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AUG 05 2011

PPPO-02-1179301-11

Mr. Wm. Turpin Ballard
Remedial Project Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Mr. Edward Winner, FFA Manager
Kentucky Department for Environmental Protection
Division of Waste Management
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

Dear Mr. Ballard and Mr. Winner:

TRANSMITTAL OF THE D1 REMOVAL ACTION REPORT FOR THE C-746-A EAST END SMELTER AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-0360&D1)

Please find enclosed the D1 *Removal Action Report for the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0360&D1 for your review.

If you have any questions or require additional information, please contact Rob Seifert at (270) 441-6823.

Sincerely,

Reinhard Knerr
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosure:
D1 Removal Action Report for the C-746-A East End Smelter

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DOE/LX/07-0360&D1
Secondary Document

REMOVAL ACTION REPORT FOR THE C-746-A EAST END SMELTER AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

Description of the Removal Action Implemented

As documented in the approved *Removal Action Work Plan for the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant*, DOE/LX/07-0296&D2/R1, (RAWP) (DOE 2010a), the demolition of the East End Smelter (EES) was warranted due to the contaminants of concern identified, their associated concentration levels, and relevant process knowledge. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action decommissioning activities described herein included the structural demolition of the EES facility, removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping), and removal of residual waste materials.

This removal action meets the removal action objectives agreed upon among U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection (KDEP), as defined in the *Action Memorandum for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter Non-Time-Critical Removal Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0290&D2 (AM) (DOE 2010b). These include the following:

- Reduce the potential exposure to on-site personnel from hazardous substances due to the structural deterioration of these facilities; and

- Reduce risks of releases to the environment and exposure to future industrial workers that may result from uncontrolled releases of hazardous substances, including radiological contamination, from these facilities.

Completion of this removal action supports the long-term remediation of the Paducah Gaseous Diffusion Plant (PGDP). Demolishing the EES structure has removed a source of a potential contaminant release to the environment. The demolition of the EES addresses the substantive Resource Conservation and Recovery Act (RCRA) closure requirements for any areas where hazardous waste was discovered during deactivation, as summarized in DOE's letter "American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste," of October 6, 2009 (DOE 2009), which was approved by Kentucky on October 20, 2009 (KDEP 2009).

Two solid waste management units (SWMUs) included in the RAWP for the EES were SWMU 463, C-746-A EES, and SWMU 137, C-746-A Inactive PCB Transformer Area. SWMU 463 was demolished to slab, and sumps and pits were backfilled with purchased, commercially available flowable fill. SWMU 137 shares a diked concrete slab with an active transformer/switch gear that services other areas of the plant. Closing this SWMU by demolition or filling with concrete would impact the operation of the active system; consequently, DOE is recommending herein that the response action for SWMU 137, pursuant to the approved AM (DOE 2010b), be addressed as part of the Gaseous Diffusion Plant (GDP) Decontamination and Decommissioning Operable Unit (D&D OU). This recommendation has been

discussed during the meetings that were held among the Federal Facility Agreement (FFA) parties as part of the annual Paducah Site Management Plan (SMP) scoping meetings. Based on these discussions, SWMU 137 has been incorporated into the surveillance and maintenance program that will continue to address other areas of the plant until GDP shutdown. The area that encompasses SWMU 137 was surveyed during the survey of the EES slab. No contamination was identified.

Summary of Results

Decommissioning of C-746-A EES was completed successfully—ahead of schedule, under budget, and without any accidents that might have jeopardized worker safety or releases that would have harmed the environment. The demolition project involved removing the siding and demolishing the building structure, including any remaining piping and equipment on the slab and packaging it for disposal. Figure 1 is a photo of the former facility prior to demolition. Figure 2 shows the location of the facility. EES demolition did not involve removal of the slab, subslab penetrations, and/or foundations. The slab was surveyed for radioactive materials and for beryllium, visually inspected for residual materials or staining, and sealed with a fixative. Pits were filled with flowable fill and capped with 4 inches of concrete.

Wastes were segregated, packaged, and dispositioned to off-site landfills at Nevada National Security Site (NNSS) (formerly known as the Nevada Test Site) and Energy*Solutions* in accordance with applicable or relevant and appropriate requirements (ARARs). No equipment was identified that could be recycled or reused inside or outside of the DOE Complex.

Figure 1. C-746-A East End Smelter Facility Prior to Demolition

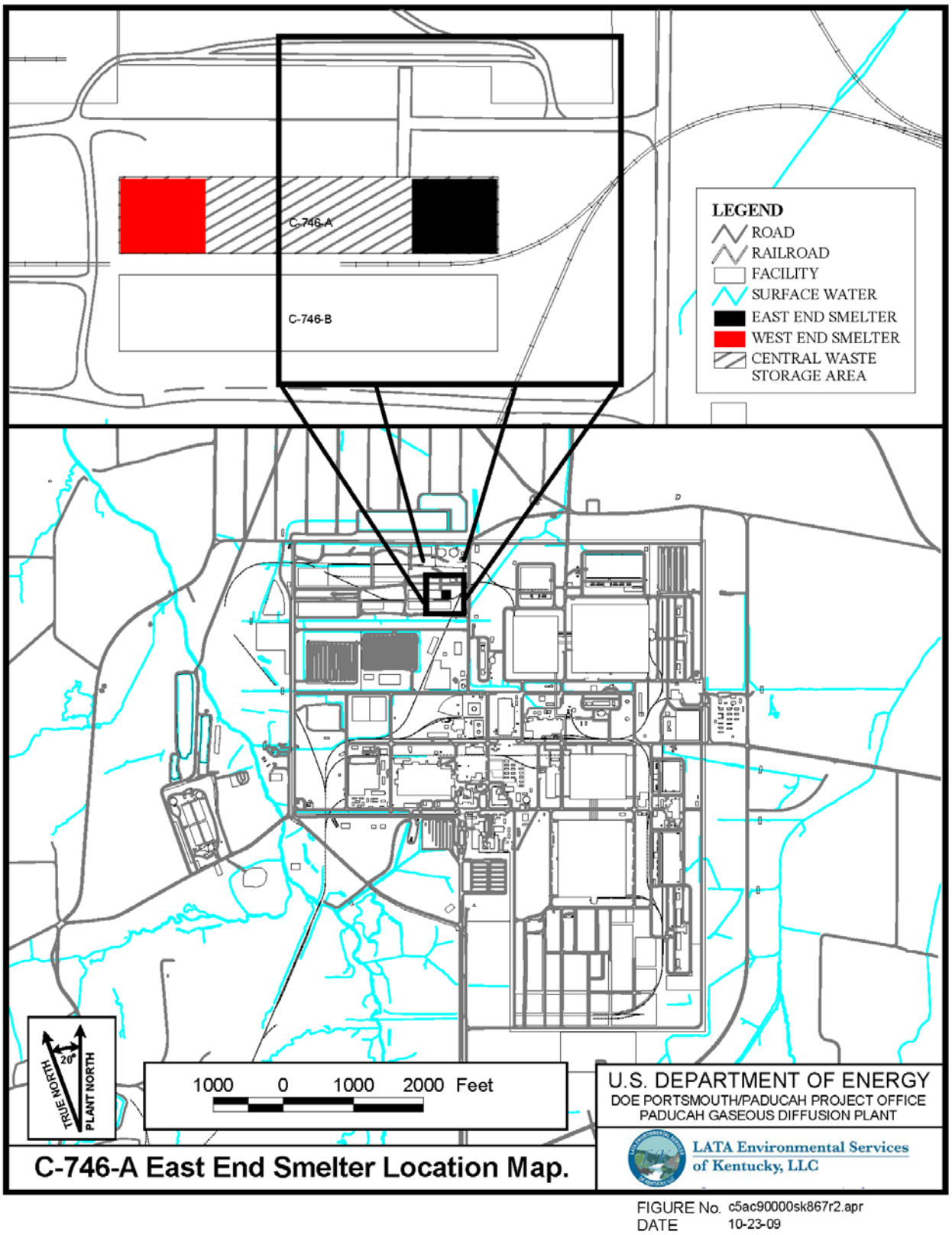

Figure 2. C-746-A East End Smelter Location Map

Demolition

The actual structural demolition of the EES was initiated on September 8, 2010, and was completed on September 17, 2010. All structural debris was packaged by September 30, 2010, and the application of slab sealant was completed by November 9, 2010. The demolition operations were completed in accordance with the D2/R1 RAWP approved by EPA on June 8, 2010. The Commonwealth of Kentucky approved the D2 RAWP on May 18, 2010, and approved the D2/R1 RAWP on August 31, 2010.

During the activities that took place prior to beginning demolition, straw bales were placed along all storm water drainage ditches. Runoff control was inspected and approved by DOE contractor environmental compliance personnel prior to start of demolition.

Dust suppression was used before, during, and after building demolition and also during waste packaging activities. Suppression methods included water misting with a DustBoss®, hand-held hoses for spot suppression, and the use of fixative.

Prior to demolition, lead fasteners, which were characterized by process knowledge to be RCRA-hazardous waste, were removed from the vertical siding of the exterior walls. The fasteners were packaged and were disposed of as RCRA-hazardous waste. Although a representative sample of the demolition debris is unlikely to have been characteristically hazardous if the fasteners had remained in the waste stream, this was a conservative approach of waste management, which is consistent with EPA's policy as set forth in 57 *FR* 990, January 9, 1992. The small quantity of lead fasteners (1 ft^3) is not likely to have caused the demolition debris (approximately 38,000 ft^3) to be a characteristically hazardous waste. Removing and segregating the fasteners at the EES was both feasible and could be accomplished safely (57 *FR* 990). They were collected and packaged into one 55-gal drum with other wastes that are characteristically hazardous for lead. This container was stored on-site and was transported to and disposed of at Energy*Solutions*, Clive, UT, along with a larger quantity of hazardous material from projects other than the EES that also was destined for Clive, UT.

The demolition of the facility was accomplished using standard construction equipment including, but not limited to, the following: excavator mounted shears; excavator mounted grapples; telescoping forklifts; mobile cranes; skid steer loader; fixed mast forklift; and circular saws equipped with steel cutting blades. Minor demolition was accomplished with plasma and oxy-acetylene cutting torches. Demolition of the structure included removal of low-hazard infrastructure that was left in place after deactivation. The low-hazard infrastructure included empty, air, water, and nitrogen piping. This piping was removed and downsized prior to shipment for disposal.

A mechanical separation of the EES from the central part of the building was performed using cold cutting methods prior to the start of any mechanical demolition. The wall that separated the two sections of the building remains as the east wall of the central warehouse. Once mechanical separation was completed, the first of three 40 ft x 180 ft bays of the building was demolished using an excavator with a mechanical shear. The building was demolished from west to east.

The north bay was demolished as follows: roof panels were removed to expose the roof framing members; roof framing members were removed; wall sheeting was removed to expose wall framing members; then wall framing members were removed and downsized using the excavator mounted shear. Upon completion of demolition of the north bay, the middle bay was demolished using the same methodology. The stacks in the middle bay had been removed previously with a crane, double wrapped in plastic, and disposed of according to applicable requirements.

It was necessary to modify demolition of the south bay due to an energized transformer bank located approximately 8 inches to the east of it. This transformer bank supplies power to other active areas of the plant and shares a diked concrete slab with SWMU 137. A lockout/tagout (LOTO) was performed on the transformer bank to ensure that no contact with energized power lines could occur during demolition of the south bay.

After the transformer was locked out, the east wall of the building was removed working west. This section of the building was taller than the first two bays; therefore, a larger shear with a greater boom length was used to provide a higher level of safety for the operator.

All demolition material was size reduced and packaged for disposal. There are three protrusions of the slab in the northeast corner and one in the southeast corner. One of the protrusions in the northeast corner and the one in the southeast corner are flanged connections to the fire protection system. Another one in the northeast corner is a connection to the fuel oil system that is east of the former location of the building. The last one in the northeast corner is a flanged connection to the recirculating cooling water system. Appendix A contains photographs that depict the project from start to finish, including photos of the slab following the demolition. There were no unanticipated issues that impacted the demolition operation.

Slab Verification Survey and Surface Preparation

After the waste was removed, the slab was cleaned and all anchor bolts, piping (with the exception of the fire protection, fuel oil, and recirculating water pipes mentioned above), and metal framing was removed from the slab using cold cutting and hot work methods, such as metal cutting saws, reciprocating saws, and torches. After the structural demolition was completed, all joints in the slab were prepared for final epoxy coat fixative application.

The slab was inspected visually to identify any residual materials or staining. No residue or staining was observed. The slab was surveyed in accordance with 10 *CFR* § 835 and DOE Order DOE P 441.1 to determine if there was residual radioactivity on the slab. The results of the radioactive survey are included in Appendix B. Figures B.1 and B.2 illustrate the location of each radiation survey sample and sample result. All sample results were below approved surface contamination limits. A Ludlum 2929, Model 43-10-1 was used. Many of the radiological survey points from the postdemolition survey of the slab indicate a reading of Lc. When a reading is reported as < Lc, the number of counts per minute reported by the instrument is below the number of counts per minute at which the instrument can distinguish the measurement from background. When the number of counts per minute from the instrument is above the Lc, then that number of counts is multiplied by an instrument specific coconversion factor to determine the dpm/100 cm^2 for that measurement. For these instruments, the Lc and conversion factor are as follows:

Instrument	ά Lc, cpm	ά CF	β Lc, cpm	β CF
E	3	2.53	66	2.62
F	3	2.86	59	3.21

CF = conversion factor to convert cpm → dpm/100 cm^2

Beryllium wipe sampling was performed on the slab using procedures that are consistent with Occupational Safety and Health Act (OSHA) Chemical Sampling Information (DOL 2010a), OSHA Technical Manual (DOL 2010b), and the National Institute for Occupational Safety and Health Manual of Analytical Methods (CDC 2010). The sampling was performed in accordance with the Chronic Beryllium Disease Prevention Program (LATA Kentucky 2010) following demolition to determine surface contamination levels. Results of this survey also are shown in Appendix B, Figure B.3. Beryllium

contamination levels did not exceed the 3.0 μg/cm^2 action level that would constitute a beryllium-regulated area; therefore, the beryllium postings were removed during February 2011, upon receipt of sampling results.

During deactivation of the facility, the slab, pits, and sumps floors were sealed with an application of Fiberlock ABC, a hydrocarbon-based fixative. Slab fixative was applied using airless sprayer equipment. Following demolition and final surveying, an additional epoxy-based sealant, E-X-P Heavy Duty epoxy paint, also was applied.

Sump Verification Survey and Waste Water Disposal

Figure 3 depicts the slab design/construction of the C-746-A EES facility. Of the three sumps, only one, the equipment pit, cross section B, (13-ft wide x 17-ft long x 7.5-ft deep) contained any water. It contained approximately 1 ft of water. No sludge was observed in the bottom of any of the sumps. Water from the equipment pit was sampled and analyzed for polychlorinated biphenyls, metals, including beryllium, and radioactive contamination. All the analytical results were below discharge limits for PGDP Kentucky Pollutant Discharge Elimination System (KPDES)-permitted Outfall 1 (see Appendix C for the analytical results). Approximately 1,650 gal of the sump water was discharged. No residues or stained areas were observed on the walls and floor of the sump following the removal of the water.

Sumps A and B were backfilled to within 4 inches of the level of the top of the slab with flowable fill material to prevent accumulation of water and to eliminate hazards to on-site personnel. A 4-inch concrete cap was placed on top of the flowable fill. Sump C was a very shallow pit that was backfilled completely with concrete.

Approximately 1,250 gal of decontamination waste water was generated during this project, which was discharged in February 2011, upon receipt of characterization results to ensure that KPDES discharge criteria were met.

Waste Segregation, Packaging, and Disposal

All waste generated during demolition was downsized using the excavator mounted shear to aid in loading and to meet the waste acceptance criteria (WAC) for the NNSS.

During the demolition process, 38,110 ft^3 of demolition debris were generated. The demolition material was segregated into two waste streams; low-level radioactive waste (LLW) and RCRA hazardous waste (lead fasteners only). The LLW waste, including the asbestos-containing material, was packaged in accordance with the NNSS WAC into 41 IP-1 containers and shipped on flat bed trucks to NNSS for disposal. The IP-1 containers are 6 x 8 x 20 ft. The disposal certification forms for the LLW material have been received from the disposal site and are available for review upon request. The lead fasteners were shipped during February 2011.

Contamination Control

Beryllium area air sampling results were below the laboratory detection limit and occupational exposure limits (Appendix D). Calculated sample results for metals did not exceed the occupational exposure limits (Table 1). Appendix E contains analytical results for beryllium and other metals from the air quality monitoring program.

Beryllium wipe sampling was performed on equipment and tools used inside the demolition area to provide information necessary to control beryllium releases to the environment, if results warranted such

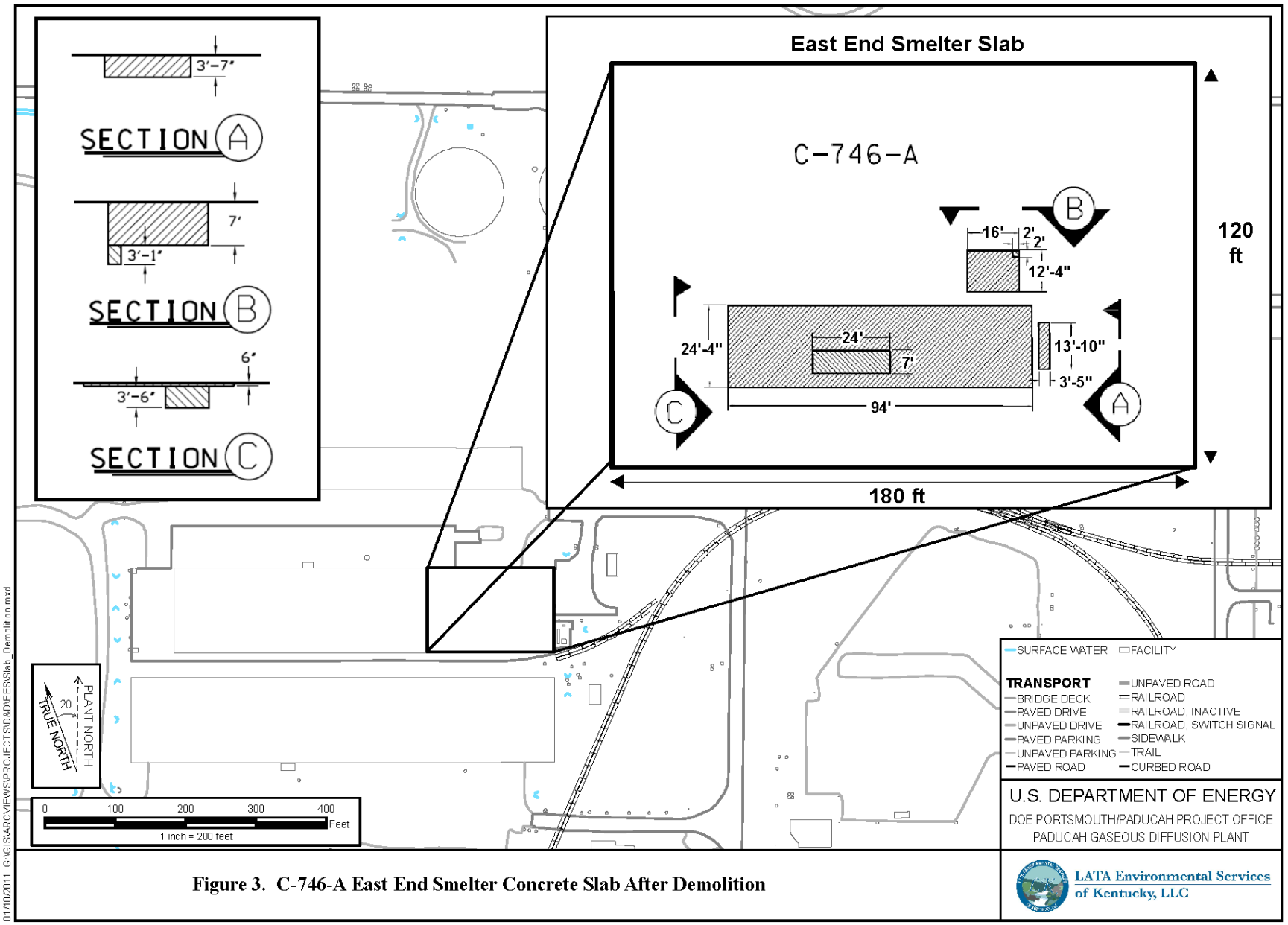

Figure 3. C-746-A East End Smelter Concrete Slab After Demolition

action. A total of 33 beryllium wipe samples was obtained throughout the demolition phase of the EES project. The analytical results of all wipe samples were below the laboratory detection limit.

During the performance of the EES demolition, activities that had the potential to involve radioactive materials or radioactive contamination were conducted in accordance with the LATA Kentucky Radiation Protection Program, PAD-PLA-HS-002. This document outlines the requirements necessary to ensure compliance with applicable federal laws and DOE Orders. Routine radiological surveys were performed on predetermined schedules by the radiation protection staff. Additional samples were obtained before, during, and following the completion of work that could impact radiation/contamination levels.

Radiological surveys included exposure rate measurements from the following locations: (1) from the general area; (2) at 30 cm from a source or surface of interest; and (3) on contact with potential sources of radiation where hands-on work was occurring. Radiological surveys also were performed in and adjacent to potentially contaminated areas to evaluate contamination levels and identify any spread of contamination beyond established boundaries.

There were no personnel contamination events during the D&D of C-746-A EES, nor was any contamination released to the environment.

Table 1. Summary of Results for Air Monitoring

Metal	# of samples	Range of Results[1]	Occupational Exposure Limit	Units
Aluminum	8	(BDL—0.00082)	0.07	(mg/m^3)
Arsenic	8	BDL	0.007	(mg/m^3)
Beryllium	11	BDL	1.4	($\mu g/m^3$)
Cadmium	8	BDL	0.007	(mg/m^3)
Chromium	8	(BDL—0.00014)	0.35	(mg/m^3)
Copper	8	(BDL—0.00019)	0.014	(mg/m^3)
Iron	8	(BDL—0.00198)	3.5	(mg/m^3)
Lead	8	(BDL—0.02635)	40	($\mu g/m^3$)
Lithium	8	BDL	0.0175	(mg/m^3)
Magnesium	8	(BDL—0.00123)	7	(mg/m^3)
Manganese	8	BDL	0.14	(mg/m^3)
Nickel	8	(0.00004–0.00244)	0.7	(mg/m^3)
Selenium	8	BDL	0.14	(mg/m^3)
Silver	8	BDL	0.007	(mg/m^3)
Uranium	8	(BDL—0.00682)	140	($\mu g/m^3$)
Zinc	8	(BDL—0.0005)	1.4	(mg/m^3)

BDL—below detection limit
[1]Analyses performed at Materials and Chemistry Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average

Material and equipment released from radiological areas to controlled areas, or for unrestricted release, were monitored by radiological control personnel. No vehicles, heavy equipment, tools, or equipment was

removed from the EES area without written certification that the equipment had undergone a radiological survey and had met the appropriate release criteria.

Area Monitoring

Air samples were obtained around the perimeter of the site and analyzed for beryllium. The analytical results of 18 samples were below the laboratory detection limit. The remaining three samples were below the action limits. Appendix E includes the results of the air quality monitoring program. This data illustrates that the EES D&D operation did not impact off-site air quality.

Summary of Problems Encountered

No problems were encountered during the implementation of the RAWP; deviations from the RAWP were minor field changes as discussed above.

Summary of Accomplishments and/or Effectiveness of the Removal Action

The demolition of the EES facility was accomplished in accordance with the RAWP (DOE 2010a). Waste handling, segregation, packaging, shipping, and disposal were accomplished in accordance with the appropriate regulations and guidelines established in the ARARs. An inspection by KDEP verified that the project was accomplished in accordance with these guidelines and regulations.

Timeline for Completion

Table 2 illustrates the timeline for the D&D phase of the EES demolition program. The demolition was initiated on September 8, 2010. The actual demolition was completed within 10 working days.

Table 2. Timeline of Demolition of C-746-A East End Smelter

Date	Activity
9/8/2010	Initiate mechanical separation of the buildings
9/10/2010	Begin demolition of north bay
9/11/2010	Completed demo of north bay
9/13/2010	Begin demo of middle bay
9/15/2010	LOTO on transformer; begin demolition of south bay
9/17/2010	Completed building demolition
9/17/2010 through 2/28/2011	Waste packaging, disposal operations, site cleanup
9/29/2010	Completed backfilling of sumps
10/27/2010	Concrete cap poured over flowable fill in sumps
11/4/2010	Final radiological contamination survey
11/9/2010	Completed applying sealant to slab

Summary of Any O&M Required

Due to potential impacts on operating electrical systems, closure of SWMU 137 will be delayed until the implementation of the GDP D&D OU project associated with activities that are post-GDP shutdown. Until that time, SWMU 137 will be integrated into the plantwide surveillance and maintenance program.

Copies of All Relevant Laboratory/Monitoring Data

Copies of all relevant data are included in Appendices C through E.

Summary of the Project Cost

The cost of implementing this removal action project, including packaging, transportation, and disposal of demolition debris, was $3.7 million. Table 3 summarizes the cost elements.

Table 3. Summary of Cost Elements

Activity	Cost, $M
Demolition of structure, slab preparation, and sealing	0.7
Structural waste packaging, transportation, and disposal	3.0
Total	**3.7**

References

DOE (U.S. Department of Energy) 2009. *American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste,* October 6.

DOE 2010a. *Removal Action Work Plan for the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant*, DOE/LX/07-0296&D2/R1, May.

DOE 2010b. *Action Memorandum for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter Non-Time-Critical Removal Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0290&D2, May.

CDC (Centers for Disease Control and Prevention) 2010. NIOSH Manual of Analytical Methods, CDC, Atlanta, GA, accessed online at http://www.cdc.gov/niosh/docs/2003-154, accessed November 21.

KDEP (Kentucky Department for Environmental Protection) 2009. Approval of *American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste,* October 20.

LATA Kentucky (LATA Environmental Services of Kentucky, LLC) 2010. *LATA Environmental Services of Kentucky, LLC, Chronic Beryllium Disease Prevention Program (CBDPP), Paducah Remediation Services Project*, PAD-PLA-HS-003, July.

DOL (U.S. Department of Labor) 2010a. Occupational Safety and Health Administration, "Chemical Sampling Information," accessed online at http://www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html, accessed November 21.

DOL 2010b. OSHA Technical Manual, TED 01-00-015 [TED 1-0.15A], accessed online at http://www.osha.gov/dts/osta/otm/otm_toc.html, accessed November 21.

APPENDIX A

PHOTOGRAPHS OF EES DEMOLITION OPERATIONS

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Initial Demolition Entry

Removal of Siding

Removal of Siding

Removal of Structural Member

Dust Control

Demolition in Progress

Packaging for Shipment

Slab After Building Demolition

APPENDIX B

SLAB RADIATION SURVEY RESULTS

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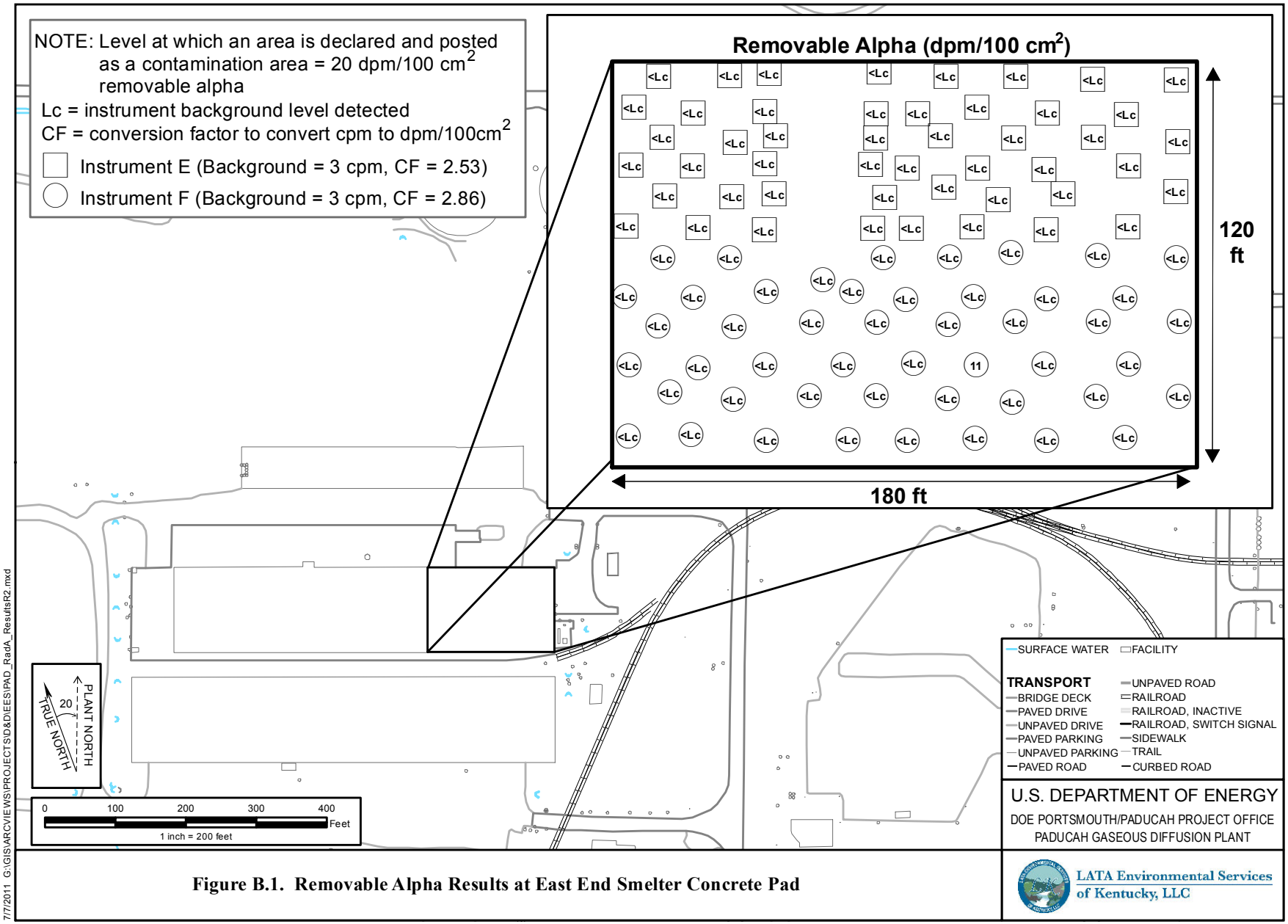

Figure B.1. Removable Alpha Results at East End Smelter Concrete Pad

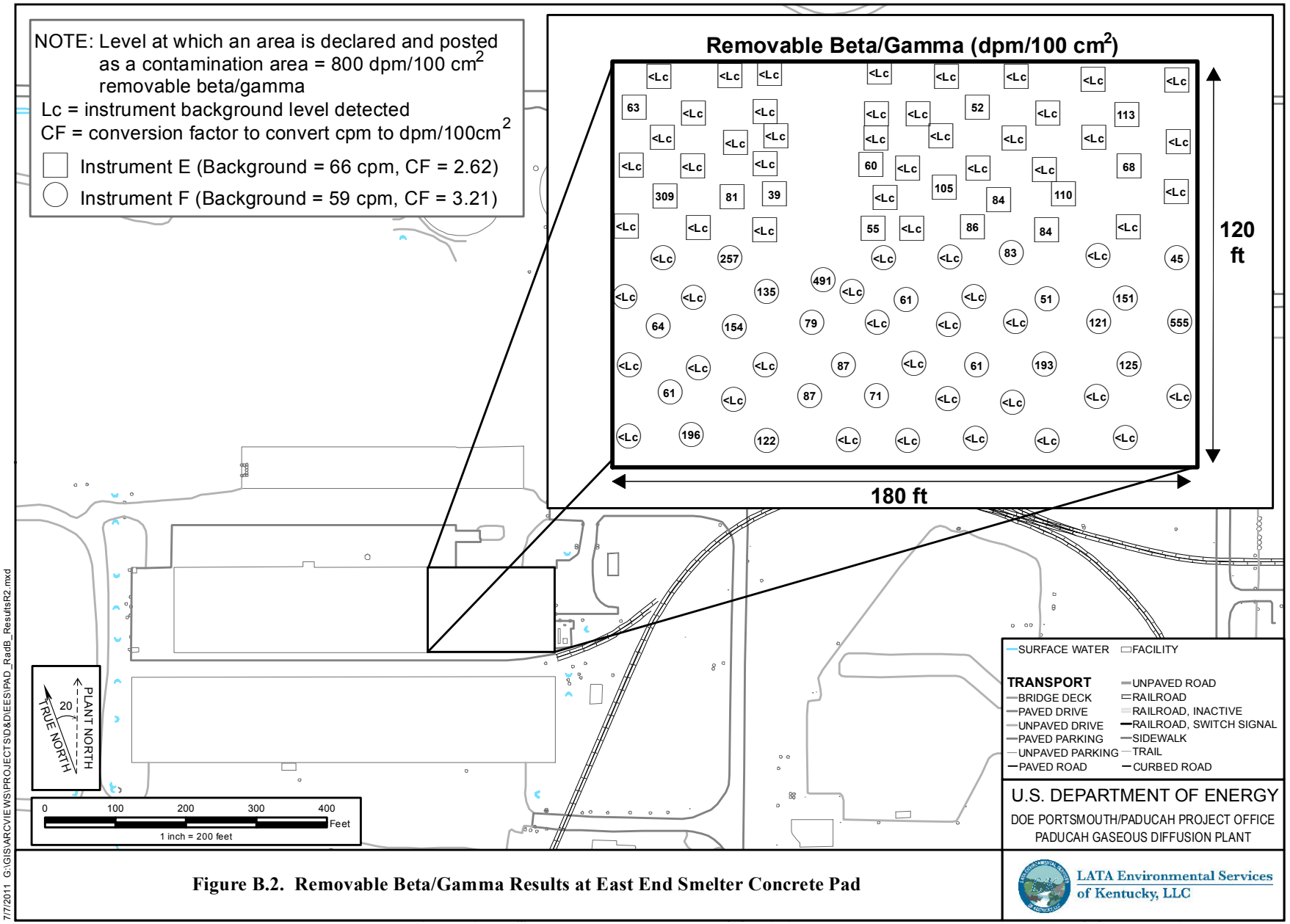

Figure B.2. Removable Beta/Gamma Results at East End Smelter Concrete Pad

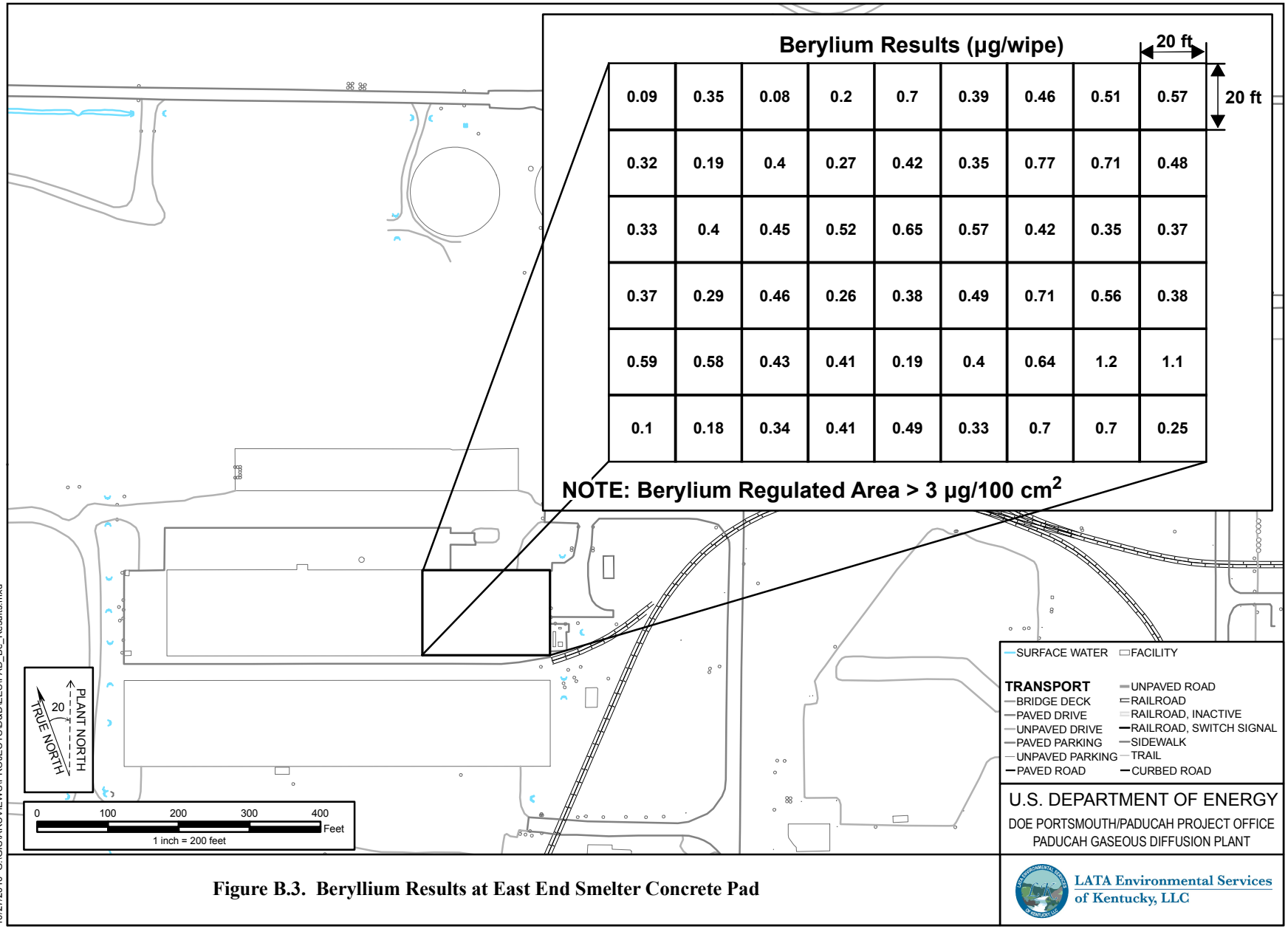

Figure B.3. Beryllium Results at East End Smelter Concrete Pad

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APPENDIX C

SUMP WATER ANALYTICAL RESULTS

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Paducah OREIS Report for ARRA10-EES-LQD1

EES-WDM-061 from: C-746-A on 4/26/2010 Media: WW SmpMethod: GR

Comments: Water from Pit

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Antimony	0.1		mg/L	U		0.1		SW846-6010B	/ X /
Arsenic	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Barium	0.025		mg/L	UBX		0.025		SW846-6010B	/ X /
Beryllium	0.005		mg/L	U		0.005		SW846-6010B	/ X /
Cadmium	0.02		mg/L	U		0.02		SW846-6010B	/ X /
Chromium	0.025		mg/L	U		0.025		SW846-6010B	/ X /
Lead	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Mercury	0.2		ug/L	UW		0.2		SW846-7470A	/ X /
Nickel	0.186		mg/L			0.05		SW846-6010B	/ X /
Selenium	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Silver	0.025		mg/L	U		0.025		SW846-6010B	/ X /
Thallium	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Total Uranium	0.008		mg/L			0.005		ST7106	/ X /
Zinc	0.2		mg/L	UB		0.2		SW846-6010B	/ X /
PPCB									
PCB-1016	0.18		ug/L	UX		0.18		SW846-8082	/ X /
PCB-1221	0.19		ug/L	UX		0.19		SW846-8082	/ X /
PCB-1232	0.15		ug/L	UX		0.15		SW846-8082	/ X /
PCB-1242	0.11		ug/L	UX		0.11		SW846-8082	/ X /
PCB-1248	0.13		ug/L	UX		0.13		SW846-8082	/ X /
PCB-1254	0.07		ug/L	UX		0.07		SW846-8082	/ X /
PCB-1260	0.05		ug/L	UX		0.05		SW846-8082	/ X /
PCB-1268	0.1		ug/L	UX		0.1		SW846-8082	/ X /
Polychlorinated biphenyl	0.19		ug/L	UX		0.19		SW846-8082	/ X /
RADS									
Americium-241	0.0169	0.0275	pCi/L	U		0.128	0.0544	RL-7128	/ X /
Cesium-137	3.4	6.8	pCi/L	U		21.2	11	RL-7124	/ X /
Cobalt-60	15.4	30.7	pCi/L	U		29	30.7	RL-7124	/ X /
Neptunium-237	0.0595	0.048	pCi/L	U		0.178	0.072	RL-7128	/ X /
Plutonium-238	-0.00016	0.0157	pCi/L	U		0.0702	0.0276	RL-7128	/ X /
Plutonium-239/240	0.0182	0.0282	pCi/L	U		0.0858	0.0406	RL-7128	/ X /
Potassium-40	451	316	pCi/L			232	320	RL-7124	/ X /
Strontium-90	0.679	0.133	pCi/L	U		2.44	0.149	RL-7140	/ X /
Technetium-99	153	15.8	pCi/L			17.4	16.2	RL-7100	/ X /
Thorium-230	0.137	0.0942	pCi/L	U		0.287	0.149	RL-7128	/ X /
Thorium-232	-0.0199	0.0372	pCi/L	U		0.182	0.0763	RL-7128	/ X /
Uranium-235			mg/L		A			ST7106	/ X /
Uranium-235			wt %		A			ST7106	/ X /
SVOA									
1,4-Dichlorobenzene	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
2,4,5-Trichlorophenol	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
2,4,6-Trichlorophenol	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
2,4-Dinitrotoluene	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
2-Methylphenol	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
Hexachlorobenzene	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
Hexachlorobutadiene	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
Hexachloroethane	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
m,p-Cresol	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
Nitrobenzene	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /
Pentachlorophenol	5.1		ug/L	UXJ		5.1		SW846-8270C	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for ARRA10-EES-LQD1

Pyridine	5.1	ug/L	UXJ	5.1	SW846-8270C	/ X /
VOA						
1,1,1-Trichloroethane	5	ug/L	U	5	SW846-8260B	/ X /
1,1-Dichloroethene	5	ug/L	U	5	SW846-8260B	/ X /
1,2-Dichloroethane	5	ug/L	U	5	SW846-8260B	/ X /
2-Butanone	5	ug/L	UJ	5	SW846-8260B	/ X /
Benzene	5	ug/L	U	5	SW846-8260B	/ X /
Carbon tetrachloride	5	ug/L	U	5	SW846-8260B	/ X /
Chlorobenzene	5	ug/L	U	5	SW846-8260B	/ X /
Chloroform	5	ug/L	U	5	SW846-8260B	/ X /
Tetrachloroethene	5	ug/L	U	5	SW846-8260B	/ X /
Trichloroethene	5	ug/L	U	5	SW846-8260B	/ X /
Vinyl chloride	5	ug/L	U	5	SW846-8260B	/ X /

Paducah OREIS Report for ARRA10-EES-LQD1

EES-WDM-062 from: C-746-A on 4/26/2010 Media: WW SmpMethod: GR

Comments: Water from Pit

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Antimony	0.1		mg/L	U		0.1		SW846-6010B	/ X /
Arsenic	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Barium	0.025		mg/L	UBX		0.025		SW846-6010B	/ X /
Beryllium	0.005		mg/L	U		0.005		SW846-6010B	/ X /
Cadmium	0.02		mg/L	U		0.02		SW846-6010B	/ X /
Chromium	0.025		mg/L	U		0.025		SW846-6010B	/ X /
Lead	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Mercury	0.2		ug/L	UW		0.2		SW846-7470A	/ X /
Nickel	0.172		mg/L			0.05		SW846-6010B	/ X /
Selenium	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Silver	0.025		mg/L	U		0.025		SW846-6010B	/ X /
Thallium	0.2		mg/L	U		0.2		SW846-6010B	/ X /
Total Uranium	0.007		mg/L			0.005		ST7106	/ X /
Zinc	0.2		mg/L	UB		0.2		SW846-6010B	/ X /
PPCB									
PCB-1016	0.17		ug/L	UX		0.17		SW846-8082	/ X /
PCB-1221	0.18		ug/L	UX		0.18		SW846-8082	/ X /
PCB-1232	0.14		ug/L	UX		0.14		SW846-8082	/ X /
PCB-1242	0.1		ug/L	UX		0.1		SW846-8082	/ X /
PCB-1248	0.12		ug/L	UX		0.12		SW846-8082	/ X /
PCB-1254	0.07		ug/L	UX		0.07		SW846-8082	/ X /
PCB-1260	0.05		ug/L	UX		0.05		SW846-8082	/ X /
PCB-1268	0.09		ug/L	UX		0.09		SW846-8082	/ X /
Polychlorinated biphenyl	0.18		ug/L	UX		0.18		SW846-8082	/ X /
RADS									
Americium-241	0.0166	0.0272	pCi/L	U		0.129	0.0542	RL-7128	/ X /
Cesium-137	1.05	2.1	pCi/L	U		23.7	13	RL-7124	/ X /
Cobalt-60	-2.92	5.85	pCi/L	U		25.4	13.6	RL-7124	/ X /
Neptunium-237	0.0646	0.0473	pCi/L	U		0.15	0.0719	RL-7128	/ X /
Plutonium-238	0.0118	0.0267	pCi/L	U		0.0693	0.0354	RL-7128	/ X /
Plutonium-239/240	0.0111	0.0158	pCi/L	U		0.0859	0.033	RL-7128	/ X /
Potassium-40	691	322	pCi/L			293	329	RL-7124	/ X /
Strontium-90	0.696	0.137	pCi/L	U		2.72	0.153	RL-7140	/ X /
Technetium-99	149	15.7	pCi/L			17.4	16.1	RL-7100	/ X /
Thorium-230	0.156	0.0903	pCi/L	U		0.289	0.147	RL-7128	/ X /
Thorium-232	0.00793	0.0184	pCi/L	U		0.185	0.0709	RL-7128	/ X /
Uranium-235			mg/L		A			ST7106	/ X /
Uranium-235			wt %		A			ST7106	/ X /
SVOA									
1,4-Dichlorobenzene	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
2,4,5-Trichlorophenol	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
2,4,6-Trichlorophenol	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
2,4-Dinitrotoluene	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
2-Methylphenol	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
Hexachlorobenzene	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
Hexachlorobutadiene	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
Hexachloroethane	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
m,p-Cresol	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
Nitrobenzene	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /
Pentachlorophenol	5.2		ug/L	UXJ		5.2		SW846-8270C	/ X /

*Verification/Validation/Assessment

Pyridine	5.2	ug/L	UXJ	5.2	SW846-8270C	/ X /
VOA						
1,1,1-Trichloroethane	5	ug/L	U	5	SW846-8260B	/ X /
1,1-Dichloroethene	5	ug/L	U	5	SW846-8260B	/ X /
1,2-Dichloroethane	5	ug/L	U	5	SW846-8260B	/ X /
2-Butanone	5	ug/L	U	5	SW846-8260B	/ X /
Benzene	5	ug/L	U	5	SW846-8260B	/ X /
Carbon tetrachloride	5	ug/L	U	5	SW846-8260B	/ X /
Chlorobenzene	5	ug/L	U	5	SW846-8260B	/ X /
Chloroform	5	ug/L	U	5	SW846-8260B	/ X /
Tetrachloroethene	5	ug/L	U	5	SW846-8260B	/ X /
Trichloroethene	5	ug/L	U	5	SW846-8260B	/ X /
Vinyl chloride	5	ug/L	U	5	SW846-8260B	/ X /

Metal results qualifiers -
B – Applies when the analyte is found in the associated blank.
U – Analyte analyzed for but not detected at or below the lowest concentration reported.
W – Post-digestion spike recovery out of control limits.
X – Other specific flags and footnotes may be required to properly define the results.

PPCB, VOA, and SVOA results qualifiers –
D – Compounds identified in an analysis at a secondary dilution filter.
U – Compound analyzed for but not detected at or below the lowest concentration reported.
X – Other specific flags and footnotes may be required to properly define the results.
J – Indicates an estimated value.

Rads results qualifiers
U – Value reported is the MDA And/or <2 sigma TPE.

Verification, Validation, Assessment (V V A) qualifier
X- not validated; refer to the RSLTQUAL field for more information

Footnote
A - Insufficient uranium present in the sample to determine the assay.

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APPENDIX D

CONTAMINATION CONTROL MONITORING RESULTS

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Table D.1. Results of Analysis of Personal Air for Beryllium

Sample Date	Beryllium (µg/m^3)
9/9/2010	< 0.00552
	< 0.0054
9/11/2010	< 0.00548
	< 0.00549
9/13/2010	< 0.00548
	< 0.00545
9/14/2010	< 0.00551
	< 0.00552
9/15/2010	< 0.00562
9/16/2010	< 0.00549
	< 0.00553

Analyses performed at Materials and Chemistry Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.

Table D.2. Results of Analysis of Area Air for Beryllium

Sample Date	Beryllium (µg/m^3)
9/9/2010	< 0.00825
	< 0.00822
	< 0.00825
9/11/2010	< 0.00786
	< 0.00769
	< 0.0078
9/13/2010	< 0.00646
	< 0.00639
	< 0.00647
9/14/2010	< 0.00626
	< 0.0063
	< 0.00635
9/15/2010	< 0.00673
	< 0.00675
	< 0.00677
9/16/2010	< 0.00622
	< 0.00625
	< 0.00625

Analyses performed at Materials and Chemistry Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.

Table D.3. Results of Analysis of Beryllium Wipe Samples

Sample Date	Beryllium Concentration ($\mu g/cm^2$)
9/9/2010	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
9/11/2010	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
9/13/2010	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
9/14/2010	< 0.05
	< 0.05
	< 0.05
9/15/2010	< 0.05
	< 0.05
	< 0.05
	< 0.05
9/16/2010	< 0.05
	< 0.05
	< 0.05
	< 0.05

Analyses performed at Materials and Chemistry Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.

APPENDIX E

AIR QUALITY MONITORING PROGRAM

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Table E.1. Results of Analysis of Heavy Metals from the Air Monitoring Program[a]

Compound	Units	Sample Date										
		9/9/10		9/11/10		9/13/10		9/14/10		9/15/10	9/16/10	
Aluminum	**(mg/m^3)**	< 0.00099	--	< 0.00099	< 0.00099	< 0.00098	--	0.00033	0.0004	0.00082	0.00066	--
Arsenic and Inorganic Compounds	**(mg/m^3)**	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	< 0.00001	--
Beryllium	**(µg/m^3)**	< 0.00552	< 0.0054	< 0.00548	< 0.00549	< 0.00548	< 0.00545	< 0.00551	< 0.00552	< 0.00562	< 0.00549	< 0.00553
Cadmium and Compounds	**(mg/m^3)**	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	< 0.00001	--
Chromium and Inorganic Compounds	**(mg/m^3)**	0.00011	--	0.00009	0.00014	0.00011	--	0.0001	0.00007	0.0001	0.00011	--
Copper Metal	**(mg/m^3)**	< 0.00001	--	< 0.00001	< 0.00002	< 0.00001	--	< 0.00001	0.00019	0.00006	0.00003	--
Iron Metal	**(mg/m^3)**	< 0.00099	--	< 0.00099	0.00105	< 0.00098	--	< 0.00033	0.00087	0.00198	0.00172	--
Lead and Inorganic Compounds	**(µg/m^3)**	0.02635	--	< 0.0132	< 0.01318	< 0.01305	--	< 0.01312	< 0.01333	0.02045	< 0.01323	--
Lithium Hydride	**(mg/m^3)**	< 0.00002	--	< 0.00002	< 0.00002	< 0.00002	--	< 0.00002	< 0.00002	< 0.00002	< 0.00002	--
Magnesium	**(mg/m^3)**	< 0.00099	--	< 0.00099	0.00105	0.00111	--	< 0.00098	< 0.001	0.00123	0.00119	--
Manganese Metal	**(mg/m^3)**	< 0.00003	--	< 0.00003	< 0.00003	< 0.00003	--	< 0.00003	< 0.00003	< 0.00003	< 0.00003	--
Nickel	**(mg/m^3)**	0.00011	--	0.00004	0.00017	0.00021	--	0.00011	0.00009	0.00244	0.00077	--
Selenium and Compounds	**(mg/m^3)**	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	< 0.0001	--
Silver (Metal Dust and Soluble Compounds)	**(mg/m^3)**	< 0.00001	--	< 0.00001	< 0.00002	< 0.00001	--	< 0.00001	< 0.00001	< 0.00001	< 0.00001	--
Uranium Metal	**(µg/m^3)**	< 0.00659	--	< 0.066	< 0.00659	< 0.00652	--	< 0.00656	< 0.00667	0.00682	< 0.00662	--
Zinc Metal	**(mg/m^3)**	0.00026	--	0.00024	0.0005	0.0002	--	< 0.0001	0.0001	0.00048	0.00035	--

[a] Analyses performed at Materials and Chemistry Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.

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