination at the L & H Tool & Die Company located at 534 West 12th Street in Newport, Kentucky (Appendix A). This investigation has been prompted by the Directors office in response to a USA Today reporter's inquiry concerning evidence of widespread elevated lead within the City of Newport. The division understands that USA Today conducted a sampling investigation in which X-Ray Fluorescence (XRF) technology was employed to conduct soil lead tests at unspecified residential locations in Newport and other unnamed urban areas. The USA Today investigation is intended to provide the basis for a scheduled newspaper article. Only limited information was provided by the reporter, although the consensus from the strategy meetings held by Division of Waste Management indicated that at least one of the presumed sources of ubiquitous lead could be a former smelting operation that was once located at the existing L & H Tool and Die building. There has been no evidence provided to suggest that the current owners of the property have ever engaged in smelting. While historical information is sketchy, it is believed that smelting operations may have ceased at least 50 years ago. Currently, L & H Tool and Die, a division of Seilkop Industries of Cincinnati, Ohio is engaged in design and manufacturing of tooling, dies, fixtures and parts stamping.

In February of 2012 a Site Screening Investigation Plan was prepared without benefit of conducting an on-site reconnaissance or obtaining site access. The plan explored optional approaches to performing the screening investigation depending on the thickness of the overlying gravel base and difficulty in penetrating the subsurface. When site access was eventually granted through the owners legal counsel (McBrayer, McGinnis, Leslie & Kirkland, PLLC), a preliminary site reconnaissance was scheduled for March 13th. I, along with Eric Brown of the State Superfund Section met with Jason Morgan of McBrayer, McGinnis, Leslie & Kirkland and Dow Porter and Ian Ware of Shield Environmental Associates, Incorporated at the site to mark sampling locations and discuss our objectives. Based on the on-site reconnaissance, the proposed sampling points were reduced in number from 30 to 25 and marked with orange marking paint. It was evident from the site surface that in-situ or manual extraction of samples would be impractical necessitating the

use of the Superfund Branch's Geoprobe® unit to advance subsurface borings. Given the generally understood nature of lead fate and transport, and the objective to approach this as a screening investigation rather than a comprehensive site characterization, it was decided to advance borings no further than 4 ft. below surface. It was also decided that since the bulk of the day's activities would be dedicated to collecting the samples, the process of extracting liners, running XRF tests and splitting samples for laboratory analysis would be conducted the following day (March 21st) at the Superfund Branch Laboratory and Equipment Building at 150 Fair Oaks Lane in Frankfort. All parties involved verbally agreed with the plan modifications.

2. Investigation

Eric Brown of the State Superfund Section accompanied me on Tuesday March 20th for mobilization to the L & H Tool and Die site. Arrival time was delayed from the scheduled start time of 9:30 A.M. by approximately 45 minutes due to a blown tire on the Geoprobe® trailer that occurred near Williamstown. Attorney Jason Morgan was notified by cell phone at the site that our arrival would be delayed. Following the tire change we arrived at the site in Newport at approximately 10:30 A.M.

All on-site borings were conducted using a 2004 Geoprobe® 54DT direct push track unit. This unit has 20,000 ft. lbs of down force and 27,000 ft. lbs of pull force hydraulically. The GH41 percussion hammer delivers 15,000 lbs per blow at 1,800 blows per minute. Since only one tool string length was employed (4 feet) the 1" inner rod of the Dual Tube system was unnecessary, utilizing only the 2.125 outer rods with an inner 1.125 inside diameter PETG liner to collect soil core samples. All soil cores were capped at both ends with vinyl end caps and marked with a black indelible Sharpie® to document sample location, sample time and a direction arrow indicating direction of boring advancement. All collected soil cores were stored in an empty liner box for transport back to Frankfort and remained in the locked Geoprobe® trailer until extraction the following day.

Appendix B provides a generalized map showing the relative location of each of the 25 soil borings and the surface soil sample collected for background purposes. The background surface soil sample was collected approximately 0.3 miles south east of the site near a welcome sign to the entrance to the Wilder community. This was considered to be a point likely out of the influence of activities connected with the operation at L & H Tool and Die, and generally upwind from the prevailing direction assuming a West to East flow.

Soil recovery from most of the borings was fair to poor, meaning that approximately half or less of the 4 foot length of the boring contained recovered material. This is primarily due to the approximate 4"-6" gravel layer at the surface and various underlying fill material over most of the site that tends to inhibit the collection of a complete 4 foot core. Also, several locations encountered highly resistant material (either large rock, concrete or brick structures that were encountered in very shallow refusal. In some cases, such as LH-09 and LH-11 the boring had to be abandoned and re-located as LH-09B and LH-11B to achieve any penetration.

A considerable amount of fill material was encountered in most of the borings situated on the west side of the building from the loading ramp west to the fence line, and on the south side of building between the loading ramp and the west fence line. A very dark, charred material was prevalent at a depth of around 1 ft. to approximately 3 ft. below surface. It was by no means continuous either vertically or horizontally across the site, but encountered in most of the borings situated in the central portion of the property. Brick, slag, and metallic debris were also interspersed in many of the borings, which also likely contributed to the poor recovery in the centralized borings. The one consistent feature found in borings successfully terminated at 4 ft. below surface was a plastic, clay interval encountered at approximately 3 ft. to 4 ft. below surface. Based on the subsequent XRF testing, this appears to be the terminating interval for elevated lead concerns as it relates to vertical migration. Generally speaking, the site has an approximate 4" to 6" gravel layer over most of the site with silty sand like material comingled with various fill material from roughly 1 ft. to around 3 ft. below surface. From 3 ft. to 4 ft. below surface, a distinguishable clay layer is present with the exception of borings LH-14 and LH-15 on the extreme east side of the property. In the two borings situated on the east side of the property between the loading ramp and the brick building, the surface was covered with what appeared to be number 4 stone. This would indicate that it could have been the location of some type of excavation, possibly a tank removal and backfilled with stone. However, in conducting these two borings, a consistent clay layer was encountered from around 6" below surface to the terminating interval at 4 feet. Recovery from both was approximately 100%. These two borings were markedly different from the rest of the property both in soil type and appearance. The XRF tests from both borings also showed no lead concentrations above residential screening levels.

3. XRF Sample Screening

On Wednesday March 21st at approximately 9:00 AM we began the process of extracting recovered soil cores from the previous days sampling event for the purpose of running XRF tests. Sample processing was conducted at the DWM laboratory and Equipment Building at 150 Fair Oaks Lane. Ian Ware of Shield Environmental Associates was present on behalf of Seilkop Industries (L & H Tool & Die property owner) to observe the soil cores and collect split samples for laboratory analysis.

XRF Testing was conducted using an Innov-X-Systems Model a-4000 potable X-Ray fluorescence Spectrometer. The instrument was anchored in the bench top Docking Station while all sample core intervals were placed in one-quart polyethylene Ziploc baggies for testing. Sample core intervals varied based on the volume of material available in the liner, but generally either 6" or 1 ft. intervals were consolidated. It is important to consider that with each individual test only an area approximately 1" X 1"X1/4" was analyzed. Therefore, it is expected that some degree of variation in concentration will occur with samples that are laboratory analyzed, simply because a much larger volume is submitted to the laboratory than is analyzed by the XRF. Given the time necessary to extract samples, prepare the sample for XRF testing, conduct QA/QC testing and collect samples for laboratory analysis, there was simply not enough time available to conduct multiple tests for each bagged sample. However, each bagged sample was manually mixed inside the bag to the extent practical in an effort to homogenize the sample.

Appendix C contains multiple spreadsheets recording the XRF results for all core sample intervals. The larger spreadsheet is an actual exported file of the day's analysis, including all 21 elements tested, along with QA/QC parameters in sequence from test #1 to the final background soil test, # 79. A temporary glitch occurred with tests # 37 through # 40 after the lithium-ion battery change. Four consecutive standardization errors occurred when it was discovered that the alloy 316 clip was inadvertently left on the instrument Kaptan window during instrument initialization. This was corrected on test # 41 resulting in a "passed" result for the standardization process.

Based on the tests conducted most all sample borings showed elevated lead at a discrete interval with the exception of the areas at the extreme northwest LH-01, LH-02 and LH-05, and the extreme east, LH-14 and LH-15. The remaining borings indicate a relatively thin layer of elevated lead ranging in thickness from around 6" to around 2 feet. The maximum lead concentration found in the XRF tests was at LH-07 in the upper 2 feet at 5,347 ppm. The other three borings in this vicinity, which is near where Sanborn maps indicate that a sand storage shed was once located also showed lead in the near surface in the 1,000 to

4,000 ppm range. The other area exhibiting a discernible pattern for lead is the south west portion near the entrance to the site. LH-20, 21, and 23 through 25 showed lead ranging from 1,800 ppm to around 5,500 ppm in the upper 1 foot. Concentrations of lead decreased significantly below 1 foot in depth in this portion of the property to either industrial regional screening levels (800 ppm) or well below.

4. QA/QC Concerns

SW-846 Method 6200 requires that a minimum of 5% of the XRF tests are supported by laboratory data to verify that accuracy is within 20% for all elements except Chromium. The Kentucky Superfund Branch collected 6 XRF samples for laboratory analysis, while Ian Ware of Shield collected samples from all XRF tests. However, at the time of this report, it is unknown how many of Shields samples were actually submitted to their laboratory (See **Addendum** Page 8, and Appendix D)

Preliminary laboratory results were obtained via e-mail from McCoy & McCoy Laboratories, Kentucky's contract lab. With the exception of one XRF test all of the samples, including the background sample were well outside the acceptable accuracy limits. There is often a variation in the XRF results compared to laboratory results since a greater volume of material is submitted to the laboratory than what is typically tested with the XRF. If the material is adequately mixed, the variation should not be greater that 20 %. At this point, it is unclear why the preliminary laboratory results deviate so profoundly from the corresponding XRF tests. One example that is particularly curious is the background soil sample. A large volume of material was collected, approximately 30 ounces. The XRF results showed 361 parts per million for lead. According to the preliminary laboratory result, the lead concentration was 1,510 ppm. Since this sample was archived, subsequent XRF tests were conducted to see if there may be fragments of high lead concentrations interspersed in the sample that could account for the variation. Prior to conducting the tests, two separate precision tests were run on NIST Standards 2710 (Pb=5,532 ppm) and 2711 (Pb=1,162). Seven (7) successive tests were run on each standard with a calculated relative standard deviation of the sample mean in accordance with section 9.5 of method 6200. The results are as follows:

NIST Standard #2710- Lead Concentration =5,532 ppm

Test 1 – Pb = 5,388 ppm +/- 89
Test 2 – Pb = 5,268 ppm +/- 87

Test 3 – Pb = 5,723 ppm +/- 80
Test 4 – Pb = 5,757 ppm +/- 111
Test 5 – Pb = 5,761 ppm +/- 97
Test 6 – Pb = 5,503 ppm +/- 91
Test 7 – Pb = 5,717 ppm +/- 109

Precision = SD/mean concentration X 100
Where: SD = Standard deviation
X bar = sample mean

$$SD = \frac{\sum (X-M)^2}{n-1}$$

SD = 201.23819
X bar (mean) = 5,588.14286
Precision = 201.23819/5,588.14286 = 0.0360
0.0360 X 100 = 3.6%

Therefore, the precision for this test is 3.6 %, well within the maximum allowable precision limit of 20%. The second test was run with NIST Standard # 2711 which has a lead concentration of 1,162 ppm. The results are as follows:

Test 1 – Pb = 1,159 +/- 29
Test 2 – Pb = 1,154 +/- 29
Test 3 – Pb = 1,175 +/- 29
Test 4 – Pb = 1,206 +/- 27
Test 5 – Pb = 1,194 +/- 29
Test 6 – Pb = 1,160 +/- 29
Test 7 – Pb = 1,201 +/- 30

SD = 21.74747
X bar = 1178.42857
21.74747/1,178.42857 = 0.0184546
0.0184546 X 100 = 1.8546 %

Therefore, for precision test # 2 the result is 1.85 %, well within the maximum limit of 20 %. Consequently, the instrument is performing well within the method QA/QC parameters.

Three successive tests were run on the archived background sample, which originally showed an XRF lead concentration at 361 ppm. The results showed 283 ppm, 297 ppm and

290 ppm, all of which were approximately within 20% of the original test. Based on the precision tests and the re-test of the background sample, there is no reason to conclude there is a problem with instrument performance. Therefore, the most reasonable explanation for the XRF/laboratory variation is either different sample matrix or variation in sample homogeneity. A sample of the archived background sample was re-submitted to the laboratory on Monday April 9th with results pending at the time of this report.

5. Conclusions

Regardless of the uncertainty associated with the accuracy or precision of the XRF tests conducted on the 25 soil borings, it can be concluded that there are lead concentrations in the soil at L & H Tool and Die in Newport that exceed residential and industrial Regional Screening levels. This is documented either through X-Ray Fluorescence Technology or by laboratory analyses. A more informed evaluation regarding the validity of the XRF testing will be possible when the final laboratory data from the initial samples and background re-sample is available. Generally, the elevated lead is found in the upper 2 or 3 feet in the soil column, however, it is not uniform in depth or thickness. It appears to vary from around 6 inches to around 2 feet in thickness. The maximum concentrations found in XRF testing were from borings LH-07 and LH-21 at 5,347 ppm and 5,502 ppm respectively. Due to sporadic soil recovery and instances of shallow refusal encountered at the site, we're unable to say with certainty that elevated lead concentrations are at consistent depth intervals over the entire property. However, it is apparent that lead concentrations decrease significantly below 3 feet in depth, with nominal concentrations at the terminating interval of 4 feet.

The source of lead contamination at the site could be from historical smelting operations at this location; however the maximum concentrations found in the XRF tests are not consistent with levels found in previous State Superfund projects where secondary smelting was a factor. It is not uncommon to find 1 to 10 % lead in soil at smelters, battery recyclers or facilities with bag house emission control. According to XRF tests conducted at L & H Tool and Die, the maximum lead concentration was only in the 0.5% range. While this exceeds both residential and industrial screening levels, and could represent a likely health risk if unmanaged, it does not appear to be a significant source of lead. Nevertheless, the property owner is subject to the remedial options stipulated in KRS 224.01-400 (18) due to a documented release of lead at this site since, at a minimum, they possess or control the property where the release is documented.

Addendum

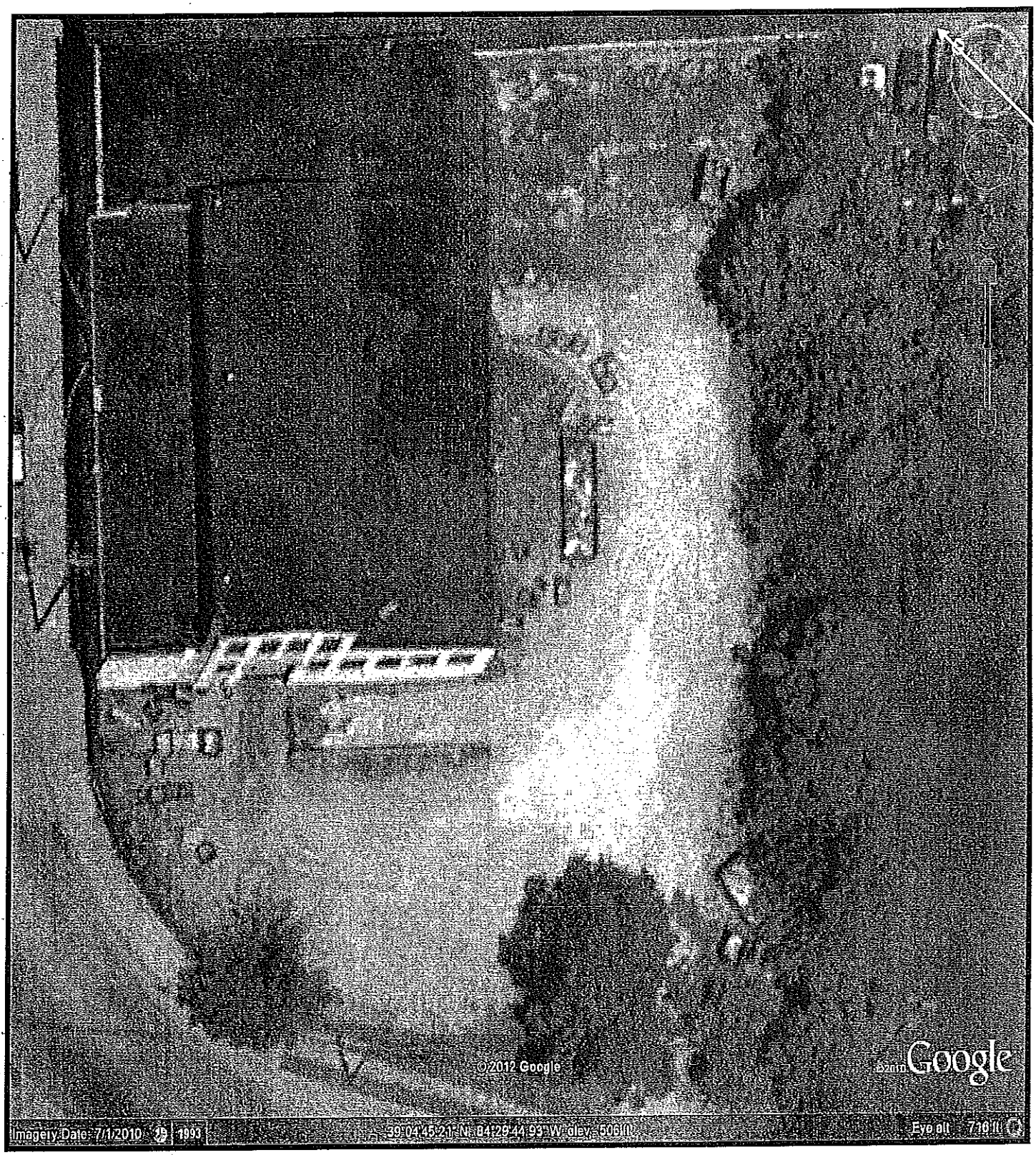
6. Data Evaluation

Following completion of the Interim Report, the official laboratory report of Kentucky's split samples were received and compared to the XRF data. An unofficial copy of the laboratory sample analysis collected by Shield Environmental (Shield) and analyzed by their laboratory was obtained and also compared to Kentucky's Contract laboratory data along with the XRF data. As expected, there were significant variations in the results from both laboratories, as well as the XRF data. A total of 65 tests were conducted on soil cores collected during the March 20th 2012 investigation at L & H Tool and Die in Newport. Of the 65 tests, 58 were submitted for laboratory analysis by Shield Environmental to their laboratory and 6 were submitted by Kentucky to McCoy and McCoy Laboratories; which serves as one of the Department's contract laboratories. Appendix D provides copies of the McCoy and McCoy laboratory reports as well as a comparative analysis of the overall data.

In the Interim Report, included in it's entirety in this document, it was speculated that there would likely be significant inconsistency in the correlation between both laboratories and the XRF data. This has proved to be the case. Of the 58 samples laboratory analyzed only 20.68% were within the method 6200 QA/QC limits of 20% difference. However, of the 4 QA/QC tests run on NIST standards all showed less than 3% difference, with an average % difference of 1.357%. This disparity was first suggested when the background sample result was obtained via e-mail from our laboratory. The laboratory result showed 1,500 parts per million lead, which is considered exceptionally elevated for a background sample, indicating either a previously unrecognized anthropogenic source contributing to the matrix, or a possible laboratory error. The XRF test on the background sample showed 361 ppm. Since this sample was archived as well as split with Shield, it was decided to conduct further XRF testing on the archived sample and submit an additional sample for laboratory analysis. Three tests were conducted of 30 second duration resulting in the following results: 283 ppm, 297 ppm and 290 ppm. The final laboratory result showed 302 ppm lead, which was more in line with the expected concentration and showed an average % difference of 3.97% when compared to XRF results. The re-testing of the archived background sample also compared favorably to the Shield data as indicated in the Data Comparison table in Appendix D.

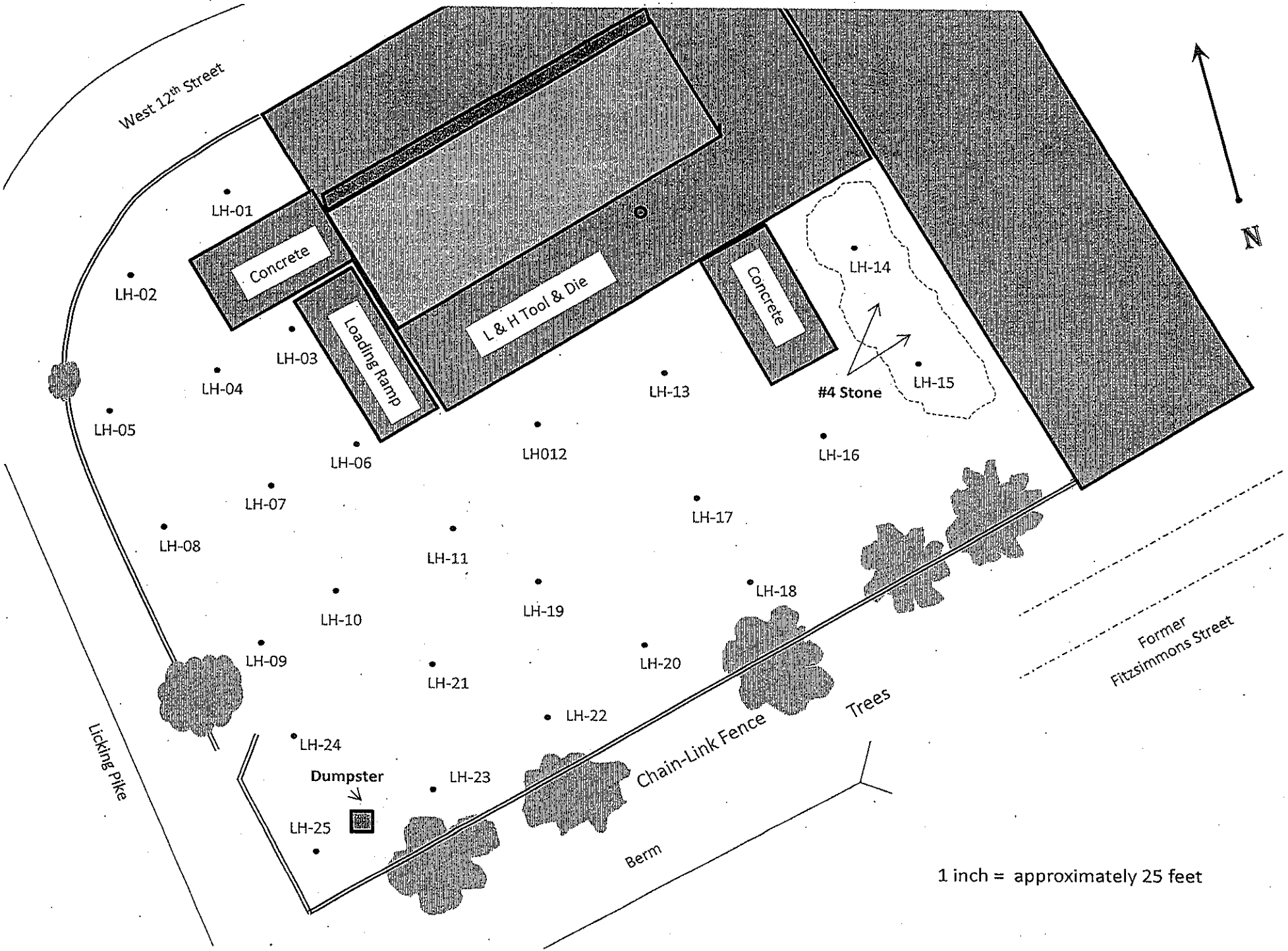
As stated in the Conclusion section of this report, the concerns related to QA/QC as it relates to the XRF remain a minor point. Laboratory sample results are available from two separate laboratories that indicate a documented occurrence of lead in on-site soil that exceeds EPA regional screening levels. There is also some indication of anomalous results from each laboratory. A review of both sets of laboratory data suggests that the most likely reason for poor data correlation is simply that each test, whether by XRF or the separate laboratories was of non-homogeneous samples. This could have been corrected by thoroughly mixing each sample interval mechanically to assure a more homogenous matrix. Also, as discussed earlier in this report, each laboratory received around 120 grams of soil for analysis, while the XRF test analyzed at most a few grams of material. However, since Kentucky's investigation was intended to be a screening investigation and not a comprehensive site characterization, the time necessary to conduct multiple XRF tests and mechanically mix each of the 79 sample intervals was neither necessary nor feasible given the time and manpower available. The information obtained in this screening investigation should provide the responsible party with data that can be useful in ultimately developing a remedial action plan.

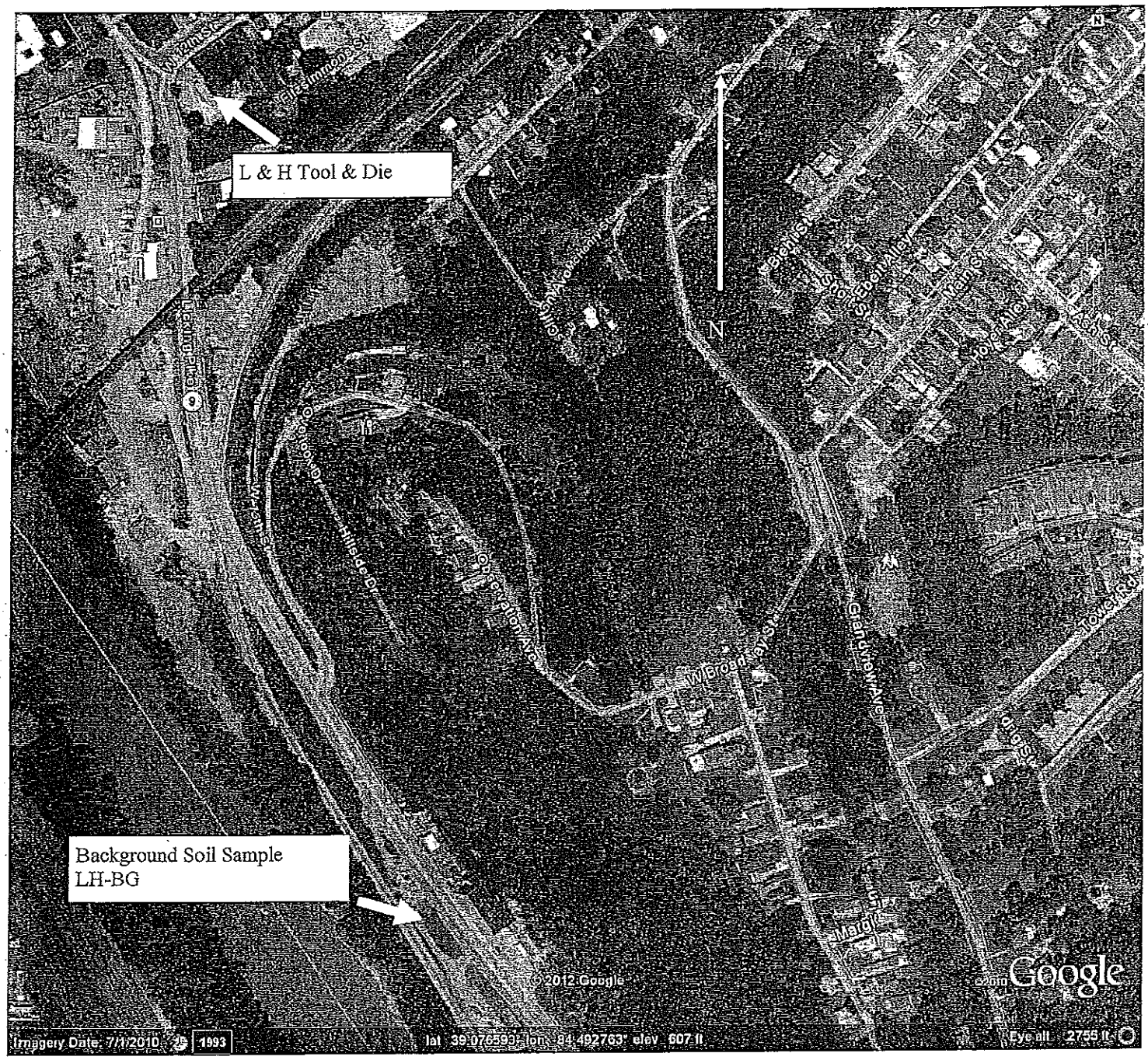
APPENDIX A



L & H Tool & Die
534 West 12th Street
Newport, Kentucky

APPENDIX B


West 12th Street
LH-01
Concrete
LH-02
Loading Ramp
L & H Tool & Die
Concrete
LH-14
N
LH-03
LH-04
LH-13
#4 Stone
LH-15
LH-05
LH012
LH-16
LH-06
LH-07
LH-17
LH-08
LH-11
LH-18
LH-10
LH-19
LH-09
LH-20
LH-21
Former
Fitzsimmons Street
LH-22
Trees
LH-24
Chain-Link Fence
Dumpster
LH-23
Licking Pike
LH-25
Berm
1 inch = approximately 25 feet



Background Soil sample collected on March 20th 2012 at 3:45 PM
Location on West side of Licking Pike (Ste Rt.9) at coordinates: 39.074699 N, 84.494262 W

Approximately 0.36 miles southeast of L &H Tool and Die.

APPENDIX C

X-Ray Fluorescence Spectrometer Results

Lead (Pb) only

Date	Reading	Mode & Sample ID		LiveTime	Match1	MN1	Pass/Fail	QA/QC	Pb	Pb +/-
21-Mar-12	1	Standardization		31.38	0.019838	239	-0.023179	PASS		
21-Mar-12	2	Soil-SiO2 blank		19.9					<LOD	9
21-Mar-12	3	Soil-NIST 2711		20.65		Pb=1162		% D = 2.15	1137	28
21-Mar-12	4	**Soil-LH-01**	0-6"	21.26					<LOD	17
21-Mar-12	5	Soil	6"-1'	22.07					26	6
21-Mar-12	6	Soil	1'-1.5'	20.87					43	7
21-Mar-12	7	**Soil-LH-02**	1'-2'	23.35					485 *	16
21-Mar-12	8	Soil	2'-3'	19.07					20	5
21-Mar-12	9	Soil	3'-4'	19.39					23	5
21-Mar-12	10	**Soil-LH-03**	1'-2'	20.12					1861 **	43
21-Mar-12	11	Soil	2'-3'	19.77					87	7
21-Mar-12	12	Soil	3'-4'	27.85					29	5
21-Mar-12	13	**Soil-LH-04**	0-2'	22.18					909 **	28
21-Mar-12	14	Soil	2'-3'	19.72					4603 **	86
21-Mar-12	15	Soil	3'-4'	20.84					133	9
21-Mar-12	16	**Soil-LH-05**	1.5-2'	23.44					284	13
21-Mar-12	17	Soil	2'-3'	19.44					111	8
21-Mar-12	18	Soil	3'-3.5'	20.54					64	7
21-Mar-12	19	Soil	3.5'-4'	23.09					56	6
21-Mar-12	20	**Soil-LH-06**	2'-2.5'	20.81					4660 **	96
21-Mar-12	21	Soil	2.5'-3'	19.72					488 *	16
21-Mar-12	22	Soil	3'-3.5'	19.69					415 *	15
21-Mar-12	23	Soil	3.5'-4'	20.96					97	8
21-Mar-12	24	Soil-SiO2 blank		19.77					<LOD	9
21-Mar-12	25	Soil-NIST 2711		21.55		Pb=1162		% D = 0.52	1168	29
21-Mar-12	26	**Soil-LH-07**	1.5'-2'	19.37					5347 **	101
21-Mar-12	27	Soil	2'-3'	20.51					465 *	17
21-Mar-12	28	Soil	3'-4'	20.37					19	5
21-Mar-12	29	**Soil-LH-08**	0-8"	20.52					1449 **	36
21-Mar-12	30	Soil	1'-2'	19.84					3460 **	67
21-Mar-12	31	Soil	2'-2' 8"	20.45					462 *	17
21-Mar-12	32	**Soil-LH-09B**	0-1' 5"	20.28					798 *	23
21-Mar-12	33	Soil	1.5'-2.5'	20.57					1394 **	36
21-Mar-12	34	Standardization		30.91	0.019843	241	-0.021298	PASS		
21-Mar-12	35	Soil-SiO2 blank		19.83					<LOD	10
21-Mar-12	36	Soil-NIST 2711		20.49		Pb=1162		% D = 1.9	1184	30
21-Mar-12	37	Standardization		0.11	0	0	0	Li Battery failure		
21-Mar-12	38	Standardization		0.13	0	0	0	Li Battery failure		
21-Mar-12	39	Standardization		0.13	0	0	0	Li Battery failure		
21-Mar-12	40	Standardization		0.13	0	0	0	Li Battery failure		
21-Mar-12	41	Standardization		31.67	0.019848	238	-0.022363	PASS		
21-Mar-12	42	**Soil-LH-10**	0-1'	19.93					1163 **	29
21-Mar-12	43	**Soil-LH-11B**	0-1'	20.86					622 *	21
21-Mar-12	44	**Soil-LH-12**	0-1' 2"	20.01					905 **	25
21-Mar-12	45	**Soil-LH-13B**	1'-2'	21.38					1028 **	32
21-Mar-12	46	Soil	2'-3'	40.78					3156 **	51

* exceeds residential screening level

** exceeds industrial screening level

XRF Results Continued

Date	Reading		Mode	LiveTime	Match1	MN1	Pass/Fail	QA/QC	Pb	Pb +/-
21-Mar-12	47	Soil	3'-4'	19.68					15	5
21-Mar-12	48	**Soil-LH-14**	1'-2'	26.75					106	7
21-Mar-12	49	Soil	2'-3'	20.61					19	5
21-Mar-12	50	Soil	3'-4'	20.76					<LOD	16
21-Mar-12	51	**Soil-LH-15**	0-1'	20.34					200	11
21-Mar-12	52	Soil	1'-4'	19.84					31	6
21-Mar-12	53	**Soil-LH-16**	0-6"	20.98					639 *	21
21-Mar-12	54	Soil	6"-1'	20.59					857 **	26
21-Mar-12	55	Soil	1'-2' 2"	19.61					127	8
21-Mar-12	56	**Soil-LH-17**	6"-1.5'	20.35					266	12
21-Mar-12	57	**Soil-LH-18**	0-1'	21.24					973 **	28
21-Mar-12	58	Soil	1'-2'	21					208	12
21-Mar-12	59	Soil	2'-2.5'	21.28					284	19
21-Mar-12	60	Soil	2.5'-4'	20.02					16	5
21-Mar-12	61	**Soil-LH-19**	0-1'	24.16					969 **	24
21-Mar-12	62	Soil-NIST 2711		28.04	Pb=1162			%D = 0.86	1172	25
21-Mar-12	63	**Soil-LH-20**	0-1'	20.24					2316 **	51
21-Mar-12	64	Soil	1'-2'	19.27					126	8
21-Mar-12	65	Soil	2'-3'	18.99					615 *	17
21-Mar-12	66	Soil	3'-4'	19.48					19	5
21-Mar-12	67	**Soil-LH-21**	0-1'	19.98					5502 **	107
21-Mar-12	68	**Soil-LH-22**	1'-2'	27.49					231	10
21-Mar-12	69	Soil	2'-3'	19.94					537 *	18
21-Mar-12	70	Soil	3'-4'	21.11					59	6
21-Mar-12	71	**Soil-LH-23**	0-1' 5"	21.73					3055 **	74
21-Mar-12	72	**Soil-LH-24**	0-1'	28.56					1803 **	38
21-Mar-12	73	Soil	1'-2'	19.87					613 *	20
21-Mar-12	74	Soil	2'-4'	26.18					25	4
21-Mar-12	75	**Soil-LH-25**	0-1'	25.51					1271 **	31
21-Mar-12	76	Soil	1'-2'	19.86					459 *	16
21-Mar-12	77	Soil	2'-3'	18.73					93	6
21-Mar-12	78	Soil	3'-4'	19.84					28	5
21-Mar-12	79	Soil-Background	surface	29.05					361	13

APPENDIX D

Data Comparison

Sample ID	Depth	XRF	Ky Lab	Shield Lab	%D KY	%D Shield	Meets one or both QA/QC Limits	
LH-01	3' - 4'	43	N/A	22	N/A	95.45		No
LH-02	1' - 2'	485	N/A	220	N/A	120.45		No
LH-02	2' - 3'	20	N/A	10	N/A	100		No
LH-02	3' - 4'	23	24.2	12	4.95	91.66	yes	No
LH-03	1' - 2'	1,861	N/A	4,800	N/A	61.22		No
LH-03	2' - 3'	87	N/A	220	N/A	60.45		No
LH-03	3' - 4'	29	N/A	21	N/A	38		No
LH-04	2' - 3'	4,603	N/A	21,000	N/A	78		No
LH-04	3' - 4'	133	N/A	220	N/A	39		No
LH-05	2' - 3'	111	N/A	64	N/A	73		No
LH-05	3' - 3.5'	64	N/A	30	N/A	113		No
LH-06	2' - 3' *	4,660	N/A	1,600	N/A	187		No
LH-06	3' - 4'	97	N/A	120	N/A	19		Yes
LH-07	1.5' - 2	5,347	N/A	2,800	N/A	90		No
LH-07	2' - 3'	465	N/A	250	N/A	86		No
LH-07	3' - 4'	19	30.5	18	37.7	5.5	No	Yes
LH-08	0 - 1' 8"	1,449	N/A	2,400	N/A	39		No
LH-08	1' 8" - 2' 8"	462	N/A	170	N/A	171		No
LH-09 B	0 - 1.5'	798	N/A	1,400	N/A	43		No
LH-09 B	1.5' - 2.5'	1,394	N/A	1,900	N/A	26.63		No
LH-10	0 -1'	1,163	N/A	2,300	N/A	49		No
LH-11 B	0 - 1'	622	2,130	1,300	71	52	No	No
LH-12	0 - 1.5'	905	N/A	520	N/A	74		No
LH-13 B	1' - 2'	1,028	N/A	1,000	N/A	2.8		Yes
LH-13 B	2' - 3'	3,156	N/A	4,200	N/A	24		No
LH-13 B	3' - 4'	15	N/A	13	N/A	15		yes
LH-14	1' - 2'	106	N/A	31	N/A	241		No
LH-14	2' - 3'	19	N/A	16	N/A	18.75		Yes
LH-14	3' - 4'	ND @16	N/A	13	N/A	15		Yes
LH-15	1' - 4'	31	N/A	17	N/A	82		No
LH-16	0 - 1'	857	N/A	870	N/A	1.5		Yes
LH-16	1' - 2'2"	127	N/A	92	N/A	38		No
LH-17	0 - 1.5'	266	837	340	68.21	21.76	No	No
LH-18	0 - 1'	973	N/A	610	N/A	59.5		No
LH-18	1' - 2'	208	N/A	96	N/A	116		No
LH-18	2' - 2.5'	284	N/A	1,600	N/A	82		No
LH-18	2.5' - 4'	16	N/A	12	N/A	33		No
LH-19	0 - 11"	969	N/A	680	N/A	42.5		No
LH-20	0 - 1'	2,316	N/A	1,400	N/A	65		No
LH-20	1' - 2'	126	N/A	510	N/A	75		No
LH-20	2' - 3'	615	N/A	990	N/A	37.8		No
LH-20	3' - 4'	19	N/A	14	N/A	35.7		No
LH-21	0 -1'	5,502	N/A	6,700	N/A	17.8		Yes

Data Comparison

Sample ID	Depth	XRF	Ky Lab	Shield Lab	%D Ky	%D Shield	Meets one or both QA/QC Limits	
LH-22	1' - 2'	231	N/A	900	N/A	74		No
LH-22	2' - 3'	537	N/A	1,400	N/A	61		No
LH-22	3' - 4'	59	N/A	14	N/A	321		No
LH-23	0 -1.5'	3,055	N/A	1,300	N/A	135		No
LH-24	0 - 1'	1,803	N/A	610	N/A	195		No
LH-24	1' - 2'	613	N/A	3,600	N/A	82.97		No
LH-24	2' - 4'	25	N/A	18	N/A	38.8		No
LH-25	0 - 1'	1,271	N/A	860	N/A	47		No
LH-25	1' - 2'	459	N/A	270	N/A	70		No
LH-25	2' - 3'	93	N/A	57	N/A	63		No
LH-25	3' - 4'	28	N/A	15	N/A	86		No
Background	Surface	361	1,500	280	75	28	No	No
		283	302	280	6.29	1.07	Yes	Yes
		297	302	280	1.65	6.07	Yes	Yes
		290	302	280	3.97	3.57	Yes	Yes

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Certificate of Analysis

Mike Blanton
NREPC/Division of Waste Management
200 Fair Oaks Lane
Frankfort KY, 40601

Report Printed: 04/02/2012 16:26

Project Name:	Solid Waste	Workorder:	2032633

Dear Mike Blanton

Enclosed are the analytical results for samples received at the lab on 03/22/2012 11:44.

McCoy & McCoy Laboratories, Inc located in Madisonville, Kentucky is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact us at (270) 821-7375.

Please visit us at www.mccoylabs.com for a listing of NELAP accreditations and Scope of Work, as well as other links to Water Quality documentation on the internet.

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Doug Wolfe

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Doug Wolfe, Lab Manager

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SAMPLE SUMMARY

Lab ID	Client Sample ID	Matrix	Date Collected	Date Received	Sampled By
2032633-01	LH 02	Solid	03/20/2012 10:50	03/22/2012 11:44	Mike Blanton
2032633-02	LH 07	Solid	03/20/2012 11:25	03/22/2012 11:44	Mike Blanton
2032633-03	LH 11B	Solid	03/20/2012 12:20	03/22/2012 11:44	Mike Blanton
2032633-04	LH 17	Solid	03/20/2012 13:35	03/22/2012 11:44	Mike Blanton
2032633-05	LH 22	Solid	03/20/2012 14:15	03/22/2012 11:44	Mike Blanton
2032633-06	LH BG	Solid	03/20/2012 15:40	03/22/2012 11:44	Mike Blanton

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ANALYTICAL RESULTS

Lab Sample ID: **2032633-01**
Description: **LH 02 Boring 2 3 to 4 feet below surface**

Sample Collection Date Time: 03/20/2012 10:50
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**2.96**	M2	mg/kg dry	0.0476	0.0190	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Barium	**87.3**	M3	mg/kg dry	0.190	0.190	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Cadmium	**0.0904**		mg/kg dry	0.0476	0.0095	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Chromium	**11.8**		mg/kg dry	0.190	0.029	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Lead	**24.2**		mg/kg dry	0.190	0.190	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Mercury	ND	U	mg/kg dry	0.0190	0.0190	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND
Selenium	**0.135**		mg/kg dry	0.095	0.086	SW846 6020C	03/26/2012 10:18	03/31/2012 02:36	RND
Silver	**0.0685**		mg/kg dry	0.0476	0.0190	SW846 6020C	03/26/2012 10:18	03/28/2012 20:11	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**81.0**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:19	HEM

ANALYTICAL RESULTS

Lab Sample ID: **2032633-02**
Description: **LH 07 Boring 7 3 to 4 feet below surface**

Sample Collection Date Time: 03/20/2012 11:25
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**3.63**		mg/kg dry	0.0426	0.0171	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND
Cadmium	**0.131**		mg/kg dry	0.0426	0.0085	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND
Chromium	**7.58**		mg/kg dry	0.171	0.026	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND
Lead	**30.5**		mg/kg dry	0.171	0.171	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND
Mercury	**0.0921**		mg/kg dry	0.0171	0.0171	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND
Selenium	**0.427**		mg/kg dry	0.085	0.077	SW846 6020C	03/26/2012 10:18	03/31/2012 02:57	RND
Silver	**0.123**		mg/kg dry	0.0426	0.0171	SW846 6020C	03/26/2012 10:18	03/28/2012 20:47	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**83.4**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:21	HEM

ANALYTICAL RESULTS

Lab Sample ID: **2032633-02RE1**
Description: **LH 07**

Sample Collection Date Time: 03/20/2012 11:25
Sample Received Date Time: 03/22/2012 11:44

Matrix: Solid

Discharge/Site No:

Regulatory ID:

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Barium	**85.2**		mg/kg dry	1.62	1.62	SW846 6020C	03/26/2012 10:18	03/28/2012 20:52	RND

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ANALYTICAL RESULTS

Lab Sample ID: **2032633-03**
Description: **LH 11B Boring 11B 1 foot below surface**

Sample Collection Date Time: 03/20/2012 12:20
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**5.33**		mg/kg dry	0.0580	0.0232	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND
Cadmium	**1.99**		mg/kg dry	0.0580	0.0116	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND
Chromium	**18.3**		mg/kg dry	0.232	0.035	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND
Mercury	**0.445**		mg/kg dry	0.0232	0.0232	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND
Selenium	**0.275**		mg/kg dry	0.116	0.104	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND
Silver	**0.426**		mg/kg dry	0.0580	0.0232	SW846 6020C	03/26/2012 10:18	03/28/2012 21:10	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**88.0**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:23	HEM

ANALYTICAL RESULTS

Lab Sample ID: **2032633-03RE1**
Description: **LH 11B**

Sample Collection Date Time: 03/20/2012 12:20
Sample Received Date Time: 03/22/2012 11:44

Matrix: Solid

Discharge/Site No:

Regulatory ID:

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Barium	**306**		mg/kg dry	2.21	2.21	SW846 6020C	03/26/2012 10:18	03/28/2012 21:16	RND
Lead	**2130**	D1	mg/kg dry	23.2	23.2	SW846 6020C	03/26/2012 10:18	03/31/2012 03:04	RND

ANALYTICAL RESULTS

Lab Sample ID: **2032633-04**
Description: **LH 17 Boring 17 6 inches to 1 foot 5 inches below surface**

Sample Collection Date Time: 03/20/2012 13:35
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**3.94**		mg/kg dry	0.0559	0.0224	SW846 6020C	03/26/2012 10:18	03/28/2012 21:22	RND
Cadmium	**1.43**		mg/kg dry	0.0559	0.0112	SW846 6020C	03/26/2012 10:18	03/28/2012 21:22	RND
Chromium	**14.4**		mg/kg dry	0.224	0.034	SW846 6020C	03/26/2012 10:18	03/28/2012 21:22	RND
Mercury	**0.542**		mg/kg dry	0.0224	0.0224	SW846 6020C	03/26/2012 10:18	03/28/2012 21:22	RND
Selenium	**0.220**		mg/kg dry	0.112	0.101	SW846 6020C	03/26/2012 10:18	03/31/2012 03:18	RND
Silver	**0.116**		mg/kg dry	0.0559	0.0224	SW846 6020C	03/26/2012 10:18	03/28/2012 21:22	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**89.1**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:25	HEM

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ANALYTICAL RESULTS

Lab Sample ID: **2032633-04RE1**
Description: **LH 17**

Sample Collection Date Time: 03/20/2012 13:35
Sample Received Date Time: 03/22/2012 11:44

Matrix: Solid

Discharge/Site No:

Regulatory ID:

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Barium	**323**		mg/kg dry	2.13	2.13	SW846 6020C	03/26/2012 10:18	03/28/2012 21:28	RND
Lead	**837**		mg/kg dry	2.13	2.13	SW846 6020C	03/26/2012 10:18	03/28/2012 21:28	RND

ANALYTICAL RESULTS

Lab Sample ID: **2032633-05**
Description: **LH 22 Boring 22 2 to 3 foot below surface**

Sample Collection Date Time: 03/20/2012 14:15
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**1.51**		mg/kg dry	0.0454	0.0181	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND
Cadmium	**5.34**		mg/kg dry	0.0454	0.0091	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND
Chromium	**9.56**		mg/kg dry	0.181	0.027	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND
Mercury	**1.03**		mg/kg dry	0.0181	0.0181	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND
Selenium	**0.249**		mg/kg dry	0.091	0.082	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND
Silver	**0.386**		mg/kg dry	0.0454	0.0181	SW846 6020C	03/26/2012 10:18	03/28/2012 21:33	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**82.5**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:27	HEM

ANALYTICAL RESULTS

Lab Sample ID: **2032633-05RE1**
Description: **LH 22**

Sample Collection Date Time: 03/20/2012 14:15
Sample Received Date Time: 03/22/2012 11:44

Matrix: Solid

Discharge/Site No:

Regulatory ID:

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Barium	**554**		mg/kg dry	1.72	1.72	SW846 6020C	03/26/2012 10:18	03/28/2012 21:39	RND
Lead	**1660**	D1	mg/kg dry	18.1	18.1	SW846 6020C	03/26/2012 10:18	03/31/2012 03:26	RND

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ANALYTICAL RESULTS

Lab Sample ID: **2032633-06**
Description: **LH BG Background Surface Soil**

Sample Collection Date Time: 03/20/2012 15:40
Sample Received Date Time: 03/22/2012 11:44

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**3.07**		mg/kg dry	0.0635	0.0254	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND
Barium	**114**		mg/kg dry	0.254	0.254	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND
Cadmium	**2.24**		mg/kg dry	0.0635	0.0127	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND
Chromium	**43.5**		mg/kg dry	0.254	0.038	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND
Mercury	**0.175**		mg/kg dry	0.0254	0.0254	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND
Selenium	**0.326**		mg/kg dry	0.127	0.114	SW846 6020C	03/26/2012 10:18	03/31/2012 03:40	RND
Silver	**0.136**		mg/kg dry	0.0635	0.0254	SW846 6020C	03/26/2012 10:18	03/28/2012 21:45	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**84.3**		%	0.001	0.001	SM2540G	03/26/2012 10:34	03/26/2012 15:29	HEM

ANALYTICAL RESULTS

Lab Sample ID: **2032633-06RE1**
Description: **LH BG**

Sample Collection Date Time: 03/20/2012 15:40
Sample Received Date Time: 03/22/2012 11:44

Matrix: Solid

Discharge/Site No:

Regulatory ID:

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Lead	**1510**		mg/kg dry	9.01	9.01	SW846 6020C	03/26/2012 10:18	03/28/2012 21:51	RND

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Notes for work order 2032633

- Samples collected by MMLI personnel are done so in accordance with procedures set forth in MMLI field services SOPs.
- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- The Chain of Custody document is included as part of this report.
- All Library Search analytes should be regarded as tentative identification based on the presumptive evidence of the mass spectra.

U	Target analyte was analyzed for, but was below detection limit (the value associated with the qualifier is the laboratory method detection limit in our LIMS system).
M3	The accuracy of the spike recovery value is reduced since the analyte concentration in the sample is disproportionate to spike level. The method control sample recovery was acceptable.
M2	Matrix spike recovery was low; the method control sample recovery was acceptable.
M1	Matrix spike recovery was high; the method control sample recovery was acceptable.
L2	The associated blank spike recovery was below method acceptance limits.
J	Estimated value.
D1	Sample required dilution due to high concentration of target analyte.

Standard Qualifiers/Acronymns

MDL	Method Detection Limit
MRL	Minimum Reporting Limit
ND	Not Detected
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
% Rec	Percent Recovery
RPD	Relative Percent Difference
>	Greater than permit limits
<	Less than permit limits

Analyses performed at the Madisonville KY location unless specified with the following location codes.

02	Pikeville, KY
03	Paducah, KY
04	Lexington, KY
05	Louisville, KY

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B213053 - EPA 3051A										
Blank (B213053-BLK1)										
Prepared: 3/26/2012 10:18, Analyzed: 3/28/2012 19:59										
Arsenic	ND	0.0472	mg/kg wet							U
Barium	ND	0.189	mg/kg wet							U
Cadmium	ND	0.0472	mg/kg wet							U
Chromium	0.040	0.189	mg/kg wet							J
Lead	ND	0.189	mg/kg wet							U
Mercury	ND	0.0189	mg/kg wet							U
Selenium	ND	0.094	mg/kg wet							U
Silver	ND	0.0472	mg/kg wet							U
LCS (B213053-BS1)										
Prepared: 3/26/2012 10:18, Analyzed: 3/28/2012 20:05										
Arsenic	13.3	0.0571	mg/kg wet	14.3		93.3	80-120			
Barium	13.7	0.229	mg/kg wet	14.3		95.7	80-120			
Cadmium	13.1	0.0571	mg/kg wet	14.3		91.8	80-120			
Chromium	13.9	0.229	mg/kg wet	14.3		97.0	80-120			
Lead	13.6	0.229	mg/kg wet	14.3		94.9	80-120			
Mercury	0.189	0.0229	mg/kg wet	0.286		66.0	80-120			L2
Selenium	12.7	0.114	mg/kg wet	14.3		88.9	80-120			
Silver	13.2	0.0571	mg/kg wet	14.3		92.7	80-120			
Matrix Spike (B213053-MS1)	**Source: 2032633-01**									
Prepared: 3/26/2012 10:18, Analyzed: 3/28/2012 20:23										
Arsenic	12.7	0.0640	mg/kg dry	16.0	2.96	60.8	80-120			M2
Barium	104	0.256	mg/kg dry	16.0	87.3	105	80-120			
Cadmium	14.4	0.0640	mg/kg dry	16.0	0.0904	89.6	80-120			
Chromium	27.0	0.256	mg/kg dry	16.0	11.8	95.2	80-120			
Lead	31.6	0.256	mg/kg dry	16.0	24.2	46.7	80-120			M2
Mercury	0.301	0.0256	mg/kg dry	0.320	ND	94.0	80-120			
Selenium	11.3	0.128	mg/kg dry	16.0	0.135	69.7	80-120			M1
Silver	14.4	0.0640	mg/kg dry	16.0	0.0685	89.4	75-120			

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B213053 - EPA 3051A										
Matrix Spike Dup (B213053-MSD1) **Source: 2032633-01**										
Prepared: 3/26/2012 10:18, Analyzed: 3/28/2012 20:35										
Arsenic	9.92	0.0474	mg/kg dry	11.8	2.96	58.7	80-120	3.52	20	M2
Barium	92.4	1.80	mg/kg dry	11.8	87.3	42.7	80-120	84.4	20	M3
Cadmium	10.6	0.0474	mg/kg dry	11.8	0.0904	88.5	80-120	1.21	20	
Chromium	22.5	0.189	mg/kg dry	11.8	11.8	90.6	80-120	5.02	20	
Lead	29.5	0.189	mg/kg dry	11.8	24.2	45.4	80-120	2.80	20	M2
Mercury	0.200	0.0189	mg/kg dry	0.237	ND	84.4	80-120	10.8	20	
Selenium	7.60	0.095	mg/kg dry	11.8	0.135	63.1	80-120	10.0	20	M1
Silver	10.6	0.0474	mg/kg dry	11.8	0.0685	89.1	75-120	0.348	20	

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Conventional Chemistry Analyses_01 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B213059 - Default Prep Wet Chem										
Blank (B213059-BLK1)										
Prepared: 3/26/2012 10:34, Analyzed: 3/26/2012 15:31										
Total Solids	ND	0.001	%							
Duplicate (B213059-DUP1)	**Source: 2032633-06**									
Prepared: 3/26/2012 10:34, Analyzed: 3/26/2012 15:33										
Total Solids	80.5	0.001	%		84.3			4.61	10	
Reference (B213059-SRM1)										
Prepared: 3/26/2012 10:34, Analyzed: 3/26/2012 15:35										
Total Solids	84.7		%	84.3		100	99.9-100.1			

2032633

CHAIN OF CUSTODY RECORD
ENERGY AND ENVIRONMENT CABINET

Program/DOW: ☐ 106 ☐ NPS ☐ SDWA ☐ Stream Survey ☐ Groundwater ☐ Wild Rivers ☐ Tox. Test ☐ Ref. Reach ☐ Lakes ☐ Pretreatment ☐ BMP ☐ ERT
Program/DWM: ☐ RCRA ☐ UST ☐ TSCA ☐ Solid Waste ☐ Fed. CERCLA ☒ St. CERCLA
Program/AQ: ☐ Air Toxics/Canister # ____ ☐ Air Quality

Fund Source HWMF Site # AI# 69937 MARS # M512 Other Program ____

SITE LOCATION: L + H TOOL + DIE FACILITY NO.: ____ COUNTY: CAMPBELL

FIELD ID #	DATE/ TIME	DESCRIPTION OF SITE	MATRIX	NUMBER OF CONTAINERS	PRESERVATION	ANALYSIS REQUESTED	LAB USE ONLY
LH-02	Date: 3/20/12 Time: ☒ am 10:50 ☐ pm	BORING # 2 3 TO 4 FEET BELOW SURFACE AKGWA #: ____	☐ Liquid ☒ Solid ☐ Chemical ☒ Grab ☐ Composite ☐ Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4 OZ	☒ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☒ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: ____	Sample # Report #
LH-07	Date: 3/20/12 Time: ☒ am 11:25 ☐ pm	BORING # 7 3 TO 4 FEET BELOW SURFACE AKGWA #: ____	☐ Liquid ☒ Solid ☐ Chemical ☒ Grab ☐ Composite ☐ Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4 OZ	☒ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☒ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: ____	Sample # Report #
LH-11B	Date: 3/20/12 Time: ☐ am 12:20 ☒ pm	BORING # 11B 1 FOOT BELOW SURFACE AKGWA #: ____	23mar12 FK ☒ Liquid ☒ Solid ☐ Chemical ☒ Grab ☐ Composite ☐ Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4 OZ	☒ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☒ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: ____	Sample # Report #

Sample is a solid. Not liquid FK 23mar12.

Metals: ☒ As ☒ Ba ☒ Cd ☒ Cr ☒ Pb ☒ Hg ☒ Se ☒ Ag ☐ Cu ☐ Fe ☐ Mn ☐ Zn ☐ Other ____

Inspector(s): MIKE BLANTON

Relinquished by: Mike Blanton MIKE BLANTON	Date 3/22/12	Received by: [signature] GABE HENSLEY	
Representing: KY DEP DWM SUPERFUND BR.	Time 1144	Representing: MMLI - LEX	
Relinquished by:	Date	Received by:	
Representing:	Time	Representing:	

DEP5005 (5146GP) Distribution: White Copy-Central Office Yellow Copy-DES Pink Copy-Field Inspector Rev. December 1, 1992

2032633

CONTINUATION PAGE 2 of 2

SITE LOCATION: L + H TOOL + DIE FACILITY ID NO.: AI # 69937 COUNTY: CAMPBELL

FIELD ID #	DATE/ TIME	DESCRIPTION OF SITE	MATRIX	NUMBER OF CONTAINERS	PRESER-VATION	ANALYSIS REQUESTED	LAB USE ONLY
LH-17	Date: 3/20/12 Time: ☐am 13:35 ☒pm	BORING # 17 6" TO 1'5" BELOW SURFACE AKGWA #: ____-____	☐Liquid ☒Solid ☐Chemical ☒Grab ☐Composite ☐Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4oz	☒Ice ☐H_2SO_4 ☐NaOH ☐HNO_3 ☐HCl ☐Other	☐ABN ☐VOC ☐NH_3 ☐TO14 ☐TOC ☐TSS ☐Cl ☐HERB ☐TKN ☐BOD ☐CN ☒T. METALS ☐O&G ☐PAH ☐FP ☐PEST/PCB ☐TDS ☐ALK ☐TCLP ☐N/P PEST ☐BTEX ☐ORTHO/P ☐OTHER:	Sample # Report #
LH-22	Date: 3/20/12 Time: ☐am 14:15 ☒pm	BORING # 22 2' TO 3' BELOW SURFACE AKGWA #: ____-____	☐Liquid ☒Solid ☐Chemical ☒Grab ☐Composite ☐Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4oz	☒Ice ☐H_2SO_4 ☐NaOH ☐HNO_3 ☐HCl ☐Other	☐ABN ☐VOC ☐NH_3 ☐TO14 ☐TOC ☐TSS ☐Cl ☐HERB ☐TKN ☐BOD ☐CN ☒T. METALS ☐O&G ☐PAH ☐FP ☐PEST/PCB ☐TDS ☐ALK ☐TCLP ☐N/P PEST ☐BTEX ☐ORTHO/P ☐OTHER:	Sample # Report #
LH-BG	Date: 3/20/12 Time: ☐am 15:40 ☐pm	BACKGROUND SURFACE SOIL AKGWA #: ____-____	☐Liquid ☒Solid ☐Chemical ☒Grab ☐Composite ☐Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other: 4oz	☒Ice ☐H_2SO_4 ☐NaOH ☐HNO_3 ☐HCl ☐Other	☐ABN ☐VOC ☐NH_3 ☐TO14 ☐TOC ☐TSS ☐Cl ☐HERB ☐TKN ☐BOD ☐CN ☒T. METALS ☐O&G ☐PAH ☐FP ☐PEST/PCB ☐TDS ☐ALK ☐TCLP ☐N/P PEST ☐BTEX ☐ORTHO/P ☐OTHER:	Sample # Report #
	Date: / / Time: ☐am : ☐pm	AKGWA #: ____-____	☐Liquid ☐Solid ☐Chemical ☐Grab ☐Composite ☐Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other:	☐Ice ☐H_2SO_4 ☐NaOH ☐HNO_3 ☐HCl ☐Other	☐ABN ☐VOC ☐NH_3 ☐TO14 ☐TOC ☐TSS ☐Cl ☐HERB ☐TKN ☐BOD ☐CN ☐T. METALS ☐O&G ☐PAH ☐FP ☐PEST/PCB ☐TDS ☐ALK ☐TCLP ☐N/P PEST ☐BTEX ☐ORTHO/P ☐OTHER:	Sample # Report #
	Date: / / Time: ☐am : ☐pm	AKGWA #: ____-____	☐Liquid ☐Solid ☐Chemical ☐Grab ☐Composite ☐Other	__ Glass 1000 ml __ Plastic 1000 ml __ VOA 40 ml __ Glass 140 ml __ 280 ml __ Other:	☐Ice ☐H_2SO_4 ☐NaOH ☐HNO_3 ☐HCl ☐Other	☐ABN ☐VOC ☐NH_3 ☐TO14 ☐TOC ☐TSS ☐Cl ☐HERB ☐TKN ☐BOD ☐CN ☐T. METALS ☐O&G ☐PAH ☐FP ☐PEST/PCB ☐TDS ☐ALK ☐TCLP ☐N/P PEST ☐BTEX ☐ORTHO/P ☐OTHER:	Sample # Report #

Inspector(s): MB

Metals: ☒As ☒Ba ☒Cd ☒Cr ☒Pb ☒Hg ☒Se ☒Ag ☐Cu ☐Fe ☐Mn ☐Zn ☐ Other____

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Certificate of Analysis

Report Printed: 04/27/2012 08:32

Mike Blanton
NREPC/Division of Waste Management
200 Fair Oaks Lane
Frankfort KY, 40601

Project Name:	Solid Waste	Workorder:	2041572

Dear Mike Blanton

Enclosed are the analytical results for samples received at the lab on 04/09/2012 11:55.

McCoy & McCoy Laboratories, Inc located in Madisonville, Kentucky is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact us at (270) 821-7375.

Please visit us at www.mccoylabs.com for a listing of NELAP accreditations and Scope of Work, as well as other links to Water Quality documentation on the internet.

Doug Wolfe

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Doug Wolfe, Lab Manager

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SAMPLE SUMMARY

Lab ID	Client Sample ID	Matrix	Date Collected	Date Received	Sampled By
2041572-01	LH BG	Solid	03/20/2012 15:40	04/09/2012 11:55	Mike Blanton

ANALYTICAL RESULTS

Lab Sample ID: **2041572-01**
Description: **LH BG Archived Background Surface Soil**

Sample Collection Date Time: 03/20/2012 15:40
Sample Received Date Time: 04/09/2012 11:55

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Arsenic	**4.40**		mg/kg dry	0.122	0.0487	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Barium	**131**		mg/kg dry	0.487	0.487	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Cadmium	**2.53**		mg/kg dry	0.122	0.0243	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Chromium	**57.4**		mg/kg dry	0.487	0.073	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Lead	**302**		mg/kg dry	0.487	0.487	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Mercury	**0.309**		mg/kg dry	0.0487	0.0487	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND
Selenium	**0.701**		mg/kg dry	0.243	0.219	SW846 6020C	04/16/2012 11:50	04/22/2012 02:31	RND
Silver	**0.256**		mg/kg dry	0.122	0.0487	SW846 6020C	04/16/2012 11:50	04/16/2012 19:10	RND

Conventional Chemistry Analyses_01

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Solids	**81.7**		%	0.001	0.001	SM2540G	04/12/2012 08:14	04/12/2012 11:57	HEM

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Notes for work order 2041572

- Samples collected by MMLI personnel are done so in accordance with procedures set forth in MMLI field services SOPs.
- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- The Chain of Custody document is included as part of this report.
- All Library Search analytes should be regarded as tentative identification based on the presumptive evidence of the mass spectra.

U	Target analyte was analyzed for, but was below detection limit (the value associated with the qualifier is the laboratory method detection limit in our LIMS system).
M2	Matrix spike recovery was low; the method control sample recovery was acceptable.
L2	The associated blank spike recovery was below method acceptance limits.
J	Estimated value.

Standard Quallifiers/Acronymns

MDL	Method Detection Limit
MRL	Minimum Reporting Limit
ND	Not Detected
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
% Rec	Percent Recovery
RPD	Relative Percent Difference
>	Greater than permit limits
<	Less than permit limits

Analyses performed at the Madisonville KY location unless specified with the following location codes.

02	Pikeville, KY
03	Paducah, KY
04	Lexington, KY
05	Louisville, KY

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216065 - EPA 3051A										
Blank (B216065-BLK1)										
Prepared: 4/16/2012 11:50, Analyzed: 4/16/2012 15:01										
Arsenic	ND	0.0885	mg/kg wet							U
Barium	ND	0.354	mg/kg wet							U
Cadmium	ND	0.0885	mg/kg wet							U
Chromium	ND	0.354	mg/kg wet							U
Lead	ND	0.354	mg/kg wet							U
Mercury	ND	0.0354	mg/kg wet							U
Selenium	ND	0.177	mg/kg wet							U
Silver	0.0389	0.0885	mg/kg wet							J
LCS (B216065-BS1)										
Prepared: 4/16/2012 11:50, Analyzed: 4/16/2012 15:08										
Arsenic	6.95	0.0689	mg/kg wet	8.61		80.7	80-120			
Barium	8.28	0.275	mg/kg wet	8.61		96.2	80-120			
Cadmium	7.58	0.0689	mg/kg wet	8.61		88.0	80-120			
Chromium	8.55	0.275	mg/kg wet	8.61		99.3	80-120			
Lead	8.15	0.275	mg/kg wet	8.61		94.6	80-120			
Mercury	0.285	0.0275	mg/kg wet	0.344		82.8	80-120			
Selenium	6.53	0.138	mg/kg wet	8.61		75.8	80-120			L2
Silver	8.15	0.0689	mg/kg wet	8.61		94.6	80-120			
Matrix Spike (B216065-MS1)	**Source: 2042198-01**									
Prepared: 4/16/2012 11:50, Analyzed: 4/16/2012 15:22										
Arsenic	17.2	0.142	mg/kg dry	17.7	ND	97.1	80-120			
Barium	16.2	0.567	mg/kg dry	17.7	ND	91.4	80-120			
Cadmium	15.0	0.142	mg/kg dry	17.7	ND	84.4	80-120			
Chromium	17.6	0.567	mg/kg dry	17.7	0.205	98.0	80-120			
Lead	16.1	0.567	mg/kg dry	17.7	ND	90.8	80-120			
Mercury	0.587	0.0567	mg/kg dry	0.709	ND	82.8	80-120			
Selenium	15.0	0.284	mg/kg dry	17.7	ND	84.5	80-120			
Silver	15.9	0.142	mg/kg dry	17.7	0.0719	89.4	75-120			

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216065 - EPA 3051A										
Matrix Spike Dup (B216065-MSD1) **Source: 2042198-01**										
Prepared: 4/16/2012 11:50, Analyzed: 4/16/2012 15:29										
Arsenic	15.9	0.138	mg/kg dry	17.3	ND	92.0	80-120	5.40	20	
Barium	15.0	0.553	mg/kg dry	17.3	ND	86.8	80-120	5.23	20	
Cadmium	13.7	0.138	mg/kg dry	17.3	ND	79.0	80-120	6.68	20	M2
Chromium	16.0	0.553	mg/kg dry	17.3	0.205	91.4	80-120	6.98	20	
Lead	14.7	0.553	mg/kg dry	17.3	ND	85.0	80-120	6.57	20	
Mercury	0.548	0.0553	mg/kg dry	0.691	ND	79.2	80-120	4.44	20	M2
Selenium	13.9	0.277	mg/kg dry	17.3	ND	80.2	80-120	5.28	20	
Silver	14.7	0.138	mg/kg dry	17.3	0.0719	84.5	75-120	5.70	20	

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Conventional Chemistry Analyses_01 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B215359 - Default Prep Wet Chem										
Blank (B215359-BLK1)										
Prepared: 4/12/2012 8:14, Analyzed: 4/12/2012 12:03										
Total Solids	ND	0.001	%							
Duplicate (B215359-DUP1)	**Source: 2041761-01**									
Prepared: 4/12/2012 8:14, Analyzed: 4/12/2012 12:05										
Total Solids	95.8	0.001	%		98.3			2.59	10	
Reference (B215359-SRM1)										
Prepared: 4/12/2012 8:14, Analyzed: 4/12/2012 12:07										
Total Solids	84.6		%	84.3		100	99.9-100.1			

2041572

CHAIN OF CUSTODY RECORD
ENERGY AND ENVIRONMENT CABINET

Program/DOW: ☐ 106 ☐ NPS ☐ SDWA ☐ Stream Survey ☐ Groundwater ☐ Wild Rivers ☐ Tox. Test ☐ Ref. Reach ☐ Lakes ☐ Pretreatment ☐ BMP ☐ ERT

Program/DWM: ☐ RCRA ☐ UST ☐ TSCA ☐ Solid Waste ☐ Fed. CERCLA ☒ St. CERCLA

Program/AQ: ☐ Air Toxics/Canister # _____ ☐ Air Quality

Fund Source HWMF Site # AI 69937 MARS# M512 Other Program _____

SITE LOCATION: L + H TOOL & DIE FACILITY NO.: _____ COUNTY: CAMPBELL

FIELD ID #	DATE/ TIME	DESCRIPTION OF SITE	MATRIX	NUMBER OF CONTAINERS	PRESER-VATION	ANALYSIS REQUESTED	LAB USE ONLY
LH-BG	Date: 3/20/12 Time: ☐ am 15:40 ☒ pm	ARCHIVED BACKGROUND SURFACE SOIL SAMPLE AKGWA #: _____ - _____	☐ Liquid ☒ Solid ☐ Chemical ☒ Grab ☐ Composite ☐ Other	☐ Glass 1000 ml ☐ Plastic 1000 ml ☐ VOA 40 ml ☐ Glass 140 ml ☐ 280 ml ☐ Other: 4 OZ	☒ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☒ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: _____	Sample # Report #
	Date: / / Time: ☐ am : ☐ pm	AKGWA #: _____ - _____	☐ Liquid ☐ Solid ☐ Chemical ☐ Grab ☐ Composite ☐ Other	☐ Glass 1000 ml ☐ Plastic 1000 ml ☐ VOA 40 ml ☐ Glass 140 ml ☐ 280 ml ☐ Other:	☐ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☐ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: _____	Sample # Report #
	Date: / / Time: ☐ am : ☐ pm	AKGWA #: _____ - _____	☐ Liquid ☐ Solid ☐ Chemical ☐ Grab ☐ Composite ☐ Other	☐ Glass 1000 ml ☐ Plastic 1000 ml ☐ VOA 40 ml ☐ Glass 140 ml ☐ 280 ml ☐ Other:	☐ Ice ☐ H_2SO_4 ☐ NaOH ☐ HNO_3 ☐ HCl ☐ Other	☐ ABN ☐ VOC ☐ NH_3 ☐ TO14 ☐ TOC ☐ TSS ☐ Cl ☐ HERB ☐ TKN ☐ BOD ☐ CN ☐ T. METALS ☐ O&G ☐ PAH ☐ FP ☐ PEST/PCB ☐ TDS ☐ ALK ☐ TCLP ☐ N/P PEST ☐ BTEX ☐ ORTHO/P ☐ OTHER: _____	Sample # Report #

Metals: ☒ As ☒ Ba ☒ Cd ☒ Cr ☒ Pb ☒ Hg ☒ Se ☒ Ag ☐ Cu ☐ Fe ☐ Mn ☐ Zn ☐ Other _____

Inspector(s): MIKE BLANTON

Relinquished by: Mike Blanton	Date 4/9/12	Received by:	
Representing: KY. DEP SUPERFUND BRANCH	Time 1155	Representing: MMLI LEX	
Relinquished by:	Date	Received by:	
Representing:	Time	Representing:	

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