Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

APR 11 2016

Mr. Brian Begley
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

PPPO-02-3370234-16C

Ms. Julie Corkran
Federal Facility Agreement Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Begley and Ms. Corkran:

REMOVAL ACTION REPORT FOR THE C-410 COMPLEX INFRASTRUCTURE DECONTAMINATION AND DECOMMISSIONING PROJECT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-2182&D1)

Enclosed for your review and approval is the *Removal Action Report for the C-410 Complex Infrastructure Decontamination and Decommissioning Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-2182&D1. This secondary document satisfies the requirement for a Removal Action Completion Report, as identified in the *Removal Action Work Plan Addendum for the C-410 Complex Infrastructure Removal D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0304&D2/R1. The outline and content for Removal Action Reports was developed and agreed to by the Paducah Federal Facility Agreement Managers in April 2010 and was used for development of this Removal Action Report.

If you have any questions or require additional information, please contact me at (270) 441-6862.

Sincerely,

Tracey Duncan
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosure:
Removal Action Report for C-410 Complex Infrastructure D&D

e-copy w/enclosure:
april.webb@ky.gov, KDEP/Frankfort
arstephe@tva.gov, TVA/Paducah
brian.begley@ky.gov, KDEP/Frankfort
corkran.julie@epa.gov, EPA/Atlanta
craig.jones@ffspaducah.com, FFS/Kevil
ffscorrespondence@ffspaducah.com, FFS/Kevil
gaye.brewer@ky.gov, KDEP/PAD
jennifer.woodard@lex.doe.gov, PPPO/PAD
leo.williamson@ky.gov, KDEP/Frankfort
mark.duff@ffspaducah.com, FFS/Kevil
mike.guffey@ky.gov, KDEP/Frankfort
mpowers@techlawinc.com, EPA/Chicago
myrna.redfield@ffspaducah.com, FFS/Kevil
pad.rmc@swiftstaley.com, SSI/Kevil
reinhard.knerr@lex.doe.gov, PPPO/PAD
richards.jon@epamail.epa.gov, EPA/Atlanta
rlcasey@tva.gov, TVA/Paducah
stephaniec.brock@ky.gov, KYRHB/Frankfort

DOE/LX/07-2182&D1
Secondary Document

REMOVAL ACTION REPORT FOR THE C-410 COMPLEX INFRASTRUCTURE DECONTAMINATION AND DECOMMISSIONING PROJECT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

Description of the Removal Action Implemented

Deactivation, decontamination, decommissioning, and demolition of the C-410 Complex at the Paducah Gaseous Diffusion Plant (PGDP) was warranted based on relevant process knowledge and the nature, concentrations, and potential for release of the identified contaminants of concern (COCs), as documented in the following documents:

- *Engineering Evaluation/Cost Analysis for the C-410 Complex Infrastructure at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1952&D2/R1, (EE/CA) (DOE 2001)

- *Action Memorandum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2002&D1/R1, (Action Memorandum) (DOE 2002)

- *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2012&D2, (RAWP) (DOE 2002)

- *Action Memorandum Addendum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0273&D2, (Action Memorandum Addendum) (DOE 2009)

- *Removal Action Work Plan Addendum for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0304&D2/R1, (RAWP Addendum) (DOE 2010)

- *Removal Action Work Plan Addendum for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0304&D2/R2 (DOE 2015)

These documents describe the processes and operations that occurred in the C-410 Complex and document the COCs, applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) criteria, and performance standards for this removal action. Deactivation, decontamination, decommissioning, and demolition of the C-410 Complex was conducted as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action (NTCRA) pursuant to DOE's authority under Executive Order 12580 and in accordance with the Federal Facility Agreement (FFA) for PGDP, Section X.E., Non-Time-Critical Removal Actions, and the National Contingency Plan (NCP), 40 *CFR* Part 300.

The first three referenced documents describe the original approach to deactivation, decontamination, decommissioning, and demolition of the C-410 Complex, which entailed removal of all hazardous materials and infrastructure (i.e., piping, equipment, material, platforms, and non-load-bearing interior

walls) from the Complex. At that time, demolition of the Complex superstructures to their respective slabs was intended to be part of a subsequent CERCLA response action to be conducted after the infrastructure removal activities were complete.

The subsequent development of safer and more efficient methods of completing the work led to changes in the scope of the original project, resulting in the preparation and approval of the last two documents. These addenda served to do the following:

1. To expand the scope of the existing NTCRA to include facility structure demolition to the slabs and disposition of demolition debris, and

2. To allow non-process systems to remain in place and to remove these systems at the same time the building is demolished using heavy equipment such as excavators with shears.

The ongoing infrastructure removal activities that were part of the original scope continued during (and ahead of) implementation of the demolition activities.

The revised NTCRA met 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 and Action Memorandum Addendum.

The removal action objectives in the 2002 Action Memorandum were the following:

- Remove the materials causing the highest potential risks (e.g., transferable radioactive materials, asbestos, and other hazardous materials such as PCBs); thereby, significantly reducing the risk to current employees and potential off-site receptors in the event of building failure or further degradation to levels within the CERCLA risk range and in compliance with ARARs;

- Reduce the potential for public, worker, and environmental exposure to radioactive and hazardous substances caused by potential uncontrolled releases from the buildings; and

- Remove the infrastructure from the C-410 Complex buildings in preparation for future final cleanup decision making for the remediation of the building structure and environmental media.

In 2009, DOE, in conjunction with EPA and KDEP, issued an addendum to the original C-410 Action Memorandum. This 2009 Action Memorandum Addendum documented the following decisions:

- To expand the scope of the existing NTCRA to include facility structure demolition to the slabs and disposition of the demolition debris; and

- To allow the non-process systems to remain in place and to remove these systems at the same time the building is demolished using heavy equipment such as excavators with shears.

Buildings and facilities located within the C-410 Complex that were included in the NTCRA were the following:

- C-410, Original Feed Plant, including the East and West Expansion
- C-410-A, Second East Expansion of the C-410 Feed Plant (consistent with DOE/OR/07-2012&D2)
- C-410-C, Hydrogen Fluoride (HF) Neutralization Building

- C-410-F, HF Storage Building (North)
- C-410-G, HF Storage Building (Center)
- C-410-H, HF Storage Building (South)
- C-410-I, Ash Receiver Shelter
- C-410-J, HF Storage Building (East)
- C-411, Cell Maintenance Building
- C-420, Green Salt Building

The original RAWP, DOE/OR/07-2012&D2, did not include the C-410-K facility because the facility was constructed later. The RAWP Addendum, DOE/LX/07-0304&D2/R1, included a reference to the C-410-K facility, noting it was not a part of the project scope. The four HF tank structures, specifically C-410-F, C-410-G, C-410-H, and C-410-J were removed as a part of the NTRCA prior to development of DOE/LX/07-0304&D2/R1. As such, these four facilities are maintained in the Removal Action Report (RAR) text.

This NTCRA excludes C-410-B and C-410-E because they are scheduled to be addressed under the Soils and Slabs Operable Unit. The C-410-D and C-410-K Buildings were leased to the United States Enrichment Corporation at the time the project was scoped and currently are in use by the DOE Paducah Deactivation Contractor. The locations of these facilities are shown in Figure 2.

To facilitate planning and implementing the work, the affected buildings were divided into a total of 64 zones. A CD-ROM provided with the RAWP includes IPIX images of each zone. Subdividing the Complex further afforded the flexibility to perform the work on either a zone-specific, multi-zone-specific, or a system-specific basis, as appropriate. Each of the zones is described in Appendix A of the RAWP (DOE 2002).

Solid Waste Management Units Associated with C-410

C-410 Complex consisted of 21 discrete solid waste management unit areas (SWMUs) that were located within and around the C-410 Building structure, as well as one broad SWMU designation (SWMU 478) intended to encompass the overall footprint of the C-410 Complex (for a total of 22 SWMUs).

As part of the C-410 deactivation, decontamination, decommissioning, and demolition activities, SWMUs 41, 494, 495, 496, and 497 (see Table 1) have been removed and only the slabs underneath these SWMUs remain. No evidence of releases was identified during deactivation, decontamination, decommissioning, and demolition of the C-410 facility from these areas or that additional action would be necessary. The slabs have been double washed and rinsed, and two contrasting colors of epoxy paint have been applied. These slabs are included within SWMU 478, which encompasses the entire footprint of the C-410 Complex. SWMUs 41, 494, 495, 496, and 497 will be designated "No Further Action" status as a result of completion of deactivation, decontamination, decommissioning, and demolition activities at the C-410 Feed Plant.

Table 1. C-410 Complex SWMUs (Removed)

SWMU Number	Description
41	C-410-C Neutralization Tank
494	Ash Receiver Area in C-410/420
495	C-410-I Ash Receiver Shed
496	C-410 Fluorine/Hydrogen Filters (Northeast Mezzanine)
497	C-410/420 F_2 Cell Neutralization Room Vats

SWMU 478 was the C-410/420 Feed Plant building that now has been removed. DOE will submit a revised SWMU Assessment Report (SAR) for SWMU 478. The revised SAR will state that SWMU 478 will be evaluated for a final action under the Soils and Slabs OU.

The remaining 16 C-410 SWMUs listed in Table 2 were subsurface features (pits and sumps) that were cleaned of all debris, water, and sludge and then backfilled with flowable fill with a 6-inch concrete cap. Consistent with the RAWP, the building slabs were inspected visually, surveyed, decontaminated, and sealed with two coats of epoxy paint and a radiological survey was completed after epoxy application. The revised SAR for SWMU 478 will include references to these 16 C-410 SWMUs. These 16 SWMUs are within the footprint of SWMU 478, and also will be investigated as part of the Soils and Slabs OU.

Table 2. C-410 Complex SWMUs (Filled with Flowable Fill)

SWMU Number	Description
498	C-410/420 Sump at Column D&E-1&2
499	C-410/420 Sump at Column H-9&10
500	C-410/420 Sump at Column U-10&11
501	C-410/420 UF6 Scale Pit Sumps A&B
502	C-410/420 Sump at Column U-9
503	C-410/420 Sump at Column G-1
504	C-410/420 Sump at Column L-10
505	C-410/420 Sump at Column A-3N
506	C-410/420 Sump at Column Wa-9
507	C-410/420 Condensate Tank Pit
508	C-410/420 Settling Basin
509	C-410/420 Drain pit
510	C-410/420 Sump at Column P&Q-2
511	C-410/420 Sump at Column Q&R-2
512	C-410/420 Sump at Column R-2
513	C-411 Cell Maintenance Room Sump Pit

C-410 Complex Overview

Figure 1 is a photo of the C-410 Building prior to demolition. Figure 2 shows the location of the buildings and other structures located within the C-410 Complex.

Summary of Results

Implementation of the C-410 Non-Time-Critical Removal Action was completed successfully, and without any accidents that jeopardized worker safety and in compliance with ARARs. The project involved removing the hazardous substances, such as asbestos, polychlorinated biphenyls (PCBs), and radioactive materials, and disposing of them properly. Further, the structure of the building was demolished to slab. The demolition did not involve removal of the slab, subslab penetrations, and/or foundations. The slab was surveyed for radioactive materials, visually inspected for residual materials or staining, and sealed with two coats of epoxy. Pits were filled with flowable fill and covered with a concrete cap.

Waste was segregated, packaged, and dispositioned to a combination of facilities in accordance with ARARs: the on-site C-746-U Landfill; the Nevada National Security Site (NNSS) (formerly known as the Nevada Test Site); and Energy*Solutions*.

Figure 1. C-410 Building Prior to Demolition

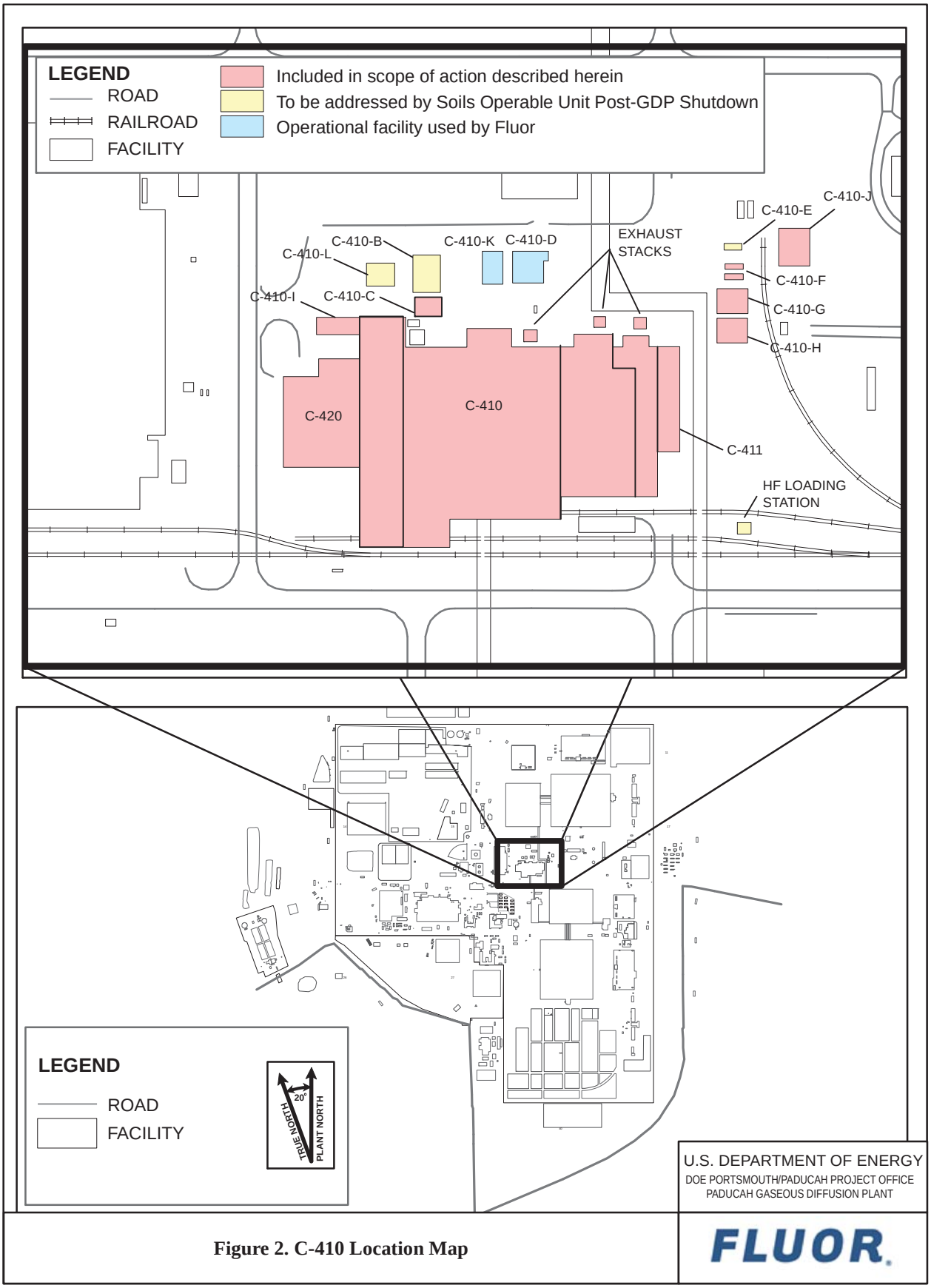

Figure 2. C-410 Location Map

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Seventy fluorine generating cells that had originated in the C-410 Complex were decontaminated by removing PCB-contaminated paint and turned over to private industry for reuse. Additionally, copper buswork and equipment that had supported the fluorine cell operations were shipped for reuse.

Infrastructure Removal[1]

The infrastructure removal at the C-410 Complex began on February 26, 2003. Initial activities included the stabilization and removal of the HF Tank Farm located east of the main C-410 Building. HF piping, pumps, and valves were drained and removed. Protective structures over the tanks were removed to allow access to the tanks, and the tanks were cleaned out and removed. The tanks, piping, and equipment were packaged for off-site disposal.

Initial activities inside the C-410 Complex involved establishing boundary control stations (BCSs) to ensure that radiological and other contamination was not carried out of the complex. BCSs provided locations for workers to don the appropriate personnel protective equipment (PPE) prior to entering the facility and a location to remove the PPE safely upon exiting the facility. Monitoring equipment was established at these locations for verifying workers exiting the facility did not have radiological contamination on their clothing or skin upon leaving the facility. Used PPE was collected at the BCS for either for laundering for reuse or disposal. Later in the project, automated "1/2 body monitors" were installed to monitor personnel exiting the facility automatically, improving effectiveness and efficiency of the monitoring process.

During the time frame that the C-410 Complex was not in operations, substantial quantities of used equipment and surplus materials from throughout the plant were stored inside the building. In order for workers to have access to the installed systems and equipment for stabilization and/or removal, packaging and disposal of this material was required. Characterization, packaging, and disposal of these "loose materials" was initiated at the beginning of the infrastructure removal project and continued throughout the project as work progressed through the different areas of the building. Additionally, one of the early infrastructure removal activities included the decontamination of 70 fluorine generation cells that had been used in the C-410 Complex. The cells underwent a sponge blasting process to remove paint that contained PCBs; the cells then were turned over to a private company for reuse. Other equipment that supported the fluorine generating process, including copper buswork, switches, fluorine cell movers, etc., were decontaminated and transferred for reuse.

As the removal and transfer of the fluorine generating equipment was moving toward completion, removal of asbestos from equipment and piping began. In many areas of the C-410 Complex, piping was layered due to the complex nature of the processes that occurred. As such, initial abatement of asbestos piping and equipment, in many cases, was the "accessible" or the "outer layer" of piping. In some areas, following abatement of the asbestos on the first layer of piping, the abated piping could be accessed to perform stabilization or removal, as required. This then allowed access to the "next layer" of piping, which, in some cases, required asbestos abatement. This layering of piping resulted in abating, then stabilizing and removing piping, then abating the next layer of asbestos pipe, throughout the removal action.

In 2009, the C-410 Project was selected as an American Recovery and Reinvestment Act (ARRA) project, resulting in an opportunity to apply additional resources and accelerate the project. To take advantage of the opportunity provided by the increased ARRA funding, an Action Memorandum Addendum and RAWP Addendum were developed, expanding the scope of the removal action to include structural demolition of the C-410 Complex and to allow non-process piping and systems to remain in

[1] This section addresses the provisions of Section 3.4.6 of the RAWP.

place and be demolished with the building using heavy equipment. Using ARRA funding, the completion of infrastructure removal and demolition of the eastern portion of the C-410 Complex was accelerated. Demolition of C-411 and the Second East Expansion of C-410, consisting of approximately 30,000 ft^2, was completed in 2011.

During the piping stabilization and removal, it was expected the process systems would be empty; however, in many of the systems, such as the glycol, alcohol, and UF_6 systems, it was identified that substantial quantities of the original chemical contents (i.e., holdup material) remained in the systems. For systems such as the glycol and alcohol systems, the impact of the presence of holdup material was limited to additional time to drain and collect the material and then to characterize, manage, and dispose of the recovered material. The impact of holdup present for systems, such as UF_6 or fluorine systems, were more significant due to the hazard presented and effort required to remove the holdup material.

A chemical trap was designed and constructed to evacuate the UF_6 or fluorine systems, and "hot taps" were fabricated to allow safely gaining access to closed systems to implement the evacuation process. In some cases, the UF_6 piping was found to contain deposits that could not be removed effectively with the traps. For these pipes and components, stabilization was performed using the chemical traps; this stabilization allowed the pipe or component to be cut and removed safely from the system. The component then could be "dipped" in a solution to neutralize and remove the larger UF_6 deposits. The components and solutions were characterized and disposed of in accordance with ARARS.

Due to the potential for recoverable quantities of UF_6, the 20 UF_6 cold traps located in the C-410 Complex were placed into storage for future asset recovery. Bolted and/or welded caps were installed on the openings to the traps; they were placed in to Sealand containers prior to relocation to the C-746-Q facility for storage.

The C-410 infrastructure removal required stabilization and removal of multiple systems in the C-410 Complex. These systems required identification, characterization, and removal of residual material from equipment and piping [except when the waste acceptance criteria (WAC) for the receiving facility allowed for disposition of the equipment or piping with the residual material intact] and transportation and disposition of equipment, piping, and residual materials. This included removal and abatement of asbestos-containing materials (ACM), mercury-containing switches and manometers, and PCB-containing electrical equipment (e.g., capacitors). All of the work was performed in accordance with ARARs and TBC criteria of federal and state environmental laws and regulations.

The following are the process systems or process components that were addressed during the infrastructure decontamination and decommissioning portion of the project.

- C-410 HF Reactors
- C-410 Hydrogen Reactors
- C-410 Fluorine (F_2) Reactors
- C-410 Cold Traps/Refrigeration
- C-410 Vacuum Cleaning
- Ash Grinding
- C-420 F_2 Reactors
- C-420 HF
- C-420 Uranium Hexafluoride
- C-420 Vacuum Cleaning
- C-420 HF Recovery
- Alumina Traps
- Fluorine Generation

- Freon System
- Glycol System
- Alcohol System
- HVAC System
- Electrical Distribution Systems

Additionally, the Action Memorandum Addendum included non-process systems (i.e., steam, air, nitrogen, plant air, etc.) in the demolition portion of the project. In some cases, however, the non-process system piping or components were removed to allow access to process systems that required stabilization or removal.

Building Demolition[2]

Prior to demolition, a storm water/run-off plan was developed consistent with identified ARARs. Controls installed to control storm water pollutants and sediments included covering all storm drains with filter fabric, apatite media, and dense grade aggregate; placing sandbags at openings to provide a 4-inch curb around foundation; and using the basements in Zone 22 and Zone 26 to hold storm water collected on the foundation. In addition, fixatives were used where feasible to eliminate fugitive dust emissions in lieu of misting to minimize the volume of water generated.

Exterior transite paneling was removed (deconstructed) using manlifts prior to demolition of the superstructures. The demolition of the facility was accomplished using standard construction equipment, excavator-mounted shears, and excavator-mounted grapples. Demolition of the structure included removal of the non-process infrastructure that remained after the process infrastructure was removed during the first phase of the project.

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

C-410 demolition did not involve removal of the slab, sub-slab penetrations, and/or foundations; however, subsurface features (e.g., pits and sumps) were filled with flowable fill and covered with a concrete cap.

Photos of the demolition of the C-410 Complex are included in Appendix A.

After demolition was complete, the slab was inspected visually, decontaminated, as appropriate, and sealed to minimize the possibility of spreading contamination. Successful removal of paint chips was verified by visual inspection of the slab and soils immediately adjacent to the slab. Radiological characterization was completed in accordance with the RAWP (DOE 2002). The slab was sealed with two coats of epoxy paint. After epoxy paint application, then another radiological survey was completed.

Demolition activities were completed in accordance with PAD-PLA-QM-001, *Quality Assurance Program Implementation Plan for the Paducah Environmental Remediation Project*; the approved RAWP (DOE 2002); and the approved RAWP Addendum (DOE 2010).

In general, demolition of the C-410 complex was completed in accordance with the steps outlined below; with exception to C-410 (Second West Expansion) in which Zones 22 and 26 remained open to collect runoff for better storm water management; subsequently, these Zones were filled with flowable fill after

[2] This section addresses the provisions of Section 2.3.5 of the RAWP Addendum.

demolition of the building. In C-420 (Green Salt Plant), the elevator pits were not filled with flowable fill until after demolition of the building.

- Perform gross decontamination.
- Spray all surfaces with fixative following deactivation.
- Remove remaining equipment/mezzanines/platforms.
- Clean pits/basements.
- RADCON/environmental survey and release pits/basements for flowable fill with a concrete cap.
- Install flowable fill with a concrete cap in pits/basements.
- Remove transite corrugated siding.
- Sever roof and roof sheathing.
- Demolish structure and roof simultaneously.
- Sort, size, and package debris.

Finish Work

1. Demolished all remaining exterior walls.

2. Cut all anchor bolts and steel flushed with concrete surface.

3. Demolished vent stacks and towers.

4. Sorted, sized, and packaged debris as directed by waste generation technicians.

5. Used flowable fill as a backfill material placed in all subgrade pits and subbasements. All flowable fill installations to subgrade pits and subbasements received a six-inch concrete cap to provide a stable surface to support operation of demolition equipment. Removable contamination on the building slab, "existing and replaced," was decontaminated using normal decontamination techniques (washing, scrubbing, wiping, vacuuming, etc.) in such a manner to minimize the generation of waste.

6. Installed radiological signs and postings, as appropriate.

7. Decontaminated rental equipment.

8. Repaired or removed access roads.

9. Graded and seeded, as needed.

Slab Verification Survey and Epoxy Coated Surface[3]

All anchor bolts, piping, and metal framing were removed from the slabs using cold cutting and hot work methods, such as metal cutting saws, reciprocating saws, and torches. Samples were collected from the bottom of the basements/sumps. Sumps and pits were cleaned and backfilled with flowable fill with a concrete cap.

The slabs were inspected visually to identify any residual materials or staining in accordance with the C-410 Complex Demolition Verification Removal Action Plan to determine if residual hazardous substances were in or present on the slab. Flowable fill was used as a backfill material placed in all subgrade pits and subbasements. All flowable fill installations to subgrade pits and subbasements

[3] This section addresses the provisions of Section 2.3.5 of the RAWP Addendum.

received a six-inch concrete cap to provide a stable surface to support operation of demolition equipment. Removable contamination on the building slab, "existing and replaced," was decontaminated using normal decontamination techniques (washing, scrubbing, wiping, vacuuming, etc.) in such a manner as to minimize the generation of waste. Radiological characterization was performed on the concrete building pad following demolition of the building and debris removal (dated August 10, 2015, see Appendix B). A final survey of entire slab was performed after application of two coats of epoxy paint to determine the appropriate radiological postings required for the slab.

Over 100 data points were measured during performance of the final survey. As expected based on historical operations, fixed radiological contamination was found on the slab, with alpha contamination identified at levels up to 19,789 disintegrations per one hundred square centimeters (dpm/100 cm^2), and beta/gamma contamination was identified at levels up to 136,267 dpm/100 cm^2 during survey performed after epoxy coating application on the slab.

The post-epoxy coating survey indicated no removable contamination above transuranic limits, which are 20 dpm/100 cm^2 removable alpha contamination and 1,000 dpm/100 cm^2 removable beta contamination. Based on post-epoxy coating application surveys, the slab was posted as a Radioactive Material Area, Fixed-Contamination, Underground Radioactive Material, and Contamination Area.

The radiological surveys are provided in Appendix B. Radiological surveys were performed in accordance with *Environmental Radiological Protection Program*, CP2-ES-0103.

Sump Verification Survey and Water Disposal[4]

Figure 3 depicts the design and construction of the C-410 Complex slabs. Prior to sampling, all material and debris was removed from the basements/sumps, and core samples of the concrete from the pit walls were collected. Sampling results are summarized in Table 3, and the data are provided in Appendix C. Data collection was performed in accordance with *Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan*, DOE/LX/07-1269&D2/R2 (available online).

A total of 16,630 gal of contaminated water was pumped from Zone 22 basement on June 18, 2014, prior to building demolition. This water was shipped off-site on September 16, 2014; September 26, 2014; and September 30, 2014, in tanker trucks. This water event was a result of the degrading condition of the building and roof system.

[4] This section addresses the provisions of Sections 2.3.4 and 2.3.6 of the RAWP Addendum.

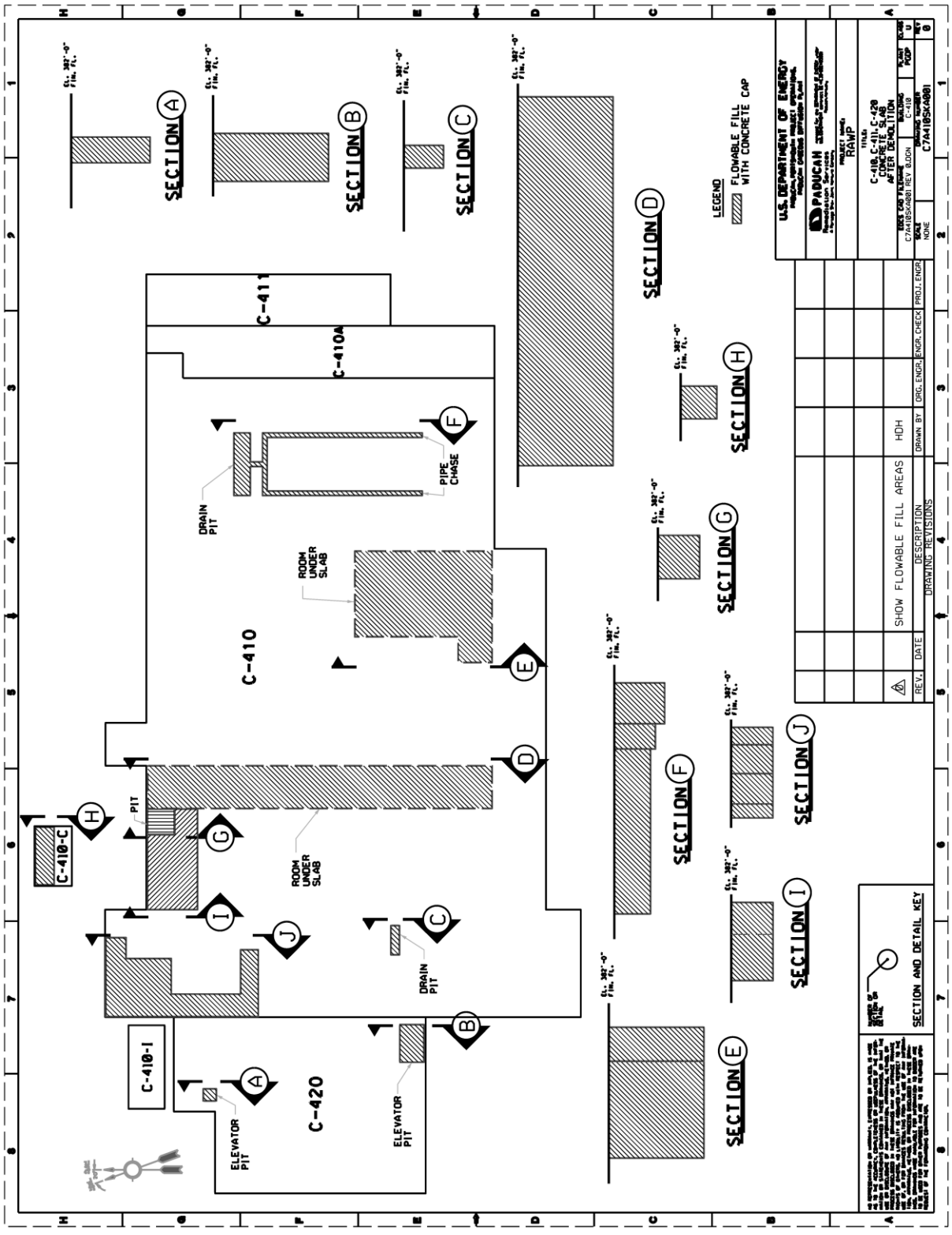

Figure 3. C-410 Map

Table 3. PCB Sump Samples

Sample Number	Location	Aroclor 1248 (mg/kg)	Total PCB (mg/kg)
410-BSMTZ22-CONC	C-410 Zone 22 Basement	0.009	0.92
410-BSMTZ26-CONC	C-410 Zone 26 Basement	0.036	1.900
410-BSMTZ28-CONC	C-410 Zone 28 Basement	0.0088	0.63
410-BSMTZ53-1-CONC	C-410 Zone 53 Basement	0.08	0.1
410-BSMTZ53-2-CONC	C-410 Zone 53 Basement	0.08	0.2
410-BSMTZ53-2-CONCD	C-410 Zone 53 Basement	0.08	0.12
410-BSMTZ54-1-CONC	C-410 Zone 54 Basement	0.08	0.1
410-BSMTZ54-2-CONC	C-410 Zone 54 Basement	0.08	0.1

In addition to water removed from Zone 22, approximately 68,000 gal of contaminated water was generated during this project and removed from Zone 26 prior to backfill with flowable fill with a concrete cap. The water was sampled and analyzed for Tc-99 and uranium, consistent with the Memorandum of Agreement (MOA) (Appendix D). Based on these results, treatment of this water was completed by ion exchange and filtering to remove suspended radionuclides. Following treatment, the water was sampled, analyzed, and discharged in accordance with the MOA (results found in Appendix C). The water was treated and discharged with completion date of October 7, 2015. The carbon media and ion exchange resin used for water treatment is suitable for reuse; therefore, it remains in-tact. The water treatment system has been stored for future projects.

Waste Segregation, Packaging, and Disposal[5]

Implementation of the NTCRA generated 774,518.7 ft^3 of demolition debris, not including contaminated water. The demolition material was segregated into two primary waste streams. The demolition generated 74,212.1 ft^3 of debris that met the waste acceptance criteria and was disposed of in the on-site C-746-U Landfill. Disposal of this waste stream, which included the transite removed from the building exterior, was completed December 31, 2015. The remaining debris was disposed of at NNSS, Perma-Fix, and Energy*Solutions*, and the final shipment was completed on January 12, 2016.

A total of 16,630 gal of contaminated water was pumped from Zone 22 basement on June 18, 2014, prior to building demolition. This water was shipped off-site on September 16, 2014; September 26, 2014; and September 30, 2014, in tanker trucks. This water event was a result of the deteriorating condition of the building and roof system.

The project resulted in the generation of 4,111.4 ft^3 of PCB remediation low-level waste (LLW) waste at levels of PCBs above 50 ppm. This PCB waste was disposed of at Energy*Solutions.* The final shipment of this material was on June 18, 2014.

[5] This section addresses the provisions of Sections 2.3.4 and 2.3.6 of the RAWP Addendum.

The project also generated 37,542 ft^3 of LLW that required disposition at the NNSS, based on levels of depleted uranium. The final shipment of this material occurred December 2013.

Approximately 6,746 ft^3 of mixed waste or hazardous waste was generated during the removal action. This material was dispositioned at Energy*Solutions*, M&EC, DSSI, Perma-Fix, or Toxco. The final shipment of this material occurred on November 12, 2015.

During the planning phase of the C-410 Removal Action, DOE assumed the cold traps contained only a thin film of UF_6 material. During the C-410 decommissioning activities, however, DOE discovered that the cold traps contained significantly more UF_6 than had been anticipated. During the May 2012 and August 2012 meetings of the Federal Facility Agreement (FFA) managers, DOE discussed its intent to place the C-410 cold traps into storage for future recovery of UF_6 material during PGDP decommissioning when systems are in place to remove the UF_6 material safely and economically. EPA and KDEP concurred that this approach is consistent with the referenced RAWP.

Additional decontamination of government furnished equipment was required to enable the use of the equipment on other projects in January and February 2016. The waste generated by this activity was tracked separately. A total of 2,050 gal of water was shipped April 8, 2016, for off-site disposal, and 450 ft^3 of PPE has been disposed of in the on-site landfill.

Approximately 1,995 ft^3 of waste was generated at EDI in Oak Ridge, Tennessee, during decontamination of the three excavators and one grapple used in building demolition. This waste was shipped April 7, 2016, to Clive, Utah, for disposal.

The approved RAWP for the C-410 Complex allows for the recycle/reuse of materials from the decommissioning of the C-410 Complex. Fluorine cells and copper bus bars were removed for off-site reuse and shipped to Toxco.

Contamination Control

During the performance of the C-410 demolition, activities that had the potential to involve radioactive materials or radioactive contamination were conducted in accordance with the *LATA Environmental Services of Kentucky, LLC, Radiation Protection Program*, PAD-PLA-HS-002/R2. 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 affect radiation/contamination levels.

Radiological surveys included exposure rate measurements from the following locations within each structure: (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.

Implementation of the C-410 NTCRA was a very labor intensive activity, requiring workers to work in and near radiological contaminated equipment and facilities throughout the duration of the project. Engineering controls, administrative controls, and personnel protective equipment were utilized to protect workers throughout the project. Examples of these controls included use of fixatives to control contamination; handling materials with equipment rather than manually; negative air machines to capture and reduce airborne contamination; radiological work permits; workforce training, monitoring of personnel and equipment before exiting the facility, and PPE.

Throughout the project, 22 personnel contamination events occurred. A personnel contamination event is defined as contamination of worker's skin, company issued clothing, or shoes. Of these 22 events, a total six of involved radiological contamination present on a worker's skin, while the remainder involved contamination on scrubs, coveralls, or boots. Contamination on skin was removed by washing with mild soap and water. Company-issued clothing that became contaminated generally was disposed of as a part of project waste.

Contamination events were evaluated on an ongoing basis to determine if improvements to controls or processes could be implemented to reduce likelihood or extent of future occurrences. Changes and modifications to controls were implemented, as appropriate. In consideration of the number of hours worked and potential for contamination presented by work activities, the radiological control program was effective at protecting the work force from radiological contamination and in preventing contamination from leaving the facility.

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 were removed from the C-410 area without written certification that the equipment had undergone a radiological survey and had met the appropriate release criteria.

Area Air Monitoring

Over 25,173 discrete air samples were collected for radiological contamination, asbestos, and metals in all phases of the project, during and prior to demolition. These samples comprised of breathing zone personnel monitoring samples for workers, area monitors, perimeter monitors, and clearance samples.

A total of 17,804 breathing zone samples was collected. Of these samples, a total of 285 breathing zone samples exceeded the DOE occupational limit for radiological contamination that triggers use of respiratory protection. The workers for which these samples were collected were using the appropriate protection.

Additionally, 7,369 perimeter or area monitoring samples were collected for radiological contamination. None of the area or perimeter monitors indicated presence of airborne radioactive materials at the DOE occupational limit. The perimeter samples were collected using solar powered samplers, running continuously, with samples nominally collected twice weekly. None of the 121 area samples representing 1,786 results and only 33 out of 4,294 results from 415 personnel samples collected and analyzed for airborne metals exceeded the Occupational Safety and Health Administration permissible exposure limits or the American Conference of Governmental Industrial Hygienists threshold limit values. The workers for which these samples were collected were using the appropriate protection.

A total of 186 perimeter samples was collected for asbestos during building demolition and transite removal. These were compared to an administrative control level for asbestos perimeter sampling of 0.01 fibers per cm^3.

A total of 1,400 breathing zone asbestos samples was collected during the transite removal and asbestos abatement activities.

Required clearance samples were performed in accordance with ARARs, including 401 *KAR* 58:040 4(2)(c). All clearance monitoring results met the applicable standards for successful abatement as defined in the ARARs.

Summary of Problems Encountered, including Deviations from the Work Plan

The expected condition of piping and equipment in the C-410 Complex was that most systems would be drained or purged and materials removed during the shut down of the building. Records indicated equipment had been "run till empty." Residual levels of liquids were expected in systems such as the glycol or alcohol systems, and the UF_6 systems were expected to contain only residual levels of material. Solid material handling systems were not expected to contain substantial quantities of solid material. However, during the stabilization and removal of most process systems, substantial quantities of hold up material remained in the systems. For systems such as the glycol and alcohol systems, the impact of the presence of material was limited to additional time to drain and collect the material, and then the efforts to characterize, manage, and dispose of the recovered material. The impacts to systems such as the UF_6 system or the fluorine systems, however, were more significant. Trapping equipment was designed and constructed to remove hazardous gases from the UF_6 and fluorine containing systems, as well as hot tapping equipment to allow a controlled mechanism to access the normally closed systems. For solid containing systems, such as UF_4 or uranium powder systems, the solid material was removed via shoveling, vacuuming, etc.

For the UF_6 cold traps, the holdup material quantities were such that the traps were placed into storage for later asset recovery, as opposed to stabilizing the traps and disposing of them.

During implementation of the removal action, UF_6 releases occurred in the C-410 Building on four occasions. No significant injuries or illnesses occurred from these releases; however, work activities were paused following each of these to allow for investigation and corrective action implementation. A description of the releases and cause is provided below:

- March 1, 2006—A release occurred when a small diameter UF_6 line was broken inadvertently during other work activities. Corrective actions included detailed inspections of the building and flagging or painting small diameter UF_6 lines. Work activities were controlled or prohibited in immediate area of these lines until they could be stabilized and removed. Release did not extend outside of the building.

- August 11, 2008—A UF_6 line was damaged during asbestos abatement of the line, resulting in a small release of UF_6 inside the asbestos enclosure. The personnel left the area, as required by work controls. A hazmat team entered and determined the release had stopped on its own. Release did not extend outside of the building. Work resumed following monitoring of the area.

- July 2010—A release occurred while a UF_6 line was being purged through a hot tap. Leak stopped following hazmat entries, and the release appeared not to have escaped the C-410 Building. Hot taps were redesigned to a more robust design, and more rigorous work controls were implemented, including design and deployment of chemical traps rather than an HF-capable negative air machine (NAM) to purge the UF_6 lines.

- May 2011—A release occurred when a work crew using a saw "nicked" a line, and the resulting UF_6 overwhelmed the HF capable NAM. This approach was inconsistent with the work and hazard controls established for this work, which called for implementing hot tapping and use of chemical traps for purging unknown lines. More robust work controls were implemented with hold points to ensure work control steps were followed and hazard controls implemented.

On February 14, 2012, work was suspended on UF_6 piping and equipment removal due to presence of elevated levels of plutonium contamination in UF_6 process lines in the C-410 Complex. The contamination levels required implementation of more robust work controls than currently were in place and those had been based on expected plutonium concentrations. Work controls were revised, additional

PPE implemented, and additional training was provided to the workforce performing this activity, as well as to support staff. Additionally, no other work was permitted in the immediate area of the UF_6 piping removal. Finally, plans were put into place to decontaminate the area following completion of removal of the UF_6 piping. Work resumed on the piping on March 13, 2012.

In December, 2009, a PCB transformer located in the basement of the First East Expansion of the C-410 Complex, located at the intersection of Building Column Line O and Column Line 10, had a small leak, impacting an area approximately 12 inches by 26 inches on the basement floor. Residual material was cleaned from the slab at the time of the event. The area was marked with paint and covered with plastic to demarcate the area of the spill when flowable fill was installed in this basement.

The C-410 Complex roofs and roof drains were in deteriorated condition due to the age of the buildings. A sealant was applied to the roof to control leaks during the project. Additionally, efforts to "patch" roof drains and divert water from roof leaks or damaged/nonfunctioning roof drains were required. Surveillance and maintenance costs were increased as a result. Routine engineering evaluations of the structural integrity of the building roofs were performed to confirm the safety of workers making entry.

The C-411 Building and the C-410 Second East Expansion were demolished approximately 3 years before demolition of the balance of the building. Following the demolition of C-411 and the Second East Expansion, a water leak resulted in accumulating approximately 75,000 gal of water in the basement area under the First East Expansion (Zone 54 Basement). This water was characterized, determined to have low levels of PCB contamination, treated via carbon filtration, and discharged. Repairs were made to the roof and wall interface to prevent recurrence.

Prior to demolishing the balance of the C-410 Complex, approximately 16,000 gal of water accumulated in Zone 22 due to deterioration of the roof and the drain pipe systems that had managed the water from the roof surface. On-site treatment capacity for this water was not available at that point. The water collected from this event was shipped off-site for disposal.

The Demolition Plan for the C-410 Complex anticipated that all free liquids would be removed from all basements, pits, trenches, and sumps in zones scheduled for immediate demolition, and that these areas would be filled with flowable fill with a concrete cap (see Demolition Plan, Pre-Demolition Conditions, Paragraph 18 and Main Tasks, Paragraph L). In the case of Zones 22 and 26, the subsurface areas remained open to collect run-off for better storm water management. On September 26, 2014, DOE proposed to EPA and KDEP its plan for discharge of the collected storm waters to an adjacent ditch and eventually to Outfall 001. This proposal was disapproved by the regulators, and EPA issued "Stop Work Order on the Discharge of Wastewater from Building C-410 Removal Action, Paducah Gaseous Diffusion Plant," on November 26, 2014. In late December 2014, a separation wall was built between Zones 22 and 26 using precast concrete blocks and concrete. The storm water was consolidated into Zone 26 in early January 2015, and Zone 22 was filled with flowable fill with a concrete cap to allow building demolition to proceed.

On July 31, 2015, the FFA parties finalized the Memorandum Of Agreement for Disposition of Contaminated Water Collected from the Basement of the C-410 Complex at the Paducah Gaseous Diffusion Plant, in which DOE agreed to remove the water from Zone 26 basement and treat using *ex situ* at Zone 26 using proven ion exchange technology with resins capable of treating radionuclides detected in the water. The ion exchange treatment system achieved 93%–98% reduction in the radionuclides, results in Appendix C. Treatment and discharge of the water was completed on October 7, 2015.

The elevator pits in C-420 remained open due to the safety issues involved in locking out and blocking up the elevator cars and counterweights. The pits were filled with flowable fill with a concrete cap after the

building structure was demolished. This differs from the RAWP because the pits were filled with flowable fill with a concrete cap after building demolition, as opposed to prior to building demolition.

On May 29, 2015, the project requested a deviation (DOE 2015) from the RAWP to allow transportation of four excavators to an off-site vendor for decontamination prior to returning the equipment to the vendors. The equipment required partial disassembly with aggressive methods for effective decontamination. The complexity of this decontamination effort prevents the effective and timely completion of the activities on-site with currently available facilities and equipment. Large, high bay equipment decontamination and disassembly areas with material handling equipment and the tooling required to disassemble large equipment were needed for disassembly and reassembly. Abrasive blasting equipment with necessary environmental controls (dust collectors, recycling equipment, etc.) was needed to perform the decontamination effort. Completing the disassembly, decontamination, and reassembly could be completed more efficiently and in a timelier manner by sending the equipment to an existing off-site facility at this time.

Prior to shipment for decontamination, the determination was made that one of the four excavators would be purchased for potential future use. As a result, three excavators and one grapple were shipped off-site for decontamination. All three of the excavators and the grapple attachment have been decontaminated and have been returned successfully to the rental company.

Summary of Accomplishments and/or Effectiveness of the Removal Action

Deactivation and demolition of the C-410 Facility was accomplished in accordance with the RAWP and RAWP Addendum. Waste handling, segregation, packaging, shipping, and disposal were accomplished in accordance with ARARs.

Timeline for Completion

Table 4 illustrates the timeline for the deactivation, decontamination, decommissioning and demolition phase of the C-410 demolition program. The demolition was initiated March 23, 2011.

Table 4. Timeline of NTCRA for the C-410 Complex

Date	Activity
2/26/2003	Initiated Removal Action by beginning removal of Hydrofluoric Acid (HF) Tank Farm.
10/2003	Completed isolation of external sources of steam, air, nitrogen, and condensate system from the C-410 Complex.
5/2004	Completed modifications on the C-410-C Limehouse to support fluorine cell decontamination for off-site shipment for reuse.
5/2004	Completed implementation of DOE required Nuclear Facility Safety Basis for C-410 Complex for activities inside the C-410 Complex.
7/2004	Completed demolition of HF tank farm.
9/2004	Completed disposition of 11 HF Tanks at NTS.
10/2004	Completed decontamination (PCB containing paint removal) & off-site shipment of the 57 fluorine cells from the C-410 complex for reuse.
7/2005	Initiated the removal of PCB contaminated paint from fluorine cells that had breaches in water jackets. These 13 cells were returned to C-410 from waste storage for decontamination.
9/2005	Completed conversion of C-420 Administrative area into a Boundary Control station.
1/2006	Completed infrastructure removal in C-411 Cell maintenance area (eastern end) of C-410 Complex.
2/2006	Transferred first Sealand container of copper bus work from C-410 Complex to an off-site contractor for reuse.

Table 4. Timeline of NTCRA for the C-410 Complex (Continued)

Date	Activity
3/2006	UF_6 release inside C-410 when small diameter instrument line was inadvertently broken. Work paused inside building while investigating cause and implementing corrective actions.
4/2006	Initiated building walkdowns and demarcating lines with potential for generating releases such as March 2006 UF_6 release.
4/2006	Completed PCB containing paint removal from 13 breached fluorine cells and shipped off-site for reuse. These cells originated in C-410 and were stored in other facilities. They were returned from storage outside the C-410 Complex for decontamination.
8/2006	Initiated asbestos abatement in C-410 Complex, using glovebags.
9/2006	Removed an exterior ventilation stack that collapsed during severe weather.
9/2006	Completed installation of construction power and temporary lighting in Sectors 2 and 3 to support removal of asbestos, piping, and equipment.
3/2007	Completed first asbestos containment construction and initiated abatement using containments.
4/2007–12/2008	Continued removal of asbestos insulation, as well as removing utility piping and/or equipment to allow access to asbestos insulated piping. Also continued characterization and packaging loose materials for disposal.
12/2007	A secondary benefit of asbestos abatement and fixative application in the fluorine cell rooms on the eastern portion of the C-410 Complex (C-410 East Expansion) resulted in significant radiological decontamination. The area was downposted, allowing tours and inspections and nonintrusive work without respiratory protection.
1/2009	Initiated small diameter instrument line removal and stabilization of F2, HF, and H2 lines in Sector 4 (C-410 East Expansion).
2/2009	Completed accessible asbestos abatement; note that additional abatement would be required as UF_6 and other hazardous systems removed, making additional equipment and piping accessible. Approximately 43,600 linear ft of asbestos pipe abated to date, plus 6,500 ft^2 on tanks and large vessels.
4/2009	Shipped 3,200 gal of waste water from C-410 elevator pit to Clive, UT, for disposal.
4/2009	Paducah Site selected to receive ARRA funding to accelerate activity at C-410 Complex. Planning began to utilize funding from the ARRA to accelerate C-410 Removal Action and other projects at Paducah.
5/2009	Initiated revision of AM and RAWP to incorporate building demolition into current non-time-critical removal action.
5/2009	Initiated additional staff hiring and training to accelerate C-410 Removal Action using ARRA funding.
8/2009	Initiated prohibited item removal (mercury switches, capacitors, etc.) from components and equipment.
9/2009	Initiated HF Electrolyte System removal.
11/2009	EPA and KY approved AM Addendum to expand scope of action to include building demolition.
11/2009	Completed removal of HF electrolyte system.
1/2010	Initiated removal of vacuum system piping.
7/2010	UF_6 release occurs inside C-410 as the result of a failed “hot tap” installed to support purging a UF_6 process line.
10/2010	Completed placing flowable fill in C-411 and C-410 East Expansion in preparation for accelerated demolition.
11/2010	Expanded scope of action to include building demolition as result of KY and EPA approval of D2/R1 RAWP Addendum.
11/2010	Completed stabilization of HF and fluorine tanks on roof of C-411.
3/2011	Completed removal, packaging, and disposal of loose materials.
4/2011	Initiated demolition of C-411 (Cell Maintenance Building and C-410 Second East Expansion).
4/2011	Completed stabilization and removal of alcohol and ammonia systems.
5/2011	Experienced UF_6 release inside C-410 when personnel “nicked” a UF_6 process line with a saw; it overwhelmed the NAM.
6/2011	Completed demolition of C-411 and C-410 Second East Expansion.
7/2011	Completed removal of uranium powder system.

Table 4. Timeline of NTCRA for the C-410 Complex (Continued)

Date	Activity
8/2011	Completed slab decontamination and fixative application on Sector 4 and C-411 slabs.
9/2011	Completed deactivation and demolition of C-310-C-410 Tie line.
2/2012	Work suspended for removal of UF_6 piping put in place due to elevated plutonium contamination levels in the UF_6 piping near the UF_6 reactor towers.
3/2012	Lifted suspension on UF_6 piping removal following completion of additional training and work control changes to mitigate hazards for plutonium.
6/2012	Completed removal of UF_6 piping from C-410 Complex, including piping contaminated with plutonium.
8/2012	Completed UF_6 ash system stabilization.
9/2012	Initiated cutting and capping of cold traps in preparation for storage for asset recover.
11/2012	Completed HVAC system stabilization or removal.
2/2013	Completed installation of welded caps on all UF_6 Cold traps in preparation for storage.
5/2013	Completed placing all UF_6 cold traps in storage in C-746-Q Facility.
7/2013	Work paused when worker removing conduit with ACM containing wire mistakenly cut into energized line. Worker was not injured. Work paused on conduit removal to complete investigation and corrective actions.
8/2013	Resumed removal of electrical conduit following investigation and implementation of corrective actions.
12/2013	Completed systems removal in C-410 Complex.
12/2013	Continued performing paint chip removal, fixative application, temporary power removal, and rad surveys.
5/2014	Initiated C-410 First East Expansion demolition.
8/2014	Completed demolition of C-410 First East Expansion and C-410 Feed Plant.
9/2014	Determined large components (screw reactors) in C-420 containing internal asbestos should be abated prior to demo with the building. Construction of containment began. Transite removal paused to allow containment to be completed and abatement performed.
11/2014	Completed asbestos abatement of screw reactors.
11/2014	Initiated construction of a separation wall between pits in Zones 22 and 26 to allow storage of water in Zone 26 pit, and installation of flowable fill in Zone 22 pit.
1/2015	Completed installation of separation wall between Zones 22 and 26; pumped water to Zone 26 pit and cleaned Zone 22 Pit for flowable fill.
1/2015	Resumed transite removal.
3/2015	Completed demolition of the C-410 vent stacks.
5/2015	Completed demolition of the C-410 West Expansion (including C-410-I), C-410-C Limehouse, and C-420 Green Salt Plant.
5/2015	Completed demolition of C-420 (Green Salt Plant).
5/2015	Developed agreement for off-site decontamination of large equipment.
7/2015	Disposition of contaminated water collected from the basement of C-410 Complex at PGDP (Memorandum of Agreement).
10/2015	Treated and discharged contaminated water.
12/2015	Completed field work at the site of C-410 Complex.
1/2016	Completed shipment of building demolition debris.
3/2016	Decontaminated and returned large equipment to vendor.
4/2016	Final shipment of waste.

Summary of Any Operation and Maintenance Required

No further operation will be required; however, routine inspections and maintenance of the slab will be undertaken as necessary.

Summary of the Project Cost

The cost of implementing this removal action project, including packaging, transportation, and disposal of demolition debris, was $235,274,000. Table 5 summarizes the cost elements.

Table 5. Summary of Cost Elements

Activity	Cost, $M
Deactivation and Decommissioning, Demolition of Structure, Project Management, Slab Preparation and Sealing, Site Restoration, and Decontamination of Equipment On-site and Off-site	$222,264,000
Structural Waste Packaging, Transportation, and Disposal	$13,010,000
Total	**$235,274,000**

References

DOE (U.S. Department of Energy) 2001. *Engineering Evaluation/Cost Analysis for the C-410 Complex Infrastructure at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1952&D2, Rev 1.

DOE 2002a. *Action Memorandum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2002&D1, Rev 1.

DOE 2002b. *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2012&D2.

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DOE 2015. *Removal Action Work Plan Addendum for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0304&D2/R2.

Appendices

Appendix A—C-410 Demolition Photographs
Appendix B—Radiation Survey Results
Appendix C—Sump Water and Pit Sampling Analytical Results
Appendix D—Memorandum of Agreement for Disposition of C-410 Basement Water at the Paducah Site

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APPENDIX A

C-410 DEMOLITION PHOTOGRAPHS

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Figure A.1. C-410 Complex Prior to Demolition (view toward southeast)

Figure A.2. C-410 Complex before Demolition (view toward northeast)

Figure A.3. Demolition of C-410 Original Feed Plant (view toward east)

Figure A.4. Transite Removal from the West Side of C-420 Complex

Figure A.5. Transite Removal from C-410 Building (view toward west)

Figure A.6. Transite Removal from East Wall of C-420 Building (view toward southwest)

Figure A.7. Downsizing Debris from C-410 Demolition

Figure A.8. C-410 Original Feed Plant Demolition (view toward northwest)

Figure A.9. Demolition of the C-420 Building (view toward northwest)

Figure A.10. Downsizing and Segregation of Demolition Debris

Figure A.11. Downsizing Demolition Debris (view toward north)

Figure A.12. C-410 Demolition Debris Loading into Gondolas (view toward north)

Figure A.13. High Reach Excavator Demolishing Northern End of C-420 Building (view toward southeast)

Figure A.14. High Reach Excavator Demolishing Northern End of C-420 Building (view toward southwest)

Figure A.15. Water Treatment System Used to Treat Water for Discharge from Zone 26 Basement

Figure A.16. C-410 Slab in Final State with Epoxy Coating Applied (view toward plant east)

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APPENDIX B

RADIATION SURVEY RESULTS

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RADIOLOGICAL SURVEY COVER FORM

Survey No: 15-FPDP-ERWM-0015-S Page 1 of 4

Completed Date: 8/10/15 Completed Time: 1420 RWP Number: FPDP-15111

Location of Survey-General (Site/Bldg.): C-410/420 Specific (Room/Area/Item): BLDG FOOTPRINT (PAD)

Material / Other Job Description: CHARACTERIZATION SURVEY

N/A

Instrument Information

Contamination / Field Instruments

1	Inst. Model #	L12	Serial #	264675	Cal Due	6/29/16	Probe Model 43-5
	Bkgd (cpm)	1	MDC Pt (dpm)	55	MDC Pl (dpm)	73	
α	Inst. Lc (cpm)	3	CF Pt	7.21	CF Pl	9.49	
2	Inst. Model #		Serial #	N	Cal Due		Probe Model
	Bkgd (cpm)		MDC Pt (dpm)		MDC Pl (dpm)		
α	Inst. Lc (cpm)		CF Pt	A	CF Pl		
3	Inst. Model #	L3	Serial #	131626	Cal Due	6-24-16	Probe Model 44-9
	Bkgd (cpm)	40	MDC Pt (dpm)	140	MDC Pl (dpm)	903	
β	Inst. Lc (cpm)	55	CF Pt	4.32	CF Pl	27.86	
4	Inst. Model #		Serial #	N	Cal Due		Probe Model
	Bkgd (cpm)		MDC Pt (dpm)		MDC Pl (dpm)		
β	Inst. Lc (cpm)		CF Pt	A	CF Pl		

Laboratory / Smear Instruments

5	Inst. Model #	L2224	Serial #	127837	Cal Due	6/5/16	Probe Model 43-10-1
	α Bkgd (cpm)	0.8	α MDC (dpm)	17	α Inst Lc (cpm)	2	α CF Pt: 2.72
	β Bkgd (cpm)	35	β MDC (dpm)	89	β Inst Lc (cpm)	46	β CF Pt: 3.66
6	Inst. Model #		Serial #		Cal Due		Probe Model
	α Bkgd (cpm)		α MDC (dpm)	N	α Inst Lc (cpm)		α CF Pt:
	β Bkgd (cpm)		β MDC (dpm)		β Inst Lc (cpm)		β CF Pt:

Radiation/Dose Instruments

7	Model #		Serial #		Cal Due		BCF
	Bkgd (mrem/hr)		LLD (mrem/hr)				
8	Model #		Serial #	A	Cal Due		BCF
	Bkgd (mrem/hr)		LLD (mrem/hr)				

Laboratory Results Attached? Yes (No)

Comments/Reference Surveys/Released To (as applicable): DIRECTS WERE PERFORMED ON 8/7/15 AND 8/10/15. INSTRUMENT BACKGROUNDS WERE THE SAME FOR BOTH DAYS.

N/A

RCT: K GLASS | Kenneth Glass Badge: 636051 RCT: C. PETERS | [signature] Badge: 30731

RCT: N/A Badge: N/A RCT: N/A Badge: N/A

RADCON Supervisor / Lead RCT Review: STEVE HENRY, Steve Henry 08-11-15 Date

Review the Identified Source Document for This Form Prior to Attempting Completion
Complete All Forms in Accordance with CP2-OP-0207

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: IS-FPDP-ERMW-0015-S

Instrument	1		5		3		5		N/A	N/A	
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ	
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW	
	bkg(cpm) 1		bkg(cpm) 0.8		bkg(cpm) 40		bkg(cpm) 35		bkg(cpm) N/A	bkg(cpm) N/A	
	CF: 1.49		CF: 2.72		CF: 27.86		CF: 3.66				
	Lc= 3		Lc= 2		Lc= 55		Lc= 46		Lc= N/A	Lc= N/A	
Item No	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location and/or remarks
1	2039	19,341	8	20	8481	235,146	76	150			On PAD surface, SEE MAP
2	26	237	1	<Lc	220	5015	43	<Lc			
3	49	456	2	3	330	8079	26	<Lc			
4	86	807	15	39	548	14,153	78	157			
5	56	522	4	9	275	6547	33	<Lc			
6	64	598	0	<Lc	175	3733	32	<Lc			
7	68	636	12	30	359	8887	48	48			
8	101	949	22	58	610	15,880	76	150			
9	105	987	16	41	260	6129	90	201			
10	59	550	5	11	355	8776	51	59			
11	63	588	24	63	163	3427	50	55			
12	28	256	35	93	762	20,115	139	381	N		
13	232	2192	34	90	1263	34,073	118	304		A	
14	51	475	10	25	2685	73,690	39	<Lc			
15	6	47	2	3	87	1309	36	<Lc			
16	12	104	0	<Lc	255	5990	36	<Lc			
17	51	475	6	14	184	4012	40	<Lc			
18	58	541	47	126	330	8079	154	436			
19	62	579	18	47	450	11,423	76	150			
20	40	370	5	11	250	6851	55	73			
21	35	323	3	6	237	5488	36	<Lc			
22	94	883	25	66	858	22,789	72	135			
23	30	275	8	20	525	13,512	54	70			
24	32	294	9	22	326	7968	60	92			
25	36	332	3	6	526	13,540	42	<Lc			↓

RCT Initials: KG/CP ↓

Comments: NONE

N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 15-FPDP-ERWM-0015-S

Instrument	1		5		3		5		N/A	N/A		
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ		
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW		
	bkg(cpm) 1		bkg(cpm) 0.8		bkg(cpm) 40		bkg(cpm) 35		bkg(cpm) N/A	bkg(cpm) N/A		
	CF 9.49		CF 2.72		CF 27.86		CF 3.66					
	Lc= 3		Lc= 2		Lc= 55		Lc= 46		Lc= N/A	Lc= N/A		
Item No	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location and/or remarks	RCT Initials
26	62	579	2	3	395	9890	31	<Lc			ON PAD SURFACE - SEE MAP	KG/CS
27	44	408	2	3	872	23,180	35	<Lc				
28	29	266	18	47	211	4764	131	351				
29	51	475	13	33	389	9723	77	154				
30	103	968	7	17	845	22,427	63	102				
31	66	617	2	3	439	11,116	32	<Lc				
32	28	256	10	25	240	5572	56	77				
33	19	171	3	6	173	3705	47	44				
34	14	123	2	3	319	7773	42	<Lc				
35	N/A	N/A	2	3	N/A	N/A	37	<Lc				
36	N/A	N/A	5	11	N/A	N/A	76	150				
37	N/A	N/A	2	3	N/A	N/A	39	<Lc				
38	6	47	4	9	104	1783	52	62				
39	11	95	2	3	100	1672	50	55				
40	3924	37,229	165	447	8911	247146	394	1314				
41	N/A	N/A	1	<Lc	N/A	N/A	32	<Lc				

N

A

N

A

Comments: NONE

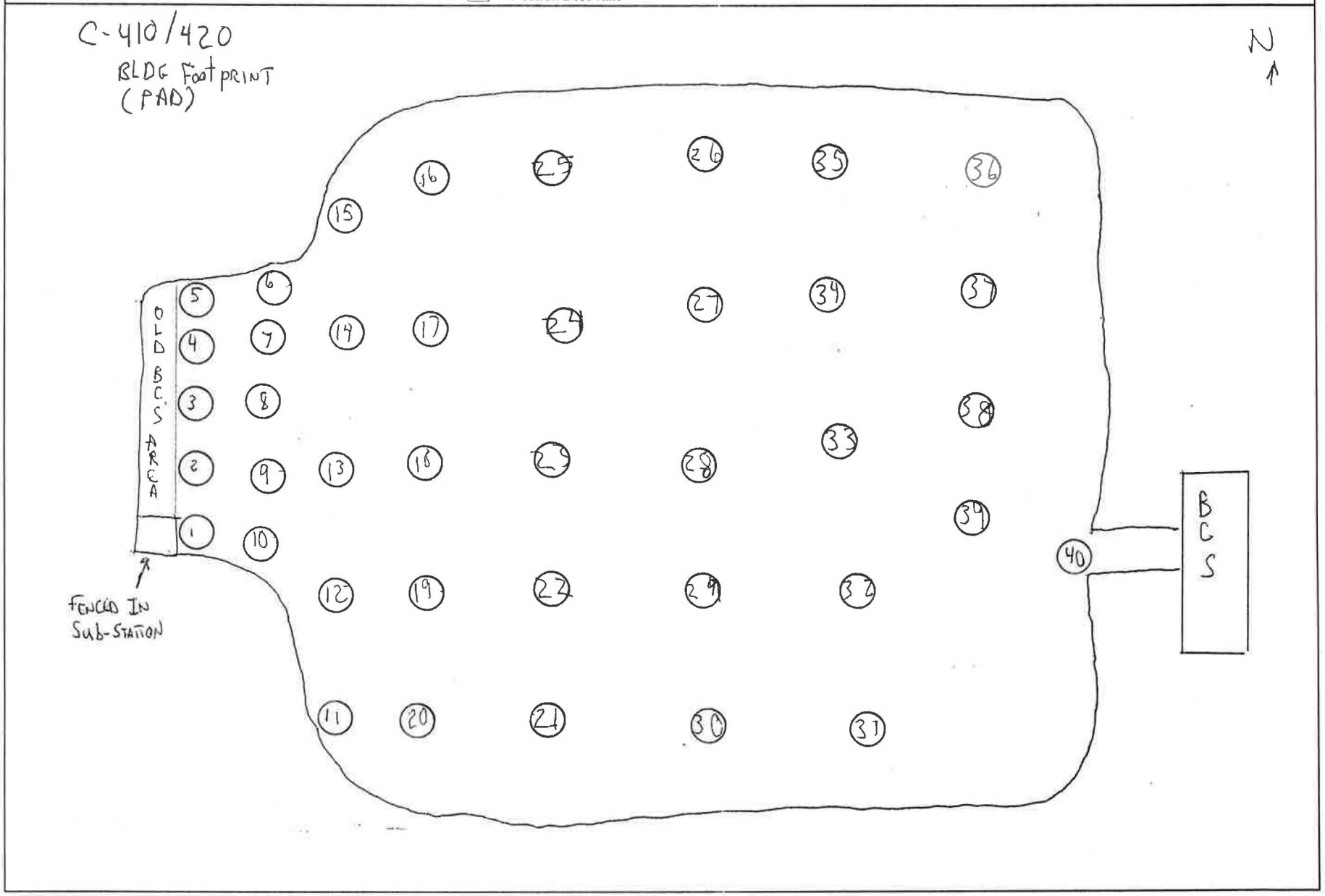
N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

RADIOLOGICAL SURVEY MAP FORM

Survey Number: 15-FPDP-ERWM-0015.-5

Legend:
A Air Sample Location
Smear / Direct
Beta or Gamma Dose Rate
Neutron Dose Rate
LAW



COPY

RADIOLOGICAL SURVEY COVER FORM

Survey No: 15-FPDP-ERWM- 0502 -S | Page: 1 of 9

Completed Date: 12/11/2015 | Completed Time: 1330 | RWP Number: FPDP-15111 R1

Location of Survey-General (Site/Bldg.): C-410/420 | Specific (Room/Area/Item): Inside CA (Post Painting of Concrete)

Material / Other Job Description: Directs and Transferable Survey of Inside CA

N/A

Instrument Information

Contamination / Field Instruments

1	Inst. Model #	L12	Serial #	135033	Cal Due	8/29/2016	Probe Model	43-5
α	Bkgd (cpm):	1	MDC Pt (dpm)	56	MDC Pl (dpm)	74		
	Inst. Lc (cpm)	3	CF Pt:	7.36	CF Pl:	9.69		
2	Inst. Model #	N/A	Serial #	N/A	Cal Due	N/A	Probe Model	N/A
α	Bkgd (cpm):	N/A	MDC Pt (dpm)	N/A	MDC Pl (dpm)	N/A		
	Inst. Lc (cpm)	N/A	CF Pt:	N/A	CF Pl:	N/A		
3	Inst. Model #	L12	Serial #	207173	Cal Due	6/15/2016	Probe Model	44-9
β	Bkgd (cpm)	32	MDC Pt (dpm)	127	MDC Pl (dpm)	819		
	Inst. Lc (cpm)	45	CF Pt:	4	CF Pl:	28		
4	Inst. Model #	N/A	Serial #	N/A	Cal Due	N/A	Probe Model	N/A
β	Bkgd (cpm):	N/A	MDC Pt (dpm)	N/A	MDC Pl (dpm)	N/A		
	Inst. Lc (cpm)	N/A	CF Pt:	N/A	CF Pl:	N/A		

Laboratory / Smear Instruments

5	Inst. Model #	N/A	Serial #	N/A	Cal Due	N/A	Probe Model	N/A
	α Bkgd (cpm):	N/A	α MDC (dpm)	N/A	α Inst. Lc (cpm)	N/A	α CF Pt:	N/A
	β Bkgd (cpm):	N/A	β MDC (dpm)	N/A	β Inst. Lc (cpm)	N/A	β CF Pt:	N/A
6	Inst. Model #	N/A	Serial #	N/A	Cal Due	N/A	Probe Model	N/A
	α Bkgd (cpm):	N/A	α MDC (dpm)	N/A	α Inst. Lc (cpm)	N/A	α CF Pt:	N/A
	β Bkgd (cpm)	N/A	β MDC (dpm)	N/A	β Inst. Lc (cpm)	N/A	β CF Pt:	N/A

Radiation/Dose Instruments

7	Model #	N/A	Serial #	N/A	Cal Due	N/A	BCF:	N/A
	Bkgd (mrem/hr)	N/A	LLD (mrem/hr):	N/A				
8	Model #	N/A	Serial #	N/A	Cal Due	N/A	BCF	N/A
	Bkgd (mrem/hr)	N/A	LLD (mrem/hr):	N/A				

Laboratory Results Attached? [Yes] No

Comments/Reference Surveys/Released To (as applicable): Portions of Painted Pad (C-410/420 Foot print) was covered in a light water film where the water had "sweated" through the paint

Smears had to be dried prior to being sent to Tenelec for counting. For transferable contamintion readings and Tenelec instrument readings, see attached Tenelec sheets

Survey Points 41,47,48,53,54,69,70,and 75 to be Surveyed at a later date (Directs and smears)

RCT: K. Glass K. Glass Badge 636051 RCT: N/A | N/A Badge N/A

RCT: N | A Badge N/A RCT: N | A Badge N/A

RADCON Supervisor / Lead RCT Review: STEVE HENRY, Steve Henry 12-15-15 Date

B-7

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 15-FPDP-ERWM- 0502 -S

Instrument	1		*		3		*		N/A	N/A		
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ		
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW		
	bkg(cpm) 1.0		bkg(cpm) *		bkg(cpm) 32		bkg(cpm) *		bkg(cpm) N/A	bkg(cpm) N/A		
	CF: 9.69		CF: *		CF: 27.95		CF: *					
	Lc= 3		Lc= *		Lc= 45		Lc= *		Lc= N/A	Lc= N/A		
Item No.	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location	RCT Initials
1	4	29	*	*	57	699	*	*	N/A	N/A	Gravel	KG
2	7	58	*	*	94	1733	*	*	N/A	N/A	Gravel	KG
3	25	232	*	*	271	6680	*	*	N/A	N/A	Gravel	KG
4	40	378	*	*	532	13975	*	*	N/A	N/A	Gravel	KG
5	11	97	*	*	1194	32478	*	*	N/A	N/A	Gravel	KG
6	5	39	*	*	228	5478	*	*	N/A	N/A	Gravel	KG
7	50	475	*	*	711	18978	*	*	N/A	N/A	Gravel	KG
8	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
9	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
10	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
11	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
12	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
13	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
14	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
15	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
16	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
17	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
18	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
19	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
20	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be done on a later date	KG
21	5	39	*	*	85	1481	*	*	N/A	N/A	Gravel	KG
22	6	48	*	*	118	2404	*	*	N/A	N/A	Gravel	KG
23	11	97	*	*	961	25966	*	*	N/A	N/A	Gravel	KG
24	26	242	*	*	277	6848	*	*	N/A	N/A	Gravel	KG
25	5	39	*	*	107	2096	*	*	N/A	N/A	Gravel	KG

Comments: * For Transferable contamination and Tenelec instrument information, see attached Tenelec sheets.

N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

Review the Identified Source Document for This Form Prior to Attempting Completion
Complete All Forms in Accordance with CP2-OP-0207

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 15-FPDP-ERWM- 0502 -S

Page 3 of 9

Instrument	1		*		3		*		N/A	N/A	
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ	
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW	
	bkg(cpm) 1.0		bkg(cpm) *		bkg(cpm) 32		bkg(cpm) *		bkg(cpm) N/A	bkg(cpm) N/A	
	CF: 9.69		CF: *		CF: 27.95		CF: *				
	Lc= 3		Lc= *		Lc= 45		Lc= *		Lc= N/A	Lc= N/A	
Item No.	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location	RCT Initials
26	18	165	*	*	396	10174	*	*	N/A	N/A	Gravel	KG
27	4	29	*	*	42	<Lc	*	*	N/A	N/A	Gravel	KG
28	1	<Lc	*	*	48	447	*	*	N/A	N/A	Gravel	KG
29	7	58	*	*	171	3885	*	*	N/A	N/A	Gravel	KG
30	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
31	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
32	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
33	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
34	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
35	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
36	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
37	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
38	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
39	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
40	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
42	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
43	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
44	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
45	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
46	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
47	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
49	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
50	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG

Comments: * For Transferable contamination and Tenelec instrument information, see attached Tenelec sheets.

N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

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RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 15-FPDP-ERWM- 0502 -S

Instrument	1		*		3		*		N/A	N/A		
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ		
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW		
	bkg(cpm) 1.0		bkg(cpm) *		bkg(cpm) 32		bkg(cpm) *		bkg(cpm) N/A	bkg(cpm) N/A		
	CF: 9.69		CF: *		CF: 27.95		CF: *					
	Lc= 3		Lc= *		Lc= 45		Lc= *		Lc= N/A	Lc= N/A		
Item No.	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location	RCT Initials
51	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
52	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
55	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
56	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
57	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
58	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
59	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
60	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
61	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
62	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
63	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
64	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
65	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
66	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Concrete Pad/ Directs to be taken on a later date.	KG
67	3	19	*	*	217	5171	*	*	N/A	N/A	Concrete Pad	KG
68	1	<Lc	*	*	235	5674	*	*	N/A	N/A	Concrete Pad	KG
69	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG
71	0	<Lc	*	*	71	1090	*	*	N/A	N/A	Concrete Pad	KG
72	0	<Lc	*	*	102	1957	*	*	N/A	N/A	Concrete Pad	KG
73	0	<Lc	*	*	69	1034	*	*	N/A	N/A	Concrete Pad	KG
74	0	<Lc	*	*	241	5842	*	*	N/A	N/A	Concrete Pad	KG
75	N/A	N/A	*	*	N/A	N/A	*	*	N/A	N/A	Gravel-Directs/Smears to be taken on a later date.	KG

Comments: * For Transferable contamination and Tenelec instrument information, see attached Tenelec sheets.

N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

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RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 15-FPDP-ERWM- 0502 -S

Instrument	1		*		3		*		N/A	N/A		
	Total α		Removable α		Total β/γ		Removable β/γ		Removable α	Removable β/γ		
	dpm/100cm2		dpm/100cm2		dpm/100cm2		dpm/100cm2		cpm/LAW	cpm/LAW		
	bkg(cpm)	1.0	bkg(cpm)	*	bkg(cpm)	32	bkg(cpm)	*	bkg(cpm) N/A	bkg(cpm) N/A		
	CF:	9.69	CF:	*	CF:	27.95	CF:	*				
	Lc=	3	Lc=	*	Lc=	45	Lc=	*	Lc= N/A	Lc= N/A		
Item No.	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location	RCT Initials
76	1	<Lc	*	*	171	3885	*	*	N/A	N/A	Concrete Pad	KG
77	0	<Lc	*	*	121	2488	*	*	N/A	N/A	Concrete Pad	KG
78	3	19	*	*	43	<Lc	*	*	N/A	N/A	Concrete Pad	KG
79	0	<Lc	*	*	56	671	*	*	N/A	N/A	Concrete Pad	KG
80	3	19	*	*	484	31382	*	*	N/A	N/A	Concrete Pad	KG
							N					
								A				

Comments: * For Transferable contamination and Tenelec instrument information, see attached Tenelec sheets.

N/A

NOTE: Any response of the instrument that is ≥ Lc is considered to be above background.

Review the Identified Source Document for This Form Prior to Attempting Completion

Complete All Forms in Accordance with CP2-OP-0207

Smear Activity Report

Survey Number 15-FPDP-ERWM-0502-S 1-80

Cal Due: 4/8/16

Batch Number 14415

Batch ID: Smear Alpha Beta S5-XLB_1 - 201512150821
Group: B
Device: S5XLB_1 **Device Serial Number:** 4665
Selected Geometry: 5/16" Stainless Steel

Count Minutes: 1.0
Count Mode: Simultaneous
Operating Volts: 1380

Efficiency (%)		Weekly 24 Hour Background (cpm)		Batch Critical Level CPM		MDC (DPM)	
Alpha Efficiency	33.81 ± 0.31	Alpha Background (CPM)	0.10	Alpha Inst Lc	1	Alpha	12
Beta Efficiency	26.46 ± 0.34	Beta Background (CPM)	1.23	Beta Inst Lc	4	Beta	26

Sample ID	Alpha Total Counts	Gross Alpha CPM	Net Alpha CPM	Alpha DPM Activity	2σ	Beta Total Counts	Gross Beta CPM	Net Beta CPM	Beta DPM Activity	2σ
20151215082142-B1	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215082533-B2	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215082643-B3	1	1.00	0.90	**2.67**	5.92	4	4.00	2.77	**10**	15.12
20151215082803-B4	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215082913-B5	1	1.00	0.90	**2.67**	5.92	11	11.00	9.77	**37**	25.07
20151215083023-B6	3	3.00	2.90	**8.58**	10.25	2	2.00	0.77	**2.90**	10.69
20151215083133-B7	1	1.00	0.90	**2.67**	5.92	8	8.00	6.77	**26**	21.38
20151215083253-B8	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215083403-B9	0	0.00	-0.10	**-0.29**	0.05	57	57.00	55.77	**211**	57.07
20151215083513-B10	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215083623-B11	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215083743-B12	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215083853-B13	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215084003-B14	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215084113-B15	1	1.00	0.90	**2.67**	5.92	3	3.00	1.77	**6.68**	13.09
20151215084234-B16	0	0.00	-0.10	**-0.29**	0.05	4	4.00	2.77	**10**	15.12
20151215084344-B17	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215084454-B18	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215084614-B19	1	1.00	0.90	**2.67**	5.92	2	2.00	0.77	**2.90**	10.69
20151215084724-B20	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215084834-B21	1	1.00	0.90	**2.67**	5.92	4	4.00	2.77	**10**	15.12
20151215084944-B22	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215085104-B23	3	3.00	2.90	**8.58**	10.25	7	7.00	5.77	**22**	20.00
20151215085214-B24	1	1.00	0.90	**2.67**	5.92	5	5.00	3.77	**14**	16.90
20151215085324-B25	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215085434-B26	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215085554-B27	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56

Smear Activity Report

Survey Number 15-FPDP-ERWM-0502-S 1-80

Batch Number 14415

Cal Due: 4/8/16

Efficiency (%)		Weekly 24 Hour Background (cpm)		Batch Critical Level CPM		MDC (DPM)	
Alpha Efficiency	33.81 ± 0.31	Alpha Background (CPM)	0.10	Alpha Inst Lc	1	Alpha	12
Beta Efficiency	26.46 ± 0.34	Beta Background (CPM)	1.23	Beta Inst Lc	4	Beta	26

Sample ID	Alpha Total Counts	Gross Alpha CPM	Net Alpha CPM	Alpha DPM Activity	2σ	Beta Total Counts	Gross Beta CPM	Net Beta CPM	Beta DPM Activity	2σ
20151215085704-B28	0	0.00	-0.10	**-0.29**	0.05	5	5.00	3.77	**14**	16.90
20151215085814-B29	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215085924-B30	2	2.00	1.90	**5.62**	8.37	0	0.00	-1.23	**-4.66**	0.22
20151215090045-B31	0	0.00	-0.10	**-0.29**	0.05	7	7.00	5.77	**22**	20.00
20151215090155-B32	1	1.00	0.90	**2.67**	5.92	3	3.00	1.77	**6.68**	13.09
20151215090305-B33	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215090415-B34	1	1.00	0.90	**2.67**	5.92	1	1.00	-0.23	**-0.88**	7.56
20151215090535-B35	1	1.00	0.90	**2.67**	5.92	9	9.00	7.77	**29**	22.68
20151215090645-B36	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215090755-B37	1	1.00	0.90	**2.67**	5.92	0	0.00	-1.23	**-4.66**	0.22
20151215090905-B38	1	1.00	0.90	**2.67**	5.92	4	4.00	2.77	**10**	15.12
20151215091025-B39	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215091135-B40	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215091245-B41	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215091355-B42	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215091515-B43	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215091625-B44	1	1.00	0.90	**2.67**	5.92	7	7.00	5.77	**22**	20.00
20151215091735-B45	1	1.00	0.90	**2.67**	5.92	2	2.00	0.77	**2.90**	10.69
20151215091845-B46	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215092005-B47	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215092116-B48	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215092226-B49	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215092346-B50	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215092456-B51	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215092606-B52	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215092716-B53	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215092836-B54	2	2.00	1.90	**5.62**	8.37	0	0.00	-1.23	**-4.66**	0.22
20151215092946-B55	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215093056-B56	1	1.00	0.90	**2.67**	5.92	2	2.00	0.77	**2.90**	10.69
20151215093206-B57	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215093326-B58	0	0.00	-0.10	**-0.29**	0.05	6	6.00	4.77	**18**	18.52

Smear Activity Report

Survey Number 15-FPDP-ERWM-0502-S 1-80

Batch Number 14415

Cal Due: 4/18/16

Efficiency (%)		Weekly 24 Hour Background (cpm)		Batch Critical Level CPM		MDC (DPM)	
Alpha Efficiency	33.81 ± 0.31	Alpha Background (CPM)	0.10	Alpha Inst Lc	1	Alpha	12
Beta Efficiency	26.46 ± 0.34	Beta Background (CPM)	1.23	Beta Inst Lc	4	Beta	26

Sample ID	Alpha Total Counts	Gross Alpha CPM	Net Alpha CPM	Alpha DPM Activity	2σ	Beta Total Counts	Gross Beta CPM	Net Beta CPM	Beta DPM Activity	2σ
20151215093436-B59	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215093546-B60	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215093656-B61	0	0.00	-0.10	**-0.29**	0.05	4	4.00	2.77	**10**	15.12
20151215093816-B62	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215093927-B63	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215094036-B64	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215094147-B65	1	1.00	0.90	**2.67**	5.92	1	1.00	-0.23	**-0.88**	7.56
20151215094307-B66	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215094417-B67	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215094527-B68	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215094637-B69	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215094757-B70	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215094907-B71	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215095017-B72	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215095127-B73	0	0.00	-0.10	**-0.29**	0.05	2	2.00	0.77	**2.90**	10.69
20151215095247-B74	0	0.00	-0.10	**-0.29**	0.05	7	7.00	5.77	**22**	20.00
20151215095357-B75	0	0.00	-0.10	**-0.29**	0.05	0	0.00	-1.23	**-4.66**	0.22
20151215095507-B76	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215095617-B77	0	0.00	-0.10	**-0.29**	0.05	3	3.00	1.77	**6.68**	13.09
20151215095737-B78	1	1.00	0.90	**2.67**	5.92	5	5.00	3.77	**14**	16.90
20151215095847-B79	0	0.00	-0.10	**-0.29**	0.05	1	1.00	-0.23	**-0.88**	7.56
20151215095957-B80	1	1.00	0.90	**2.67**	5.92	5	5.00	3.77	**14**	16.90

Count Room Review: Bill Truesdell **Sampling Tech Review:** Kenneth A. Glass

RADIOLOGICAL SURVEY MAP FORM

Survey Number: 15-FPDP-ERWM-0502-S

Legend:

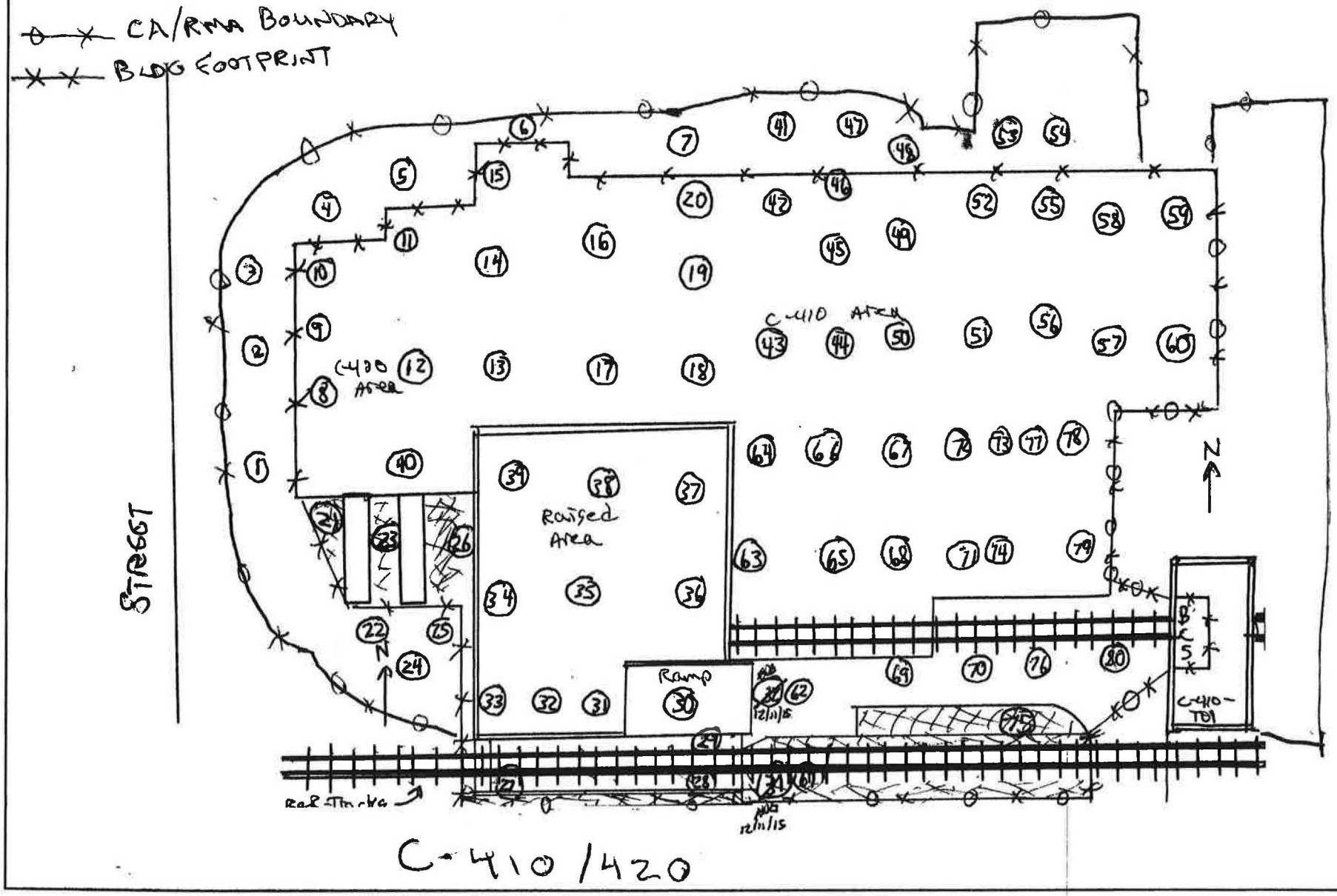
A Air Sample Location

Smear / Direct

Beta or Gamma Dose Rate

Neutron Dose Rate

LAW



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APPENDIX C

SUMP WATER AND PIT SAMPLING ANALYTICAL RESULTS

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Paducah OREIS Report for DD14-410-BSMT

410-BSMTZ53-1-CONC from: C410-Z053 on 3/12/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 53 - Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	18.9		mg/kg	U		18.9		SW846-6010B	/ X /
Barium	42.1		mg/kg			2.36		SW846-6010B	/ X /
Cadmium	1.95		mg/kg			1.89		SW846-6010B	/ X /
Chromium	8.08		mg/kg			2.36		SW846-6010B	/ X /
Lead	18.9		mg/kg	U		18.9		SW846-6010B	/ X /
Mercury	0.016		mg/kg	U		0.016		SW846-7471A	/ X /
Selenium	18.9		mg/kg	U		18.9		SW846-6010B	/ X /
Silver	2.36		mg/kg	UB		2.36		SW846-6010B	/ X /
PPCB									
PCB-1016	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1221	0.1		mg/kg	U		0.1		SW846-8082	/ X /
PCB-1232	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1242	0.05		mg/kg	U		0.05		SW846-8082	/ X /
PCB-1248	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1254	0.07		mg/kg	U		0.07		SW846-8082	/ X /
PCB-1260	0.1		mg/kg			0.08		SW846-8082	/ X /
PCB-1268	0.06		mg/kg	U		0.06		SW846-8082	/ X /
Polychlorinated biphenyl	0.1		mg/kg	U		0.1		SW846-8082	/ X /

410-BSMTZ53-1-WIPE1 from: C410-Z053 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 53 Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	1.09	0.215	pCi/sample			0.245	0.294	RL-7128	/ X /
Cesium-137	0.0643	0.129	pCi/sample	U		1.94	1.07	RL-7124	/ X /
Neptunium-237	0.739	0.202	pCi/sample			0.374	0.278	RL-7128	/ X /
Plutonium-238	0.151	0.098	pCi/sample			0.138	0.112	RL-7128	/ X /
Plutonium-239/240	6.87	0.562	pCi/sample			0.137	1.47	RL-7128	/ X /
Strontium-90	0.902	0.185	pCi/sample	BU		5.31	0.294	RL-7140	/ X /
Technetium-99	75.8	4.21	pCi/sample			3.98	5.74	RL-7100	/ X /
Thorium-230	25.4	1.18	pCi/sample			1.13	4.48	RL-7128	/ X /
Thorium-232	0.156	0.126	pCi/sample	U		0.433	0.2	RL-7128	/ X /
Uranium-234	1050	13.7	pCi/sample	T		1.37	221	RL-7128	/ X /
Uranium-235	52.2	3.39	pCi/sample	T		0.385	11.5	RL-7128	/ X /
Uranium-238	1090	13.9	pCi/sample	T		0.587	230	RL-7128	/ X /

*Verification/Validation/Assessment

410-BSMTZ53-1-WIPE2 from: C410-Z053 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 53 Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	9.75	0.647	pCi/sample			0.246	1.73	RL-7128	/ X /
Cesium-137	3.72	1.36	pCi/sample			1.86	1.44	RL-7124	/ X /
Neptunium-237	6.15	0.547	pCi/sample			0.342	1.28	RL-7128	/ X /
Plutonium-238	1.42	0.259	pCi/sample			0.136	0.374	RL-7128	/ X /
Plutonium-239/240	43.2	1.43	pCi/sample			0.142	8.19	RL-7128	/ X /
Strontium-90	1.3	0.258	pCi/sample	BU		4.81	0.419	RL-7140	/ X /
Technetium-99	231	6.35	pCi/sample			3.98	13.5	RL-7100	/ X /
Thorium-230	513	4.94	pCi/sample			1.11	84.3	RL-7128	/ X /
Thorium-232	2.52	0.346	pCi/sample			0.401	0.562	RL-7128	/ X /
Uranium-234	612	8.97	pCi/sample			1.14	121	RL-7128	/ X /
Uranium-235	30.2	2.21	pCi/sample			0.348	6.36	RL-7128	/ X /
Uranium-238	640	9.15	pCi/sample			0.533	127	RL-7128	/ X /

410-BSMTZ53-2-CONC from: C410-Z053 on 3/12/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 53 - Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	19.4		mg/kg	U		19.4		SW846-6010B	/ X /
Barium	62.6		mg/kg			2.42		SW846-6010B	/ X /
Cadmium	1.94		mg/kg	U		1.94		SW846-6010B	/ X /
Chromium	7.66		mg/kg			2.42		SW846-6010B	/ X /
Lead	19.4		mg/kg	U		19.4		SW846-6010B	/ X /
Mercury	0.02		mg/kg			0.016		SW846-7471A	/ X /
Selenium	19.4		mg/kg	U		19.4		SW846-6010B	/ X /
Silver	2.42		mg/kg	UB		2.42		SW846-6010B	/ X /
PPCB									
PCB-1016	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1221	0.1		mg/kg	U		0.1		SW846-8082	/ X /
PCB-1232	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1242	0.05		mg/kg	U		0.05		SW846-8082	/ X /
PCB-1248	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1254	0.07		mg/kg	U		0.07		SW846-8082	/ X /
PCB-1260	0.2		mg/kg			0.08		SW846-8082	/ X /
PCB-1268	0.06		mg/kg	U		0.06		SW846-8082	/ X /
Polychlorinated biphenyl	0.2		mg/kg			0.1		SW846-8082	/ X /

*Verification/Validation/Assessment

410-BSMTZ53-2-CONCD from: C410-Z053 on 3/12/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 53 - Survey Unit 2, Duplicate

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	19.2		mg/kg	U		19.2		SW846-6010B	/ X /
Barium	55.5		mg/kg			2.4		SW846-6010B	/ X /
Cadmium	1.92		mg/kg	U		1.92		SW846-6010B	/ X /
Chromium	8.06		mg/kg			2.4		SW846-6010B	/ X /
Lead	19.2		mg/kg	U		19.2		SW846-6010B	/ X /
Mercury	0.016		mg/kg	U		0.016		SW846-7471A	/ X /
Selenium	19.2		mg/kg	U		19.2		SW846-6010B	/ X /
Silver	2.4		mg/kg	UB		2.4		SW846-6010B	/ X /
PPCB									
PCB-1016	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1221	0.1		mg/kg	U		0.1		SW846-8082	/ X /
PCB-1232	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1242	0.05		mg/kg	U		0.05		SW846-8082	/ X /
PCB-1248	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1254	0.07		mg/kg	U		0.07		SW846-8082	/ X /
PCB-1260	0.12		mg/kg			0.08		SW846-8082	/ X /
PCB-1268	0.06		mg/kg	U		0.06		SW846-8082	/ X /
Polychlorinated biphenyl	0.12		mg/kg			0.1		SW846-8082	/ X /

410-BSMTZ53-2-WIPE1 from: C410-Z053 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 53 Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.143	0.0934	pCi/sample	U		0.253	0.134	RL-7128	/ X /
Cesium-137	0.506	1.01	pCi/sample	U		2.01	1.21	RL-7124	/ X /
Neptunium-237	0.18	0.12	pCi/sample	U		0.354	0.175	RL-7128	/ X /
Plutonium-238	0.0212	0.0342	pCi/sample	U		0.138	0.0561	RL-7128	/ X /
Plutonium-239/240	0.773	0.193	pCi/sample			0.138	0.245	RL-7128	/ X /
Strontium-90	0.786	0.162	pCi/sample	BU		5.2	0.257	RL-7140	/ X /
Technetium-99	50.9	3.76	pCi/sample			3.98	4.58	RL-7100	/ X /
Thorium-230	3.14	0.412	pCi/sample			1.11	0.832	RL-7128	/ X /
Thorium-232	-0.00373	0.00364	pCi/sample	U		0.4	0.157	RL-7128	/ X /
Uranium-234	729	10.8	pCi/sample	T		1.21	152	RL-7128	/ X /
Uranium-235	36.6	2.68	pCi/sample	T		0.345	8.09	RL-7128	/ X /
Uranium-238	764	11	pCi/sample	T		0.597	160	RL-7128	/ X /

*Verification/Validation/Assessment

410-BSMTZ53-2-WIPE2 from: C410-Z053 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 53 Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.415	0.144	pCi/sample			0.25	0.185	RL-7128	/ X /
Cesium-137	1.05	2.1	pCi/sample	U		2.14	2.1	RL-7124	/ X /
Neptunium-237	0.596	0.171	pCi/sample			0.331	0.237	RL-7128	/ X /
Plutonium-238	0.0504	0.0477	pCi/sample	U		0.133	0.0659	RL-7128	/ X /
Plutonium-239/240	1.73	0.272	pCi/sample			0.131	0.419	RL-7128	/ X /
Strontium-90			pCi/sample	BX	X			RL-7140	/ X /
Technetium-99	67.5	4.07	pCi/sample			3.98	5.35	RL-7100	/ X /
Thorium-230	13.8	0.834	pCi/sample			1.12	2.6	RL-7128	/ X /
Thorium-232	0.0815	0.0794	pCi/sample	U		0.409	0.168	RL-7128	/ X /
Uranium-234	224	3.85	pCi/sample			1.03	39.6	RL-7128	/ X /
Uranium-235	11.5	0.968	pCi/sample			0.218	2.24	RL-7128	/ X /
Uranium-238	233	3.92	pCi/sample			0.457	41.3	RL-7128	/ X /

410-BSMTZ54-1-CONC from: C410-Z054 on 3/11/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 54 - Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Barium	34.9		mg/kg			2.46		SW846-6010B	/ X /
Cadmium	1.97		mg/kg	U		1.97		SW846-6010B	/ X /
Chromium	8.49		mg/kg			2.46		SW846-6010B	/ X /
Lead	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Mercury	0.016		mg/kg	U		0.016		SW846-7471A	/ X /
Selenium	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Silver	2.46		mg/kg	UB		2.46		SW846-6010B	/ X /
PPCB									
PCB-1016	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1221	0.1		mg/kg	U		0.1		SW846-8082	/ X /
PCB-1232	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1242	0.05		mg/kg	U		0.05		SW846-8082	/ X /
PCB-1248	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1254	0.07		mg/kg	U		0.07		SW846-8082	/ X /
PCB-1260	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1268	0.06		mg/kg	U		0.06		SW846-8082	/ X /
Polychlorinated biphenyl	0.1		mg/kg	U		0.1		SW846-8082	/ X /

*Verification/Validation/Assessment

410-BSMTZ54-1-WIPE1 from: C410-Z054 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 54 Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.297	0.123	pCi/sample			0.249	0.163	RL-7128	/ X /
Cesium-137	-0.473	0.945	pCi/sample	U		1.57	0.945	RL-7124	/ X /
Neptunium-237	0.515	0.2	pCi/sample			0.369	0.255	RL-7128	/ X /
Plutonium-238	0.0122	0.0305	pCi/sample	U		0.154	0.0626	RL-7128	/ X /
Plutonium-239/240	1.08	0.243	pCi/sample			0.158	0.322	RL-7128	/ X /
Strontium-90			pCi/sample	BX	X			RL-7140	/ X /
Technetium-99	44.7	3.64	pCi/sample			3.98	4.3	RL-7100	/ X /
Thorium-230	12.9	0.845	pCi/sample			1.12	2.48	RL-7128	/ X /
Thorium-232	0.069	0.0877	pCi/sample	U		0.402	0.177	RL-7128	/ X /
Uranium-234	183	3.48	pCi/sample			1.02	33.1	RL-7128	/ X /
Uranium-235	9.67	0.888	pCi/sample			0.205	1.96	RL-7128	/ X /
Uranium-238	200	3.62	pCi/sample			0.438	36.2	RL-7128	/ X /

410-BSMTZ54-1-WIPE2 from: C410-Z054 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 54 Survey Unit 1

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.18	0.0984	pCi/sample	U		0.255	0.139	RL-7128	/ X /
Cesium-137	1.2	2.41	pCi/sample	U		2.22	2.41	RL-7124	/ X /
Neptunium-237	0.413	0.134	pCi/sample			0.351	0.197	RL-7128	/ X /
Plutonium-238	0.0295	0.0376	pCi/sample	U		0.134	0.0584	RL-7128	/ X /
Plutonium-239/240	1.05	0.216	pCi/sample			0.128	0.292	RL-7128	/ X /
Strontium-90			pCi/sample	BX	X			RL-7140	/ X /
Technetium-99	46.8	3.68	pCi/sample			3.98	4.39	RL-7100	/ X /
Thorium-230	7.35	0.591	pCi/sample			1.15	1.49	RL-7128	/ X /
Thorium-232	0.0389	0.0844	pCi/sample	U		0.402	0.176	RL-7128	/ X /
Uranium-234	295	4.8	pCi/sample			1.04	53.1	RL-7128	/ X /
Uranium-235	15.2	1.21	pCi/sample			0.223	2.98	RL-7128	/ X /
Uranium-238	313	4.93	pCi/sample			0.458	56.3	RL-7128	/ X /

*Verification/Validation/Assessment

410-BSMTZ54-2-CONC from: C410-Z054 on 3/11/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 54 - Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Barium	50.4		mg/kg			2.46		SW846-6010B	/ X /
Cadmium	1.97		mg/kg	U		1.97		SW846-6010B	/ X /
Chromium	6.97		mg/kg			2.46		SW846-6010B	/ X /
Lead	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Mercury	0.026		mg/kg			0.017		SW846-7471A	/ X /
Selenium	19.7		mg/kg	U		19.7		SW846-6010B	/ X /
Silver	2.46		mg/kg	UB		2.46		SW846-6010B	/ X /
PPCB									
PCB-1016	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1221	0.1		mg/kg	U		0.1		SW846-8082	/ X /
PCB-1232	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1242	0.05		mg/kg	U		0.05		SW846-8082	/ X /
PCB-1248	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1254	0.07		mg/kg	U		0.07		SW846-8082	/ X /
PCB-1260	0.08		mg/kg	U		0.08		SW846-8082	/ X /
PCB-1268	0.06		mg/kg	U		0.06		SW846-8082	/ X /
Polychlorinated biphenyl	0.1		mg/kg	U		0.1		SW846-8082	/ X /

410-BSMTZ54-2-WIPE1 from: C410-Z054 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 54 Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.347	0.133	pCi/sample			0.252	0.173	RL-7128	/ X /
Cesium-137	0.261	0.522	pCi/sample	U		2	1.08	RL-7124	/ X /
Neptunium-237	1.64	0.301	pCi/sample			0.34	0.451	RL-7128	/ X /
Plutonium-238	0.0369	0.0552	pCi/sample	U		0.14	0.0712	RL-7128	/ X /
Plutonium-239/240	1.78	0.3	pCi/sample			0.144	0.453	RL-7128	/ X /
Strontium-90	0.0815	0.0176	pCi/sample	BU		4.85	0.0271	RL-7140	/ X /
Technetium-99	37	3.48	pCi/sample			3.98	3.97	RL-7100	/ X /
Thorium-230	8.64	0.687	pCi/sample			1.13	1.74	RL-7128	/ X /
Thorium-232	-0.0412	0.0714	pCi/sample	U		0.43	0.178	RL-7128	/ X /
Uranium-234	150	2.99	pCi/sample			1.02	26.4	RL-7128	/ X /
Uranium-235	7.98	0.765	pCi/sample			0.204	1.6	RL-7128	/ X /
Uranium-238	178	3.24	pCi/sample			0.433	31.3	RL-7128	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-BSMT

410-BSMTZ54-2-WIPE2 from: C410-Z054 on 3/7/2014 Media: SW SmpMethod: GR

Comments: Rad Wipe of Zone 54 Survey Unit 2

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	0.559	0.16	pCi/sample			0.246	0.209	RL-7128	/ X /
Cesium-137	2.84	2.18	pCi/sample			1.78	2.21	RL-7124	/ X /
Neptunium-237	1.16	0.226	pCi/sample			0.348	0.332	RL-7128	/ X /
Plutonium-238	0.0985	0.0642	pCi/sample	U		0.136	0.0801	RL-7128	/ X /
Plutonium-239/240	2.24	0.303	pCi/sample			0.136	0.509	RL-7128	/ X /
Strontium-90	0.707	0.146	pCi/sample	BU		4.81	0.231	RL-7140	/ X /
Technetium-99	100	4.61	pCi/sample			3.98	6.91	RL-7100	/ X /
Thorium-230	22.4	1.01	pCi/sample			1.11	4.08	RL-7128	/ X /
Thorium-232	0.138	0.0991	pCi/sample	U		0.391	0.185	RL-7128	/ X /
Uranium-234	295	5.03	pCi/sample			1.06	54	RL-7128	/ X /
Uranium-235	15.2	1.27	pCi/sample			0.256	3.04	RL-7128	/ X /
Uranium-238	319	5.21	pCi/sample			0.464	58.3	RL-7128	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-BSMT2

410-BSMTZ22-CONC from: C410-Z022 on 6/20/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 22

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	2.6		mg/kg	J		5		SW846-6010C	/ X /
Barium	59		mg/kg			25		SW846-6010C	/ X /
Cadmium	0.45		mg/kg	J		2.5		SW846-6010C	/ X /
Chromium	20		mg/kg			5		SW846-6010C	/ X /
Lead	8.8		mg/kg	B		5		SW846-6010C	/ X /
Mercury	0.52		mg/kg			0.031		SW846-7471	/ X /
Selenium	7.4		mg/kg	U		7.4		SW846-6010C	/ X /
Silver	5		mg/kg	U		5		SW846-6010C	/ X /
PPCB									
PCB-1016	9		ug/kg	U		34		SW846-8082A	/ X /
PCB-1221	9		ug/kg	U		34		SW846-8082A	/ X /
PCB-1232	9		ug/kg	U		34		SW846-8082A	/ X /
PCB-1242	9		ug/kg	U		34		SW846-8082A	/ X /
PCB-1248	9		ug/kg	U		34		SW846-8082A	/ X /
PCB-1254	420		ug/kg	X		34		SW846-8082A	/ X /
PCB-1260	500		ug/kg			34		SW846-8082A	/ X /
PCB-1268	5.7		ug/kg	U		34		SW846-8082A	/ X /
Polychlorinated biphenyl	920		ug/kg			34		SW846-8082A	/ X /

410-BSMTZ22-WIPE1 from: C410-Z022 on 6/23/2014 Media: SW SmpMethod: GR

Comments: Zone 22 Location 8 Rad Wipe

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	2.21	0.423	pCi/Sampl			0.152	0.488	A-01-R	/ X /
Cesium-137	0	4.27	pCi/Sampl	U		8.03	4.27	GA-01-R	/ X /
Neptunium-237	2.5	0.468	pCi/Sampl			0.314	0.513	A-01-R	/ X /
Plutonium-238	0.492	0.196	pCi/Sampl			0.139	0.201	A-01-R	/ X /
Plutonium-239/240	13.2	0.986	pCi/Sampl			0.175	1.49	A-01-R	/ X /
Strontium-90	0.913	1.33	pCi/Sampl	U		2.22	1.33	DOE SR-03-RC MOD	/ X /
Technetium-99	299	11.3	pCi/Sampl			9.21	30.9	HASL 300, TC-02-RC	/ X /
Thorium-230	35.1	1.63	pCi/Sampl			0.182	3.37	A-01-R	/ X /
Thorium-232	0.244	0.173	pCi/Sampl			0.233	0.174	A-01-R	/ X /
Uranium-234	232	5.49	pCi/Sampl			0.248	20.3	A-01-R	/ X /
Uranium-235	14.2	1.52	pCi/Sampl			0.309	1.93	A-01-R	/ X /
Uranium-238	239	5.56	pCi/Sampl			0.398	20.8	A-01-R	/ X /

*Verification/Validation/Assessment

410-BSMTZ22-WIPE2 from: C410-Z022 on 6/23/2014 Media: SW SmpMethod: GR

Comments: Zone 22 Location 11 Rad Wipe

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	86.7	2.48	pCi/Sampl			0.136	9.85	A-01-R	/ X /
Cesium-137	2.79	6.66	pCi/Sampl	U		11.5	6.67	GA-01-R	/ X /
Neptunium-237	64.8	2.02	pCi/Sampl			0.151	5.81	A-01-R	/ X /
Plutonium-238	20	1.27	pCi/Sampl			0.266	2.11	A-01-R	/ X /
Plutonium-239/240	840	8.17	pCi/Sampl			0.0596	71	A-01-R	/ X /
Strontium-90	1.49	1.25	pCi/Sampl	U		2.01	1.25	DOE SR-03-RC MOD	/ X /
Technetium-99	13000	195	pCi/Sampl			22.4	1260	HASL 300, TC-02-RC	/ X /
Thorium-230	818	7.99	pCi/Sampl			0.345	69.2	A-01-R	/ X /
Thorium-232	6.52	0.715	pCi/Sampl			0.167	0.901	A-01-R	/ X /
Uranium-234	9430	401	pCi/Sampl			12.8	888	A-01-R	/ X /
Uranium-235	557	111	pCi/Sampl			50.8	120	A-01-R	/ X /
Uranium-238	9310	399	pCi/Sampl			52.3	878	A-01-R	/ X /

410-BSMTZ22-WIPE2D from: C410-Z022 on 6/23/2014 Media: SW SmpMethod: GR

Comments: Zone 22 Location 11 Rad Wipe - Duplicate

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	203	3.82	pCi/Sampl			0.173	22.6	A-01-R	/ X /
Cesium-137	5.13	7.75	pCi/Sampl	U		12.9	7.77	GA-01-R	/ X /
Neptunium-237	107	2.38	pCi/Sampl			0.177	9.31	A-01-R	/ X /
Plutonium-238	39.6	1.74	pCi/Sampl			0.29	3.75	A-01-R	/ X /
Plutonium-239/240	1600	11	pCi/Sampl			0.182	135	A-01-R	/ X /
Strontium-90	11.6	1.67	pCi/Sampl			1.82	1.92	DOE SR-03-RC MOD	/ X /
Technetium-99	26200	394	pCi/Sampl			31.6	2550	HASL 300, TC-02-RC	/ X /
Thorium-230	1250	10.1	pCi/Sampl			0.157	105	A-01-R	/ X /
Thorium-232	8.6	0.839	pCi/Sampl			0.0614	1.11	A-01-R	/ X /
Uranium-234	19000	574	pCi/Sampl			53.3	1690	A-01-R	/ X /
Uranium-235	1080	154	pCi/Sampl			51.6	179	A-01-R	/ X /
Uranium-238	19800	586	pCi/Sampl			53.2	1770	A-01-R	/ X /

410-BSMTZ26/28-WIPE1 from: C410-Z026 on 5/8/2014 Media: SW SmpMethod: GR

Comments: Zone 26 Location 14 Rad Wipe

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	17.9	1.18	pCi/Sampl			0.148	2.3	A-01-R	/ X /
Cesium-137	42.1	12	pCi/Sampl			9.92	12.7	GA-01-R	/ X /
Neptunium-237	22.1	1.24	pCi/Sampl			0.166	2.23	A-01-R	/ X /
Plutonium-238	2.62	0.461	pCi/Sampl			0.253	0.511	A-01-R	/ X /
Plutonium-239/240	109	2.87	pCi/Sampl			0.145	9.57	A-01-R	/ X /
Strontium-90	22.2	2.21	pCi/Sampl			2.12	2.87	DOE SR-03-RC MOD	/ X /
Technetium-99	4570	69.4	pCi/Sampl			13.9	444	HASL 300, TC-02-RC	/ X /
Thorium-230	97.3	2.78	pCi/Sampl			0.267	8.63	A-01-R	/ X /
Thorium-232	0.622	0.242	pCi/Sampl			0.219	0.248	A-01-R	/ X /
Uranium-234	8350	368	pCi/Sampl			30.9	792	A-01-R	/ X /
Uranium-235	543	107	pCi/Sampl			48.2	116	A-01-R	/ X /
Uranium-238	8940	380	pCi/Sampl			38.7	841	A-01-R	/ X /

*Verification/Validation/Assessment

410-BSMTZ26/28-WIPE2 from: C410-Z026 on 5/8/2014 Media: SW SmpMethod: GR

Comments: Zone 26 Location 27 Rad Wipe

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Americium-241	71.7	2.35	pCi/Sampl			0.236	8.22	A-01-R	/ X /
Cesium-137	56.6	11.5	pCi/Sampl			4.3	12.9	GA-01-R	/ X /
Neptunium-237	49.7	1.75	pCi/Sampl			0.188	4.52	A-01-R	/ X /
Plutonium-238	11.8	0.957	pCi/Sampl			0.273	1.38	A-01-R	/ X /
Plutonium-239/240	506	6.2	pCi/Sampl			0.21	42.9	A-01-R	/ X /
Strontium-90	40.3	2.74	pCi/Sampl			1.97	4.3	DOE SR-03-RC MOD	/ X /
Technetium-99	6340	95.7	pCi/Sampl			15.8	616	HASL 300, TC-02-RC	/ X /
Thorium-230	738	7.55	pCi/Sampl			0.185	62.4	A-01-R	/ X /
Thorium-232	3.95	0.551	pCi/Sampl			0.0577	0.643	A-01-R	/ X /
Uranium-234	7320	351	pCi/Sampl			55.9	708	A-01-R	/ X /
Uranium-235	405	95.2	pCi/Sampl			57.4	101	A-01-R	/ X /
Uranium-238	7690	358	pCi/Sampl			46	738	A-01-R	/ X /

410-BSMTZ26-CONC from: C410-Z026 on 5/12/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 26

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	4		mg/kg	J		4.5		SW846-6010C	/ X /
Barium	39		mg/kg			22		SW846-6010C	/ X /
Cadmium	1.9		mg/kg	J		2.2		SW846-6010C	/ X /
Chromium	14		mg/kg			4.5		SW846-6010C	/ X /
Lead	26		mg/kg	B		4.5		SW846-6010C	/ X /
Mercury	0.33		mg/kg			0.032		SW846-7471	T / X /
Selenium	6.7		mg/kg	U		6.7		SW846-6010C	/ X /
Silver	4.5		mg/kg	U		4.5		SW846-6010C	/ X /
PPCB									
PCB-1016	36		ug/kg	U		130		SW846-8082A	/ X /
PCB-1221	36		ug/kg	U		130		SW846-8082A	/ X /
PCB-1232	36		ug/kg	U		130		SW846-8082A	/ X /
PCB-1242	36		ug/kg	U		130		SW846-8082A	/ X /
PCB-1248	36		ug/kg	U		130		SW846-8082A	/ X /
PCB-1254	680		ug/kg	X		130		SW846-8082A	/ X /
PCB-1260	1200		ug/kg			130		SW846-8082A	/ X /
PCB-1268	22		ug/kg	U		130		SW846-8082A	/ X /
Polychlorinated biphenyl	1900		ug/kg			130		SW846-8082A	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-BSMT2

410-BSMTZ28-CONC from: C410-Z028 on 5/12/2014 Media: SC SmpMethod: GR

Comments: Concrete borings from floor, Zone 28

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	3.3		mg/kg	J		4.6		SW846-6010C	/ X /
Barium	92		mg/kg			23		SW846-6010C	/ X /
Cadmium	0.59		mg/kg	J		2.3		SW846-6010C	/ X /
Chromium	11		mg/kg			4.6		SW846-6010C	/ X /
Lead	5.2		mg/kg	B		4.6		SW846-6010C	/ X /
Mercury	3.3		mg/kg			0.31		SW846-7471	T / X /
Selenium	6.8		mg/kg	U		6.8		SW846-6010C	/ X /
Silver	4.6		mg/kg	U		4.6		SW846-6010C	/ X /
PPCB									
PCB-1016	8.8		ug/kg	U		33		SW846-8082A	/ X /
PCB-1221	8.8		ug/kg	U		33		SW846-8082A	/ X /
PCB-1232	8.8		ug/kg	U		33		SW846-8082A	/ X /
PCB-1242	8.8		ug/kg	U		33		SW846-8082A	/ X /
PCB-1248	8.8		ug/kg	U		33		SW846-8082A	/ X /
PCB-1254	340		ug/kg			33		SW846-8082A	/ X /
PCB-1260	290		ug/kg			33		SW846-8082A	/ X /
PCB-1268	5.6		ug/kg	U		33		SW846-8082A	/ X /
Polychlorinated biphenyl	630		ug/kg			33		SW846-8082A	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ22-01 from: C410-Z022 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH 6-7 range. JS 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00475		mg/L			0.002		EPA-200.8	/ = /
Uranium	1.35		mg/L			0.0002		EPA-200.8	/ = /
METAL-D									
Uranium, Dissolved	0.0978		mg/L			0.0002		EPA-200.8	/ = /
PPCB									
PCB-1016	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1221	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1232	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1242	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1248	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1254	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1260	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1268	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
Polychlorinated biphenyl	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
RADS									
Americium-241	-0.233	1.03	pCi/L	U		2.69	1.03	HASL 300, Am-05-RC	/ = /
Cesium-137	12.7	6.49	pCi/L			11.1	6.58	EPA-901.1	/ = /
Dissolved Alpha	-42.6	22.8	pCi/L	U		9.34	34.4	EPA-900.0	/ = /
Dissolved Beta	24300	166	pCi/L			7.04	3920	EPA-900.0	/ = /
Neptunium-237	1.29	1.76	pCi/L	U		2.4	1.77	Alpha Spectroscopy	/ = /
Plutonium-238	-0.271	1.2	pCi/L	U		3.13	1.2	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	0.724	1.99	pCi/L	U		3.45	1.99	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	644	40	pCi/L			6.9	114	EPA-900.0	/ = /
Suspended Beta	607	31.9	pCi/L			9.02	118	EPA-900.0	/ = /
Technetium-99	36800	724	pCi/L			90.1	4130	HASL 300, Tc-02-RC	/ = /
Thorium-230	3.38	2.77	pCi/L	U		3.63	2.85	HASL 300, Th-01-RC	/ = /
Thorium-232	0.51	1.35	pCi/L	U		2.23	1.35	HASL 300, Th-01-RC	/ = /
Total Uranium	362	24.1	pCi/L			4.6	47.7	HASL 300, U-02-RC M	/ = /
Uranium-234	180	16.9	pCi/L			2.52	34	HASL 300, U-02-RC M	/ = /
Uranium-235	7.27	4.02	pCi/L			3.11	4.19	HASL 300, U-02-RC M	/ = /
Uranium-238	175	16.7	pCi/L			2.28	33.1	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ22-02 from: C410-Z022 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH 6-7 Range. JS 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00499		mg/L			0.002		EPA-200.8	/ = /
Uranium	0.567		mg/L			0.0002		EPA-200.8	/ = /
METAL-D									
Uranium, Dissolved	0.0872		mg/L			0.0002		EPA-200.8	/ = /
PPCB									
PCB-1016	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1221	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1232	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1242	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1248	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1254	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1260	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1268	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
Polychlorinated biphenyl	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
RADS									
Americium-241	-0.123	1.06	pCi/L	U		2.46	1.06	HASL 300, Am-05-RC	/ = /
Cesium-137	14.2	7.44	pCi/L	U		15.6	9.9	EPA-901.1	/ = /
Dissolved Alpha	20.5	8.21	pCi/L			6.88	9.47	EPA-900.0	/ = /
Dissolved Beta	20500	123	pCi/L			8.23	3390	EPA-900.0	/ = /
Neptunium-237	-0.294	1.33	pCi/L	U		3.35	1.33	Alpha Spectroscopy	/ = /
Plutonium-238	0.254	1.41	pCi/L	U		2.71	1.41	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	1.49	2.2	pCi/L	U		3.22	2.21	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	633	38.6	pCi/L			7.49	110	EPA-900.0	/ = /
Suspended Beta	651	29.8	pCi/L			6.29	113	EPA-900.0	/ = /
Technetium-99	38200	745	pCi/L			81	4290	HASL 300, Tc-02-RC	/ = /
Thorium-230	7.44	3.87	pCi/L			4.06	4.08	HASL 300, Th-01-RC	/ = /
Thorium-232	0.55	1.45	pCi/L	U		2.38	1.45	HASL 300, Th-01-RC	/ = /
Total Uranium	863	37	pCi/L			4.6	105	HASL 300, U-02-RC M	/ = /
Uranium-234	442	26.4	pCi/L			3.18	76.9	HASL 300, U-02-RC M	/ = /
Uranium-235	16.6	5.81	pCi/L			2.43	6.41	HASL 300, U-02-RC M	/ = /
Uranium-238	404	25.3	pCi/L			2.27	70.7	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ22-03 from: C410-Z022 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH 6-7 Range. JS 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00663		mg/L			0.002		EPA-200.8	/ J /
Uranium	0.436		mg/L			0.0002		EPA-200.8	/ J /
METAL-D									
Uranium, Dissolved	0.0576		mg/L			0.0002		EPA-200.8	/ J /
PPCB									
PCB-1016	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1221	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1232	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1242	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1248	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1254	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1260	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
PCB-1268	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
Polychlorinated biphenyl	0.0943		ug/L	U		0.0943		SW846-8082	/ = /
RADS									
Americium-241	0.727	1.43	pCi/L	U		1.98	1.43	HASL 300, Am-05-RC	/ = /
Cesium-137	6.27	6.68	pCi/L	U		13.2	7.28	EPA-901.1	/ UJ /
Dissolved Alpha	17.7	9.72	pCi/L			9.41	11	EPA-900.0	/ = /
Dissolved Beta	21700	137	pCi/L			9.79	3530	EPA-900.0	/ = /
Neptunium-237	0.278	1.96	pCi/L	U		4.02	1.96	Alpha Spectroscopy	/ = /
Plutonium-238	0.901	1.3	pCi/L	U		1.57	1.3	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	2.22	1.96	pCi/L	U		2.29	1.98	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	115	15.8	pCi/L			8.03	24.8	EPA-900.0	/ = /
Suspended Beta	282	18.7	pCi/L			9.91	51.6	EPA-900.0	/ = /
Technetium-99	37100	727	pCi/L			80.4	4160	HASL 300, Tc-02-RC	/ = /
Thorium-230	4.47	3.45	pCi/L	U		4.56	3.6	HASL 300, Th-01-RC	/ = /
Thorium-232	-0.0194	2.44	pCi/L	U		5.13	2.44	HASL 300, Th-01-RC	/ = /
Total Uranium	256	19.7	pCi/L			3.57	34.1	HASL 300, U-02-RC M	/ J /
Uranium-234	118	13.4	pCi/L			2.39	23.3	HASL 300, U-02-RC M	/ J /
Uranium-235	12.4	4.42	pCi/L			1.88	4.85	HASL 300, U-02-RC M	/ J /
Uranium-238	125	13.7	pCi/L			1.87	24.4	HASL 300, U-02-RC M	/ J /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ22-03D from: C410-Z022 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater, Duplicate pH Range 6-7. JS 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00387		mg/L			0.002		EPA-200.8	/ J /
Uranium	0.317		mg/L			0.0002		EPA-200.8	/ J /
METAL-D									
Uranium, Dissolved	0.0756		mg/L			0.0002		EPA-200.8	/ J /
PPCB									
PCB-1016	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1221	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1232	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1242	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1248	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1254	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1260	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1268	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
Polychlorinated biphenyl	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
RADS									
Americium-241	0.643	1.69	pCi/L	U		3.05	1.7	HASL 300, Am-05-RC	/ = /
Cesium-137	17.4	9.62	pCi/L			11.4	9.74	EPA-901.1	/ J /
Dissolved Alpha	20.3	10.4	pCi/L			9.47	11.6	EPA-900.0	/ = /
Dissolved Beta	24900	157	pCi/L			7.15	4140	EPA-900.0	/ = /
Neptunium-237	-0.489	0.926	pCi/L	U		2.86	0.927	Alpha Spectroscopy	/ = /
Plutonium-238	0.665	1.83	pCi/L	U		3.17	1.83	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	1.18	2.09	pCi/L	U		3.17	2.1	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	116	14.7	pCi/L			7.22	24.5	EPA-900.0	/ = /
Suspended Beta	243	15.9	pCi/L			9.88	45.8	EPA-900.0	/ = /
Technetium-99	36300	709	pCi/L			78.1	4070	HASL 300, Tc-02-RC	/ = /
Thorium-230	3.67	2.51	pCi/L			2.87	2.63	HASL 300, Th-01-RC	/ = /
Thorium-232	-0.176	0.693	pCi/L	U		1.85	0.695	HASL 300, Th-01-RC	/ = /
Total Uranium	166	14.7	pCi/L			4.39	22.9	HASL 300, U-02-RC M	/ J /
Uranium-234	83.1	10.4	pCi/L			2.79	16.6	HASL 300, U-02-RC M	/ J /
Uranium-235	5.86	2.95	pCi/L			2.47	3.09	HASL 300, U-02-RC M	/ J /
Uranium-238	76.7	9.95	pCi/L			2.33	15.5	HASL 300, U-02-RC M	/ J /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ26-01 from: C410-Z026 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH 6-7 Range. Brad Brown 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00585		mg/L			0.002		EPA-200.8	/ = /
Uranium	0.948		mg/L			0.0002		EPA-200.8	/ = /
METAL-D									
Uranium, Dissolved	0.0676		mg/L			0.0002		EPA-200.8	/ = /
PPCB									
PCB-1016	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1221	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1232	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1242	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1248	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1254	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1260	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1268	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
Polychlorinated biphenyl	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
RADS									
Americium-241	-0.252	1.14	pCi/L	U		2.88	1.14	HASL 300, Am-05-RC	/ = /
Cesium-137	12.6	7.22	pCi/L			9.14	7.3	EPA-901.1	/ = /
Dissolved Alpha	107	19.2	pCi/L			9.53	27.8	EPA-900.0	/ = /
Dissolved Beta	25400	160	pCi/L			7.7	4160	EPA-900.0	/ = /
Neptunium-237	-0.073	1.1	pCi/L	U		2.56	1.1	Alpha Spectroscopy	/ = /
Plutonium-238	-0.163	0.723	pCi/L	U		1.89	0.724	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	0.708	1.57	pCi/L	U		2.75	1.57	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	161	17.9	pCi/L			7.45	32.1	EPA-900.0	/ = /
Suspended Beta	293	17.9	pCi/L			9.97	53.5	EPA-900.0	/ = /
Technetium-99	37500	727	pCi/L			78.7	4200	HASL 300, Tc-02-RC	/ = /
Thorium-230	5.36	2.72	pCi/L			2.54	2.91	HASL 300, Th-01-RC	/ = /
Thorium-232	-0.16	0.621	pCi/L	U		1.66	0.623	HASL 300, Th-01-RC	/ = /
Total Uranium	511	25	pCi/L			3.33	59.2	HASL 300, U-02-RC M	/ = /
Uranium-234	233	16.9	pCi/L			2.09	39.6	HASL 300, U-02-RC M	/ = /
Uranium-235	18.2	4.81	pCi/L			2.1	5.56	HASL 300, U-02-RC M	/ = /
Uranium-238	260	17.8	pCi/L			1.52	43.7	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ26-02 from: C410-Z026 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH Range 6-7 Range. BB 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00574		mg/L			0.002		EPA-200.8	/ = /
Uranium	0.943		mg/L			0.0002		EPA-200.8	/ = /
METAL-D									
Uranium, Dissolved	0.079		mg/L			0.0002		EPA-200.8	/ = /
PPCB									
PCB-1016	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1221	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1232	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1242	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1248	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1254	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1260	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
PCB-1268	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
Polychlorinated biphenyl	0.0971		ug/L	U		0.0971		SW846-8082	/ = /
RADS									
Americium-241	-0.53	0.855	pCi/L	U		2.72	0.857	HASL 300, Am-05-RC	/ = /
Cesium-137	8.78	9.01	pCi/L	U		17.9	9.87	EPA-901.1	/ = /
Dissolved Alpha	28.5	11.3	pCi/L			9.46	13	EPA-900.0	/ = /
Dissolved Beta	19300	134	pCi/L			9.92	3140	EPA-900.0	/ = /
Neptunium-237	0.205	1.32	pCi/L	U		2.71	1.32	Alpha Spectroscopy	/ = /
Plutonium-238	0.764	2.42	pCi/L	U		3.65	2.43	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	3.23	4.59	pCi/L	U		7.17	4.63	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	436	34.8	pCi/L			8.04	79.8	EPA-900.0	/ = /
Suspended Beta	494	28.8	pCi/L			7.19	96.1	EPA-900.0	/ = /
Technetium-99	37500	729	pCi/L			80.7	4200	HASL 300, Tc-02-RC	/ = /
Thorium-230	8.25	3.41	pCi/L			2.79	3.76	HASL 300, Th-01-RC	/ = /
Thorium-232	-0.17	0.668	pCi/L	U		1.78	0.67	HASL 300, Th-01-RC	/ = /
Total Uranium	666	28.6	pCi/L			3.52	75.9	HASL 300, U-02-RC M	/ = /
Uranium-234	305	19.4	pCi/L			2.11	50.7	HASL 300, U-02-RC M	/ = /
Uranium-235	20.8	5.11	pCi/L			1.54	6.03	HASL 300, U-02-RC M	/ = /
Uranium-238	340	20.5	pCi/L			2.37	56.2	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW4

410-BSMTZ26-03 from: C410-Z026 on 9/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH Range 6-7. Brad Brown 9-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Lead	0.00741		mg/L			0.002		EPA-200.8	/ = /
Uranium	0.926		mg/L			0.0002		EPA-200.8	/ = /
METAL-D									
Uranium, Dissolved	0.087		mg/L			0.0002		EPA-200.8	/ = /
PPCB									
PCB-1016	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1221	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1232	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1242	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1248	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1254	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1260	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
PCB-1268	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
Polychlorinated biphenyl	0.0962		ug/L	U		0.0962		SW846-8082	/ = /
RADS									
Americium-241	0.342	1.9	pCi/L	U		3.64	1.9	HASL 300, Am-05-RC	/ = /
Cesium-137	17.1	6.03	pCi/L			7.93	6.2	EPA-901.1	/ = /
Cobalt-60	34.1	9.79	pCi/L			8.54	10.2	EPA-901.1	/ = /
Dissolved Alpha	17.6	8.85	pCi/L			8.47	9.88	EPA-900.0	/ = /
Dissolved Beta	19200	123	pCi/L			9.74	3110	EPA-900.0	/ = /
Neptunium-237	0.296	1.33	pCi/L	U		2.59	1.33	Alpha Spectroscopy	/ = /
Plutonium-238	-0.111	0.96	pCi/L	U		2.22	0.963	HASL 300, Pu-11-RC	/ = /
Plutonium-239/240	2.04	2.86	pCi/L	U		4.62	2.88	HASL 300, Pu-11-RC	/ = /
Suspended Alpha	446	32.7	pCi/L			6.93	80.7	EPA-900.0	/ = /
Suspended Beta	616	28.6	pCi/L			7.85	105	EPA-900.0	/ = /
Technetium-99	33900	664	pCi/L			74.4	3800	HASL 300, Tc-02-RC	/ = /
Thorium-230	15.2	5.45	pCi/L			4.74	6.01	HASL 300, Th-01-RC	/ = /
Thorium-232	-0.0431	1.37	pCi/L	U		3.02	1.37	HASL 300, Th-01-RC	/ = /
Total Uranium	550	29.9	pCi/L			3.95	69	HASL 300, U-02-RC M	/ = /
Uranium-234	255	20.3	pCi/L			2.32	46.7	HASL 300, U-02-RC M	/ = /
Uranium-235	17	5.94	pCi/L			2.49	6.57	HASL 300, U-02-RC M	/ = /
Uranium-238	277	21.2	pCi/L			2.01	50.3	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW6

410BSMT-01 from: C-410 on 10/6/2014 Media: WS SmpMethod: GR

Comments: C-410 Basement - EPA Request pH 6-7 range. TC 10-6-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
SVOA									
1,1-biphenyl	10		ug/L	U		10		SW846-8270C	/ = /
1,2,4,5-Tetrachlorobenzene	10		ug/L	U		10		SW846-8270C	/ = /
2,3,4,6-Tetrachlorophenol	10		ug/L	U		10		SW846-8270C	/ = /
2,4,5-Trichlorophenol	10		ug/L	U		10		SW846-8270C	/ = /
2,4,6-Trichlorophenol	10		ug/L	U		10		SW846-8270C	/ = /
2,4-Dichlorophenol	10		ug/L	U		10		SW846-8270C	/ = /
2,4-Dimethylphenol	10		ug/L	U		10		SW846-8270C	/ = /
2,4-Dinitrophenol	20		ug/L	U		20		SW846-8270C	/ = /
2,4-Dinitrotoluene	10		ug/L	U		10		SW846-8270C	/ = /
2,6-Dinitrotoluene	10		ug/L	U		10		SW846-8270C	/ = /
2-Chloronaphthalene	1		ug/L	U		1		SW846-8270C	/ = /
2-Chlorophenol	10		ug/L	U		10		SW846-8270C	/ = /
2-Methyl-4,6-dinitrophenol	10		ug/L	U		10		SW846-8270C	/ = /
2-Methylnaphthalene	3.12		ug/L			1		SW846-8270C	/ = /
2-Methylphenol	10		ug/L	U		10		SW846-8270C	/ = /
2-Nitrobenzenamine	10		ug/L	U		10		SW846-8270C	/ = /
2-Nitrophenol	10		ug/L	U		10		SW846-8270C	/ = /
3,3'-Dichlorobenzidine	10		ug/L	U		10		SW846-8270C	/ = /
3-Nitrobenzenamine	10		ug/L	U		10		SW846-8270C	/ = /
4-Bromophenyl phenyl ether	10		ug/L	U		10		SW846-8270C	/ = /
4-Chloro-3-methylphenol	10		ug/L	U		10		SW846-8270C	/ = /
4-Chlorobenzenamine	10		ug/L	U		10		SW846-8270C	/ = /
4-Chlorophenyl phenyl ether	10		ug/L	U		10		SW846-8270C	/ = /
4-Nitrophenol	10		ug/L	U		10		SW846-8270C	/ = /
Acenaphthene	4.34		ug/L			1		SW846-8270C	/ = /
Acenaphthylene	1		ug/L	U		1		SW846-8270C	/ = /
Acetophenone	10		ug/L	U		10		SW846-8270C	/ = /
Anthracene	1		ug/L	U		1		SW846-8270C	/ = /
Atrazine	10		ug/L	U		10		SW846-8270C	/ = /
Benz(a)anthracene	0.63		ug/L	J		1		SW846-8270C	/ = /
Benzaldehyde	10		ug/L	U		10		SW846-8270C	/ R /
Benzo(a)pyrene	1		ug/L	U		1		SW846-8270C	/ = /
Benzo(b)fluoranthene	0.82		ug/L	J		1		SW846-8270C	/ = /
Benzo(ghi)perylene	1		ug/L	U		1		SW846-8270C	/ = /
Benzo(k)fluoranthene	0.35		ug/L	J		1		SW846-8270C	/ = /
Bis(2-chloroethoxy)methane	10		ug/L	U		10		SW846-8270C	/ = /
Bis(2-chloroethyl) ether	10		ug/L	U		10		SW846-8270C	/ = /
Bis(2-ethylhexyl)phthalate	10		ug/L	U		10		SW846-8270C	/ = /
Butyl benzyl phthalate	10		ug/L	U		10		SW846-8270C	/ = /
Caprolactam	10		ug/L	U		10		SW846-8270C	/ = /
Carbazole	0.32		ug/L	J		1		SW846-8270C	/ = /
Chrysene	1.14		ug/L			1		SW846-8270C	/ = /
Dibenz(a,h)anthracene	1		ug/L	U		1		SW846-8270C	/ = /
Dibenzofuran	5.61		ug/L	J		10		SW846-8270C	/ = /
Diethyl phthalate	10		ug/L	U		10		SW846-8270C	/ = /
Dimethyl phthalate	10		ug/L	U		10		SW846-8270C	/ = /
Di-n-butyl phthalate	10		ug/L	U		10		SW846-8270C	/ = /
Di-n-octylphthalate	10		ug/L	U		10		SW846-8270C	/ = /
Diphenylamine	10		ug/L	U		10		SW846-8270C	/ = /
Fluoranthene	4.42		ug/L			1		SW846-8270C	/ = /
Fluorene	4.67		ug/L			1		SW846-8270C	/ = /

*Verification/Validation/Assessment

Hexachlorobenzene	10	ug/L	U	10	SW846-8270C	/ = /
Hexachlorobutadiene	10	ug/L	U	10	SW846-8270C	/ = /
Hexachlorocyclopentadiene	10	ug/L	U	10	SW846-8270C	/ = /
Hexachloroethane	10	ug/L	U	10	SW846-8270C	/ = /
Indeno(1,2,3-cd)pyrene	0.35	ug/L	J	1	SW846-8270C	/ = /
Isophorone	3.93	ug/L	J	10	SW846-8270C	/ = /
m,p-Cresol	10	ug/L	U	10	SW846-8270C	/ = /
Naphthalene	0.96	ug/L	J	1	SW846-8270C	/ = /
Nitrobenzene	10	ug/L	U	10	SW846-8270C	/ = /
N-Nitroso-di-n-propylamine	10	ug/L	U	10	SW846-8270C	/ = /
Pentachlorophenol	10	ug/L	U	10	SW846-8270C	/ = /
Phenanthrene	19	ug/L		1	SW846-8270C	/ = /
Phenol	10	ug/L	U	10	SW846-8270C	/ R /
p-Nitroaniline	10	ug/L	U	10	SW846-8270C	/ = /
Pyrene	3.18	ug/L		1	SW846-8270C	/ = /
VOA						
1,1-Dichloroethene	1	ug/L	U	1	SW846-8260B	/ = /
1,2-Dichloroethene	2	ug/L	U	2	SW846-8260B	/ = /
1,2-Dimethylbenzene	1	ug/L	U	1	SW846-8260B	/ UJ /
Acrylonitrile	5	ug/L	U	5	SW846-8260B	/ = /
Benzene	1	ug/L	U	1	SW846-8260B	/ = /
Carbon tetrachloride	1	ug/L	U	1	SW846-8260B	/ = /
Chloroform	1	ug/L	U	1	SW846-8260B	/ = /
cis-1,2-Dichloroethene	1	ug/L	U	1	SW846-8260B	/ = /
Ethylbenzene	1	ug/L	U	1	SW846-8260B	/ = /
m,p-Xylene	2	ug/L	U	2	SW846-8260B	/ = /
Tetrachloroethene	1	ug/L	U	1	SW846-8260B	/ = /
Total Xylene	3	ug/L	U	3	SW846-8260B	/ = /
trans-1,2-Dichloroethene	1	ug/L	U	1	SW846-8260B	/ = /
Trichloroethene	1	ug/L	U	1	SW846-8260B	/ = /
Vinyl chloride	1	ug/L	U	1	SW846-8260B	/ = /

Paducah OREIS Report for DD14-410-STRMWW7

410BSMT-02 from: C-410 on 10/10/2014 Media: WS SmpMethod: GR

Comments: C-410 Basement - EPA Request Tc-99 pH range 6-7. TC 10-10-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	4540	91.3	pCi/L			28	512	HASL 300, Tc-02-RC	/ X /
Technetium-99	4130	72.6	pCi/L			26.7	462	HASL 300, Tc-02-RC	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW9

410-BSMTZ22-04 from: C410-Z022 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH 6-7 range. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1640	39.6	pCi/L			17.5	186	HASL 300, Tc-02-RC	/ = /
Technetium-99	1640	39.6	pCi/L			17.5	186	HASL 300, Tc-02-RC	/ = /
Total Uranium	4740	406	pCi/L			95.3	681	HASL 300, U-02-RC M	/ = /
Total Uranium	4740	406	pCi/L			95.3	681	HASL 300, U-02-RC M	/ = /
Uranium-234	2160	272	pCi/L			49.3	452	HASL 300, U-02-RC M	/ = /
Uranium-234	2160	272	pCi/L			49.3	452	HASL 300, U-02-RC M	/ = /
Uranium-235	138	81.1	pCi/L			60.9	84.3	HASL 300, U-02-RC M	/ = /
Uranium-235	138	81.1	pCi/L			60.9	84.3	HASL 300, U-02-RC M	/ = /
Uranium-238	2450	290	pCi/L			54.3	502	HASL 300, U-02-RC M	/ = /
Uranium-238	2450	290	pCi/L			54.3	502	HASL 300, U-02-RC M	/ = /

410-BSMTZ22-05 from: C410-Z022 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1850	42.5	pCi/L			18.5	209	HASL 300, Tc-02-RC	/ = /
Technetium-99	1850	42.5	pCi/L			18.5	209	HASL 300, Tc-02-RC	/ = /
Total Uranium	4980	422	pCi/L			100	714	HASL 300, U-02-RC M	/ = /
Total Uranium	4980	422	pCi/L			100	714	HASL 300, U-02-RC M	/ = /
Uranium-234	2500	297	pCi/L			50.4	515	HASL 300, U-02-RC M	/ = /
Uranium-234	2500	297	pCi/L			50.4	515	HASL 300, U-02-RC M	/ = /
Uranium-235	152	86	pCi/L			62.4	89.7	HASL 300, U-02-RC M	/ = /
Uranium-235	152	86	pCi/L			62.4	89.7	HASL 300, U-02-RC M	/ = /
Uranium-238	2330	287	pCi/L			60	487	HASL 300, U-02-RC M	/ = /
Uranium-238	2330	287	pCi/L			60	487	HASL 300, U-02-RC M	/ = /

410-BSMTZ22-06 from: C410-Z022 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1610	36.1	pCi/L			17	182	HASL 300, Tc-02-RC	/ J /
Technetium-99	1610	36.1	pCi/L			17	182	HASL 300, Tc-02-RC	/ J /
Total Uranium	5550	415	pCi/L			102	745	HASL 300, U-02-RC M	/ = /
Total Uranium	5550	415	pCi/L			102	745	HASL 300, U-02-RC M	/ = /
Uranium-234	2630	284	pCi/L			66.3	512	HASL 300, U-02-RC M	/ = /
Uranium-234	2630	284	pCi/L			66.3	512	HASL 300, U-02-RC M	/ = /
Uranium-235	159	81.8	pCi/L			59.7	85.8	HASL 300, U-02-RC M	/ = /
Uranium-235	159	81.8	pCi/L			59.7	85.8	HASL 300, U-02-RC M	/ = /
Uranium-238	2760	291	pCi/L			48.3	534	HASL 300, U-02-RC M	/ = /
Uranium-238	2760	291	pCi/L			48.3	534	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

410-BSMTZ22-06D from: C410-Z022 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 22 Basement stormwater, Duplicate pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	2020	43.2	pCi/L			18.2	228	HASL 300, Tc-02-RC	/ J /
Technetium-99	2020	43.2	pCi/L			18.2	228	HASL 300, Tc-02-RC	/ J /
Total Uranium	6480	433	pCi/L			74.8	831	HASL 300, U-02-RC M	/ = /
Total Uranium	6480	433	pCi/L			74.8	831	HASL 300, U-02-RC M	/ = /
Uranium-234	3110	299	pCi/L			44	579	HASL 300, U-02-RC M	/ = /
Uranium-234	3110	299	pCi/L			44	579	HASL 300, U-02-RC M	/ = /
Uranium-235	189	84.8	pCi/L			49.4	90	HASL 300, U-02-RC M	/ = /
Uranium-235	189	84.8	pCi/L			49.4	90	HASL 300, U-02-RC M	/ = /
Uranium-238	3180	302	pCi/L			34.8	589	HASL 300, U-02-RC M	/ = /
Uranium-238	3180	302	pCi/L			34.8	589	HASL 300, U-02-RC M	/ = /

410-BSMTZ26-04 from: C410-Z026 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	2160	46.2	pCi/L			19.9	243	HASL 300, Tc-02-RC	/ = /
Technetium-99	2160	46.2	pCi/L			19.9	243	HASL 300, Tc-02-RC	/ = /
Total Uranium	4770	364	pCi/L			65	632	HASL 300, U-02-RC M	/ = /
Total Uranium	4770	364	pCi/L			65	632	HASL 300, U-02-RC M	/ = /
Uranium-234	2340	254	pCi/L			45.4	449	HASL 300, U-02-RC M	/ = /
Uranium-234	2340	254	pCi/L			45.4	449	HASL 300, U-02-RC M	/ = /
Uranium-235	157	75.5	pCi/L			41.3	79.5	HASL 300, U-02-RC M	/ = /
Uranium-235	157	75.5	pCi/L			41.3	79.5	HASL 300, U-02-RC M	/ = /
Uranium-238	2270	250	pCi/L			21.4	437	HASL 300, U-02-RC M	/ = /
Uranium-238	2270	250	pCi/L			21.4	437	HASL 300, U-02-RC M	/ = /

410-BSMTZ26-05 from: C410-Z026 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1630	34.9	pCi/L			16.3	184	HASL 300, Tc-02-RC	/ = /
Technetium-99	1630	34.9	pCi/L			16.3	184	HASL 300, Tc-02-RC	/ = /
Total Uranium	4920	381	pCi/L			64	663	HASL 300, U-02-RC M	/ = /
Total Uranium	4920	381	pCi/L			64	663	HASL 300, U-02-RC M	/ = /
Uranium-234	2330	261	pCi/L			40.7	455	HASL 300, U-02-RC M	/ = /
Uranium-234	2330	261	pCi/L			40.7	455	HASL 300, U-02-RC M	/ = /
Uranium-235	140	73.4	pCi/L			28	76.8	HASL 300, U-02-RC M	/ = /
Uranium-235	140	73.4	pCi/L			28	76.8	HASL 300, U-02-RC M	/ = /
Uranium-238	2450	268	pCi/L			40.7	476	HASL 300, U-02-RC M	/ = /
Uranium-238	2450	268	pCi/L			40.7	476	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW9

410-BSMTZ26-06 from: C410-Z026 on 10/24/2014 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater pH range 6-7. TC 10-24-14

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1820	38.4	pCi/L			17.4	205	HASL 300, Tc-02-RC	/ = /
Technetium-99	1820	38.4	pCi/L			17.4	205	HASL 300, Tc-02-RC	/ = /
Total Uranium	5950	399	pCi/L			95.1	749	HASL 300, U-02-RC M	/ = /
Total Uranium	5950	399	pCi/L			95.1	749	HASL 300, U-02-RC M	/ = /
Uranium-234	2790	272	pCi/L			58.6	514	HASL 300, U-02-RC M	/ = /
Uranium-234	2790	272	pCi/L			58.6	514	HASL 300, U-02-RC M	/ = /
Uranium-235	236	91	pCi/L			57.1	98.2	HASL 300, U-02-RC M	/ = /
Uranium-235	236	91	pCi/L			57.1	98.2	HASL 300, U-02-RC M	/ = /
Uranium-238	2930	278	pCi/L			48.6	535	HASL 300, U-02-RC M	/ = /
Uranium-238	2930	278	pCi/L			48.6	535	HASL 300, U-02-RC M	/ = /

*Verification/Validation/Assessment

Paducah OREIS Report for DD14-410-STRMWW11

410-BSMTZ22-07 from: C410-Z022 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 22 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	11100	222	pCi/L			12.1	1770	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5180	70.1	pCi/L			24.1	577	HASL 300, Tc-02-RC	/ X /
Uranium-234	5110	151	pCi/L			7.06	1190	HASL 300, U-02-RC M	/ X /
Uranium-235	461	45.4	pCi/L			8.13	116	HASL 300, U-02-RC M	/ X /
Uranium-238	5560	157	pCi/L			5.54	1300	HASL 300, U-02-RC M	/ X /

410-BSMTZ22-08 from: C410-Z022 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 22 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	10500	231	pCi/L			16.5	1780	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5010	68.1	pCi/L			23.5	558	HASL 300, Tc-02-RC	/ X /
Uranium-234	4920	159	pCi/L			12.3	1230	HASL 300, U-02-RC M	/ X /
Uranium-235	419	46.5	pCi/L			8.15	114	HASL 300, U-02-RC M	/ X /
Uranium-238	5110	162	pCi/L			7.36	1280	HASL 300, U-02-RC M	/ X /

410-BSMTZ22-09 from: C410-Z022 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 22 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	8590	175	pCi/L			5.93	1260	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5140	67.4	pCi/L			22.5	572	HASL 300, Tc-02-RC	/ X /
Uranium-234	3880	118	pCi/L			2.78	836	HASL 300, U-02-RC M	/ X /
Uranium-235	341	34.9	pCi/L			2.78	80.7	HASL 300, U-02-RC M	/ X /
Uranium-238	4370	125	pCi/L			4.44	938	HASL 300, U-02-RC M	/ X /

*Verification/Validation/Assessment

410-BSMTZ22SL-07 from: C410-Z022 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 22 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1870	119	pCi/g			107	246	HASL 300, Tc-02-RC	/ X /
Technetium-99	893	82.9	pCi/g			94.1	132	HASL 300, Tc-02-RC	/ X /
Total Uranium	2540	72.5	pCi/g			4.99	609	HASL 300, U-02-RC M	/ X /
Uranium-234	1200	49.7	pCi/g			3.16	420	HASL 300, U-02-RC M	/ X /
Uranium-235	81.1	14.4	pCi/g			2.77	31.6	HASL 300, U-02-RC M	/ X /
Uranium-238	1260	50.8	pCi/g			2.7	439	HASL 300, U-02-RC M	/ X /

410-BSMTZ22SL-08 from: C410-Z022 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 22 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1140	61.6	pCi/g			50.7	145	HASL 300, Tc-02-RC	/ X /
Technetium-99	1680	76	pCi/g			59	208	HASL 300, Tc-02-RC	/ X /
Total Uranium	3190	116	pCi/g			8.54	1070	HASL 300, U-02-RC M	/ X /
Uranium-234	1510	79.4	pCi/g			6.04	747	HASL 300, U-02-RC M	/ X /
Uranium-235	126	25.6	pCi/g			4.02	66.8	HASL 300, U-02-RC M	/ X /
Uranium-238	1550	80.2	pCi/g			4.5	762	HASL 300, U-02-RC M	/ X /

410-BSMTZ22SL-09 from: C410-Z022 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 22 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1770	182	pCi/g			214	273	HASL 300, Tc-02-RC	/ X /
Technetium-99	1060	154	pCi/g			199	197	HASL 300, Tc-02-RC	/ X /
Total Uranium	641	23.5	pCi/g			2.44	105	HASL 300, U-02-RC M	/ X /
Uranium-234	295	15.9	pCi/g			1.37	70.5	HASL 300, U-02-RC M	/ X /
Uranium-235	19.3	4.58	pCi/g			1.63	6.42	HASL 300, U-02-RC M	/ X /
Uranium-238	327	16.7	pCi/g			1.2	77.9	HASL 300, U-02-RC M	/ X /

410-BSMTZ26-07 from: C410-Z026 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 26 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	8950	196	pCi/L			10.6	1420	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5290	68.8	pCi/L			22.7	589	HASL 300, Tc-02-RC	/ X /
Uranium-234	4160	134	pCi/L			7.36	963	HASL 300, U-02-RC M	/ X /
Uranium-235	277	34.7	pCi/L			6.84	72.3	HASL 300, U-02-RC M	/ X /
Uranium-238	4510	139	pCi/L			3.35	1040	HASL 300, U-02-RC M	/ X /

*Verification/Validation/Assessment

410-BSMTZ26-08 from: C410-Z026 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 26 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	12900	262	pCi/L			12.2	2210	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5530	72.3	pCi/L			24.1	615	HASL 300, Tc-02-RC	/ X /
Uranium-234	6020	179	pCi/L			8.46	1520	HASL 300, U-02-RC M	/ X /
Uranium-235	516	52.6	pCi/L			7.7	139	HASL 300, U-02-RC M	/ X /
Uranium-238	6360	184	pCi/L			4.16	1600	HASL 300, U-02-RC M	/ X /

410-BSMTZ26-08D from: C410-Z026 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 26 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	10400	220	pCi/L			12	1700	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	5020	66.6	pCi/L			22.5	559	HASL 300, Tc-02-RC	/ X /
Uranium-234	4760	148	pCi/L			7.34	1140	HASL 300, U-02-RC M	/ X /
Uranium-235	425	44.5	pCi/L			6.68	110	HASL 300, U-02-RC M	/ X /
Uranium-238	5250	156	pCi/L			6.66	1250	HASL 300, U-02-RC M	/ X /

410-BSMTZ26-09 from: C410-Z026 on 12/3/2014 Media: WS SmpMethod: GR

Comments: pH was taken w/paper strips. No other readings were needed. pH range was 6-7. BB 12-3-14C-410 Zone 26 Basement stormwater (top, m

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Total Uranium	10100	211	pCi/L			11.7	1600	HASL 300, U-02-RC M	/ X /
OTHIN									
Asbestos	200000		fibers/L	U		1		EPA-100.2	/ X /
RADS									
Technetium-99	4680	63	pCi/L			21.5	521	HASL 300, Tc-02-RC	/ X /
Uranium-234	4720	144	pCi/L			7.02	1100	HASL 300, U-02-RC M	/ X /
Uranium-235	417	43.1	pCi/L			7.59	106	HASL 300, U-02-RC M	/ X /
Uranium-238	4980	148	pCi/L			5.51	1160	HASL 300, U-02-RC M	/ X /

410-BSMTZ26SL-07 from: C410-Z026 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	1420	175	pCi/g			220	239	HASL 300, Tc-02-RC	/ X /
Technetium-99	2360	154	pCi/g			143	312	HASL 300, Tc-02-RC	/ X /
Total Uranium	403	16.2	pCi/g			1.81	60.2	HASL 300, U-02-RC M	/ X /
Uranium-234	193	11.2	pCi/g			1.14	42.1	HASL 300, U-02-RC M	/ X /
Uranium-235	13.8	3.36	pCi/g			1.12	4.45	HASL 300, U-02-RC M	/ X /
Uranium-238	196	11.3	pCi/g			0.852	42.7	HASL 300, U-02-RC M	/ X /

410-BSMTZ26SL-08 from: C410-Z026 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	2270	191	pCi/g			208	324	HASL 300, Tc-02-RC	/ X /
Technetium-99	31000	472	pCi/g			138	3600	HASL 300, Tc-02-RC	/ X / R-C
Total Uranium	778	26.7	pCi/g			2.09	130	HASL 300, U-02-RC M	/ X /
Uranium-234	375	18.5	pCi/g			1.19	91.5	HASL 300, U-02-RC M	/ X /
Uranium-235	23.6	5.18	pCi/g			1.22	7.65	HASL 300, U-02-RC M	/ X /
Uranium-238	379	18.5	pCi/g			1.19	92.4	HASL 300, U-02-RC M	/ X /

410-BSMTZ26SL-08D from: C410-Z026 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement Sludge, Duplicate

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	2140	158	pCi/g			156	292	HASL 300, Tc-02-RC	/ X /
Technetium-99	2080	172	pCi/g			186	294	HASL 300, Tc-02-RC	/ X /
Total Uranium	327	15.5	pCi/g			1.57	51.4	HASL 300, U-02-RC M	/ X /
Uranium-234	162	10.9	pCi/g			1.08	36.8	HASL 300, U-02-RC M	/ X /
Uranium-235	8.9	2.88	pCi/g			0.986	3.47	HASL 300, U-02-RC M	/ X /
Uranium-238	157	10.7	pCi/g			0.57	35.7	HASL 300, U-02-RC M	/ X /

410-BSMTZ26SL-09 from: C410-Z026 on 12/3/2014 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement Sludge

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
RADS									
Technetium-99	2230	170	pCi/g			176	307	HASL 300, Tc-02-RC	/ X /
Technetium-99	2440	160	pCi/g			148	324	HASL 300, Tc-02-RC	/ X /
Total Uranium	632	22.5	pCi/g			1.73	101	HASL 300, U-02-RC M	/ X /
Uranium-234	306	15.6	pCi/g			1.05	71.4	HASL 300, U-02-RC M	/ X /
Uranium-235	22.7	4.76	pCi/g			1.07	7.03	HASL 300, U-02-RC M	/ X /
Uranium-238	304	15.5	pCi/g			0.867	71	HASL 300, U-02-RC M	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-STRMWW1

410-BSMTZ26-10 from: C410-Z026 on 3/10/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater (top, middle, bottom composite) pH of 8. CB 3-10-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
ANION									
Chloride	11.1		mg/L			1		EPA-300.0	/ X /
Nitrate	0.218		mg/L			0.1		EPA-300.0	/ X /
Sulfate	58.1		mg/L			2		EPA-300.0	/ X /
METAL									
Cadmium	0.00434		mg/L			0.001		EPA-200.8	/ X /
Calcium	78.2		mg/L			4		EPA-200.8	/ X /
Magnesium	3.11		mg/L			0.03		EPA-200.8	/ X /
Potassium	30.6		mg/L			0.3		EPA-200.8	/ X /
Selenium	0.00304		mg/L	J		0.005		EPA-200.8	/ X /
Sodium	24		mg/L			0.25		EPA-200.8	/ X /
RADS									
Technetium-99	7710	170	pCi/L			74.3	873	HASL 300, Tc-02-RC	/ X /
Total Uranium	5250	125	pCi/L			6.66	737	HASL 300, U-02-RC M	/ X /
Uranium-234	2480	85.8	pCi/L			4.73	506	HASL 300, U-02-RC M	/ X /
Uranium-235	148	23.4	pCi/L			2.87	37.9	HASL 300, U-02-RC M	/ X /
Uranium-238	2620	88.3	pCi/L			3.71	535	HASL 300, U-02-RC M	/ X /
WETCHEM									
Ammonia	0.326		mg/L			0.05		EPA-350.1	/ X /
Bicarbonate	67		mg/L			2		EPA-310.1	/ X /

410-BSMTZ26-10D from: C410-Z026 on 3/10/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater (top, middle, bottom composite) - Field Duplicate pH of 8. CB 3-10-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
ANION									
Chloride	11.6		mg/L			1		EPA-300.0	/ X /
Nitrate	0.218		mg/L	H		0.1		EPA-300.0	T / X /
Sulfate	61.5		mg/L			2		EPA-300.0	/ X /
METAL									
Cadmium	0.00412		mg/L			0.001		EPA-200.8	/ X /
Calcium	76.1		mg/L			4		EPA-200.8	/ X /
Magnesium	2.9		mg/L			0.03		EPA-200.8	/ X /
Potassium	30.1		mg/L			0.3		EPA-200.8	/ X /
Selenium	0.003		mg/L	J		0.005		EPA-200.8	/ X /
Sodium	23.8		mg/L			0.25		EPA-200.8	/ X /
RADS									
Technetium-99	7190	146	pCi/L			51.7	811	HASL 300, Tc-02-RC	/ X /
Total Uranium	4240	108	pCi/L			8.34	582	HASL 300, U-02-RC M	/ X /
Uranium-234	2010	73.9	pCi/L			6.88	398	HASL 300, U-02-RC M	/ X /
Uranium-235	106	18.9	pCi/L			2.63	28	HASL 300, U-02-RC M	/ X /
Uranium-238	2130	76.1	pCi/L			3.92	423	HASL 300, U-02-RC M	/ X /
WETCHEM									
Ammonia	0.287		mg/L			0.05		EPA-350.1	/ X /
Bicarbonate	137		mg/L			2		EPA-310.1	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-STRMWW1

410-BSMTZ26-11 from: C410-Z026 on 3/10/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater (top, middle, bottom composite) pH of 8. CB 3-10-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
ANION									
Chloride	14.5		mg/L			1		EPA-300.0	/ X /
Nitrate	0.254		mg/L	H		0.1		EPA-300.0	T / X /
Sulfate	74.1		mg/L			2		EPA-300.0	/ X /
METAL									
Cadmium	0.00131		mg/L			0.001		EPA-200.8	/ X /
Calcium	27.8		mg/L			0.2		EPA-200.8	/ X /
Magnesium	1.5		mg/L			0.03		EPA-200.8	/ X /
Potassium	35.6		mg/L			0.3		EPA-200.8	/ X /
Selenium	0.00232		mg/L	J		0.005		EPA-200.8	/ X /
Sodium	29.7		mg/L			0.25		EPA-200.8	/ X /
RADS									
Technetium-99	8020	156	pCi/L			21.9	904	HASL 300, Tc-02-RC	/ X /
Total Uranium	2640	69.5	pCi/L			5.49	321	HASL 300, U-02-RC M	/ X /
Uranium-234	1250	47.7	pCi/L			3.5	220	HASL 300, U-02-RC M	/ X /
Uranium-235	62.7	12	pCi/L			3.57	16.1	HASL 300, U-02-RC M	/ X /
Uranium-238	1330	49.1	pCi/L			2.27	233	HASL 300, U-02-RC M	/ X /
WETCHEM									
Ammonia	0.307		mg/L			0.05		EPA-350.1	/ X /
Bicarbonate	9		mg/L			2		EPA-310.1	/ X /

410-BSMTZ26-12 from: C410-Z026 on 3/10/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater (top, middle, bottom composite) pH of 8. CB 3-10-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
ANION									
Chloride	14.5		mg/L			1		EPA-300.0	/ X /
Nitrate	0.263		mg/L	H		0.1		EPA-300.0	T / X /
Sulfate	74.2		mg/L			2		EPA-300.0	/ X /
METAL									
Cadmium	0.00132		mg/L			0.001		EPA-200.8	/ X /
Calcium	25.8		mg/L			0.2		EPA-200.8	/ X /
Magnesium	1.35		mg/L			0.03		EPA-200.8	/ X /
Potassium	35		mg/L			0.3		EPA-200.8	/ X /
Selenium	0.00211		mg/L	J		0.005		EPA-200.8	/ X /
Sodium	31		mg/L			0.25		EPA-200.8	/ X /
RADS									
Technetium-99	8010	156	pCi/L			20.3	903	HASL 300, Tc-02-RC	/ X /
Total Uranium	2600	67.8	pCi/L			9	310	HASL 300, U-02-RC M	/ X /
Uranium-234	1210	46.1	pCi/L			5.53	211	HASL 300, U-02-RC M	/ X /
Uranium-235	87.9	14	pCi/L			5.19	20.5	HASL 300, U-02-RC M	/ X /
Uranium-238	1300	47.7	pCi/L			4.83	225	HASL 300, U-02-RC M	/ X /
WETCHEM									
Ammonia	1.11		mg/L			0.05		EPA-350.1	/ X /
Bicarbonate	18		mg/L			2		EPA-310.1	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-CNCRT

410-CNCRT-01 from: C410-Z026 on 10/7/2015 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement concrete. 261g total between both jars. C-410 basement concrete. See additional sampling notes. 1/2 inch of standing water over sample location. JS 10-7-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	6.5		mg/kg	J,B		9.4		SW846-6010C	/ X /
Barium	75		mg/kg			47		SW846-6010C	/ X /
Cadmium	1.7		mg/kg	J		4.7		SW846-6010C	/ X /
Chromium	30		mg/kg	B		9.4		SW846-6010C	/ X /
Lead	56		mg/kg			9.4		SW846-6010C	/ X /
Mercury	0.14		mg/kg			0.031		SW846-7471B	/ X / J
Selenium	14		mg/kg	U		14		SW846-6010C	/ X /
Silver	0.75		mg/kg	J		9.4		SW846-6010C	/ X /
RADS									
Americium-241	2.13	0.242	pCi/g			0.0205	0.337	A-01-R	/ X /
Neptunium-237	1.92	0.254	pCi/g			0.0559	0.301	A-01-R	/ X /
Plutonium-238	0.387	0.0602	pCi/g			0.0164	0.0684	A-01-R	/ X /
Plutonium-239/240	12.2	0.337	pCi/g			0.0203	1.08	A-01-R	/ X /
Plutonium-241	10.7	1.77	pCi/g			1.96	2.01	ST-RC-0245	/ X /
Uranium-234	505	13.1	pCi/g			0.742	44.4	A-01-R	/ X /
Uranium-235	33.7	3.74	pCi/g			0.31	4.69	A-01-R	/ X /
Uranium-238	521	13.3	pCi/g			0.535	45.7	A-01-R	/ X /

410-CNCRT-02 from: C410-Z026 on 10/7/2015 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement concrete. 150g total for one jar. C-410 basement concrete. See additional sampling notes. 1/2 inch of standing water over sampling location. JS 10-7-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	4.8		mg/kg	J,B		9		SW846-6010C	/ X /
Barium	67		mg/kg			45		SW846-6010C	/ X /
Cadmium	1.2		mg/kg	J		4.5		SW846-6010C	/ X /
Chromium	22		mg/kg	B		9		SW846-6010C	/ X /
Lead	33		mg/kg			9		SW846-6010C	/ X /
Mercury	0.1		mg/kg			0.032		SW846-7471B	/ X / J
Selenium	14		mg/kg	U		14		SW846-6010C	/ X /
Silver	9		mg/kg	U		9		SW846-6010C	/ X /
RADS									
Americium-241	1.37	0.197	pCi/g			0.0212	0.248	A-01-R	/ X /
Neptunium-237	1.2	0.187	pCi/g			0.0451	0.213	A-01-R	/ X /
Plutonium-238	0.198	0.0431	pCi/g			0.0198	0.0462	A-01-R	/ X /
Plutonium-239/240	6.94	0.251	pCi/g			0.016	0.635	A-01-R	/ X /
Plutonium-241	5.19	1.39	pCi/g			1.83	1.46	ST-RC-0245	/ X /
Uranium-234	344	12.3	pCi/g			0.814	31.4	A-01-R	/ X /
Uranium-235	23.7	3.49	pCi/g			0.841	4.02	A-01-R	/ X /
Uranium-238	344	12.3	pCi/g			0.887	31.4	A-01-R	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-CNCRT

410-CNCRT-03 from: C410-Z026 on 10/7/2015 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement concrete. 230g total between two jars. C-410 basement concrete. See additional sampling notes. 1/2 inch of standing water over sample location. JS 10-7-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	3.8		mg/kg	J,B		8.7		SW846-6010C	/ X /
Barium	73		mg/kg			44		SW846-6010C	/ X /
Cadmium	0.61		mg/kg	J		4.4		SW846-6010C	/ X /
Chromium	14		mg/kg	B		8.7		SW846-6010C	/ X /
Lead	1.9		mg/kg	J		8.7		SW846-6010C	/ X /
Mercury	0.02		mg/kg	J		0.033		SW846-7471B	/ X / J
Selenium	13		mg/kg	U		13		SW846-6010C	/ X /
Silver	8.7		mg/kg	U		8.7		SW846-6010C	/ X /
RADS									
Americium-241	0.0516	0.039	pCi/g			0.0221	0.0395	A-01-R	/ X /
Neptunium-237	0.0296	0.0343	pCi/g	U		0.0474	0.0344	A-01-R	/ X /
Plutonium-238	0.0218	0.0165	pCi/g			0.0205	0.0166	A-01-R	/ X /
Plutonium-239/240	0.188	0.0423	pCi/g			0.0165	0.0452	A-01-R	/ X /
Plutonium-241	1.93	1.21	pCi/g			1.89	1.22	ST-RC-0245	/ X /
Uranium-234	15.8	1.7	pCi/g			0.391	2.16	A-01-R	/ X /
Uranium-235	0.955	0.463	pCi/g			0.169	0.47	A-01-R	/ X /
Uranium-238	14.9	1.65	pCi/g			0.436	2.07	A-01-R	/ X /

410-CNCRT-04 from: C410-Z026 on 10/7/2015 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement concrete. 260g total between two jars. C-410 basement concrete. See additional sampling notes. Sample location was not submerged under water. JS 10-7-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	5.6		mg/kg	J,B		9.1		SW846-6010C	/ X /
Barium	76		mg/kg			45		SW846-6010C	/ X /
Cadmium	4.5		mg/kg	U		4.5		SW846-6010C	/ X /
Chromium	18		mg/kg	B		9.1		SW846-6010C	/ X /
Lead	5.7		mg/kg	J		9.1		SW846-6010C	/ X /
Mercury	0.031		mg/kg	U		0.031		SW846-7471B	/ X / UJ
Selenium	14		mg/kg	U		14		SW846-6010C	/ X /
Silver	9.1		mg/kg	U		9.1		SW846-6010C	/ X /
RADS									
Americium-241	0.136	0.0626	pCi/g			0.0215	0.0643	A-01-R	/ X /
Neptunium-237	0.0854	0.0517	pCi/g			0.0416	0.0522	A-01-R	/ X /
Plutonium-238	0.0293	0.0201	pCi/g			0.0258	0.0202	A-01-R	/ X /
Plutonium-239/240	0.889	0.0912	pCi/g			0.0203	0.118	A-01-R	/ X /
Plutonium-241	1.5	1.15	pCi/g	U		1.82	1.16	ST-RC-0245	/ X /
Uranium-234	52.7	3.18	pCi/g			0.353	5.45	A-01-R	/ X /
Uranium-235	3.69	0.938	pCi/g			0.179	0.988	A-01-R	/ X /
Uranium-238	55.3	3.25	pCi/g			0.143	5.67	A-01-R	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-CNCRT

410-CNCRT-05 from: C410-Z026 on 10/7/2015 Media: SL SmpMethod: GR

Comments: C-410 Zone 26 Basement concrete. 330g total between two jars. C-410 basement concrete. See additional sampling notes. Sample location was not submerged under water. JS 10-7-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Arsenic	5.6		mg/kg	J,B		8.7		SW846-6010C	/ X /
Barium	47		mg/kg			44		SW846-6010C	/ X /
Cadmium	0.35		mg/kg	J		4.4		SW846-6010C	/ X /
Chromium	17		mg/kg	B		8.7		SW846-6010C	/ X /
Lead	8		mg/kg	J		8.7		SW846-6010C	/ X /
Mercury	0.022		mg/kg	J		0.031		SW846-7471B	/ X / J
Selenium	13		mg/kg	U		13		SW846-6010C	/ X /
Silver	8.7		mg/kg	U		8.7		SW846-6010C	/ X /
RADS									
Americium-241	0.921	0.167	pCi/g			0.0227	0.195	A-01-R	/ X /
Neptunium-237	0.64	0.144	pCi/g			0.0534	0.154	A-01-R	/ X /
Plutonium-238	0.131	0.0372	pCi/g			0.0181	0.0388	A-01-R	/ X /
Plutonium-239/240	5.38	0.235	pCi/g			0.0286	0.509	A-01-R	/ X /
Plutonium-241	5.45	1.57	pCi/g			2.11	1.64	ST-RC-0245	/ X /
Uranium-234	81.7	5.87	pCi/g			0.846	9.03	A-01-R	/ X /
Uranium-235	5.23	1.65	pCi/g			0.392	1.71	A-01-R	/ X /
Uranium-238	92	6.21	pCi/g			0.579	9.91	A-01-R	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-WWTRMT

410-INLET-01 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system inlet (5min after treatment begins). C-410 Zone 26 Basement. Started system at 1318. Collected sample from a valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	2360		ug/L			10		EPA-200.8	/ X /
RADS									
Technetium-99	2300	67.4	pCi/L			19.2	264	HASL 300, Tc-02-RC M	/ X /

410-INLET-02 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system inlet (halfway thru treatment run). C-410 Zone 26 Basement. Started system at 1318. Collected sample from valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	2330		ug/L			10		EPA-200.8	/ X /
RADS									
Technetium-99	2320	67.1	pCi/L			18.9	266	HASL 300, Tc-02-RC M	/ X /

410-INLET-03 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system inlet (w/in 5min of predicted end of treatment run). C-410 Zone 26 Basement. Started system at 1318. Collected sample from a valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	2300		ug/L			10		EPA-200.8	/ X /
RADS									
Technetium-99	2240	64.5	pCi/L			17.3	257	HASL 300, Tc-02-RC M	/ X /

410-OUTLET-01 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (5min after treatment begins). C-410 Zone 26 Basement. Started system at 1318. Collected sample from valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	13		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	63.3	15.1	pCi/L			18.8	16.6	HASL 300, Tc-02-RC M	/ X /

410-OUTLET-02 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (halfway thru treatment run). C-410 Zone 26 Basement. Started system at 1318. Collected sample from valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	31.6		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	109	16.5	pCi/L			16.5	20.4	HASL 300, Tc-02-RC M	/ X /

*Verification/Validation/Assessment

410-OUTLET-02D from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (halfway thru treatment run), Duplicate. C-410 Zone 26 Basement. Started system at 1318. Collected sample from valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	32.1		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	115	17.7	pCi/L			18.1	21.8	HASL 300, Tc-02-RC M	/ X /

410-OUTLET-03 from: C410-Z026 on 8/31/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (w/in 5min of predicted end of treatment run). C-410 Zone 26 Basement. Started system at 1318. Collected sample from valve. JS 8-31-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	35.4		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	130	17.8	pCi/L			17	22.8	HASL 300, Tc-02-RC M	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-WWTRMT2

410-INLET-04 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system inlet (5min after treatment begins). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	1460		ug/L			4		EPA-200.8	/ X /
RADS									
Technetium-99	1560	35.8	pCi/L			20.1	177	HASL 300, Tc-02-RC M	/ X /

410-INLET-05 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 basement stormwater from treatment system inlet approx. at the 58,500 gallon mark (halfway through treatment). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	1480		ug/L			4		EPA-200.8	/ X /
RADS									
Technetium-99	1770	37.3	pCi/L			19.4	200	HASL 300, Tc-02-RC M	/ X /

410-INLET-06 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system inlet (w/in 5min of predicted end of treatment run). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	1480		ug/L			4		EPA-200.8	/ X /
RADS									
Technetium-99	1730	38.1	pCi/L			20.7	195	HASL 300, Tc-02-RC M	/ X /

410-OUTLET-04 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (5min after treatment begins). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	28.5		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	22.9	12.2	pCi/L			19.9	12.5	HASL 300, Tc-02-RC M	/ X /

410-OUTLET-05 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 basement stormwater from treatment system outlet approx. at the 58,500 gallon mark (halfway through treatment). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	38.6		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	43.6	12.2	pCi/L			18.9	13.2	HASL 300, Tc-02-RC M	/ X /

*Verification/Validation/Assessment

Paducah OREIS Report for DD15-410-WWTRMT2

410-OUTLET-06 from: C410-Z026 on 9/18/2015 Media: WS SmpMethod: GR

Comments: C-410 Zone 26 Basement stormwater from treatment system outlet (w/in 5min of predicted end of treatment run). C-410 basement. System started up at 0819. Clear water. JS 9-21-15

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	TPU	Method	V/V/A*
METAL									
Uranium	40		ug/L			0.2		EPA-200.8	/ X /
RADS									
Technetium-99	17.9	11.4	pCi/L	U		18.8	11.6	HASL 300, Tc-02-RC M	/ X /

*Verification/Validation/Assessment

Result Qualifier Codes

U	ALL ANALYSIS TYPES EXCEPT RADS: Not detected; RADS: Value reported is < MDA and/or TPU.
J	Estimated Quantitation
B	Compound found in blank as well as sample.
T	Tracer recovery is less than or equal to 30% or greater than or equal to 105%
X	Other specific flags or footnotes may be required to properly define the results.
H	Analysis performed outside holding time requirement.

Verification Codes

T	Holding time exceeded for this analysis

Validation Codes

=	Validated result, which is detected and unqualified
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	Analyte, compound or nuclide not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.
R	Result rejected by validator.
X	Not validated; Refer to the RSLTQUAL field for more information

Assessment Codes

R-C	Result questionable, credibility at issue.
J	Result estimated.
UJ	Not detected and result estimated.

APPENDIX D

MEMORANDUM OF AGREEMENT FOR DISPOSITION OF C-410 BASEMENT WATER AT THE PADUCAH SITE

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Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

AUG 0 4 2015

Mr. Jon Richards
Remedial Project Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

PPPO-02-2932877-15

Ms. April Webb
Acting Interim Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

Dear Mr. Richards and Ms. Webb:

DISPOSITION OF CONTAMINATED WATER COLLECTED FROM THE BASEMENT OF THE C-410 COMPLEX AT THE PADUCAH GASEOUS DIFFUSION PLANT

Reference: Letter from J. Corkran to J. Woodard, "EPA Revised Memorandum of Agreement Proposal-Disposition of Contaminated Water Collected from the Basement of the C-410 Complex at the Paducah Gaseous Diffusion Plant," dated July 8, 2015

The purpose of this letter is to document the U.S. Department of Energy (DOE) agreement with the U.S. Environmental Protection Agency (EPA) and the Commonwealth of Kentucky regarding the disposition of contaminated water collected in a basement of the C-410 Complex at the Paducah Site. DOE has agreed to treat the water prior to discharge and has elected to discharge the water directly to the internal plant ditches. DOE has attached the signed Memorandum of Agreement (MOA) to reflect this agreement and a map depicting the route the treated C-410 water will follow.

In an effort to bring the C-410 project to completion, DOE has agreed with the attached MOA even though it does not contain key elements that are important to DOE. First, the MOA does not recognize that DOE is taking this action voluntarily. Based on the DOE's calculations, discharge of the C-410 water without treatment does not present an imminent and substantial endangerment to public health or welfare or the environment. The proposed discharge is below the applicable or relevant and appropriate requirement approved for this project [10 *CFR* § 20.130(a)(1); 902 *KAR* 100.019 §10(1)]. In addition, discharge of the C-410 water without treatment would be within the acceptable Comprehensive Environmental Response, Compensation, and Liability Act risk range and would not exceed any other activity or dose-

based regulations or guidance for radionuclide releases.[1] As such, it is DOE's position that this action is being done voluntarily as a Best Management Practice.

Secondly, the MOA omits the FFA parties' understanding that no additional actions related to the removal, treatment, and disposition of the contaminated C-410 water will be required beyond activities addressed in the agreement. In the reference letter, EPA acknowledged that once the C-410 water is dispositioned, no scenario could be identified that would require additional action; as such, it is acceptable not to include the clause.

Lastly, EPA's revised proposal removed, from the draft MOA, the clause that requires EPA to provide the technical analysis (including calculations) that supports EPA's claim that DOE's original plan to discharge the collected water directly "...may present an imminent and substantial endangerment to public health or welfare or the environment." DOE has requested multiple times that EPA provide the basis for its determination that discharge of the C-410 water may present an imminent and substantial endangerment to human health or the environment. To date, EPA has not provided such information. In the reference letter, EPA stated that "the EPA Region 4 Paducah team is prepared to support an FFA Stop Work Order retrospective, outside of the C-410 MOA if requested/directed by EPA Region 4 Senior Managers, including a discussion of the FFA stop work language and a discussion of imminent and substantial endangerment technical analysis/calculations, to enhance three-party understanding." Given EPA's affirmative, written representation that such data/calculations exist, DOE will be sending a letter to EPA Region 4 Senior Managers. This letter will request EPA provide this information in writing and facilitate a meeting between the three parties.

If you have any questions or require additional information, please contact me at (270) 441-6820.

Sincerely,

Jennifer Woodard

Jennifer Woodard
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosures:
1. Signed Memorandum of Agreement (MOA)
2. Map C-410 Treated Water Discharge Route

[1] These standards include the 60,000 pCi/L effluent limit for technetium-99 (Tc-99) that EPA approved in the Paducah Gaseous Diffusion Plant Southwest Plume MOA and at the Maxey Flats Superfund Site in Kentucky, 902 *KAR* 100:019 (44) Table II; 10 *CFR* Part 20 Appendix B; the 12 mrem guidance that EPA recently issued, *Radiation Risk Assessment at CERCLA Sites: Q&A OSWER No. 9200.4-40*, May 2014; and DOE's Derived Concentration Standards for Tc-99 and uranium isotopes. In addition, the proposed discharge presents no threat to on-site workers.

e-copy w/enclosures:
april.webb@ky.gov, KDEP/Frankfort
brian.begley@ky.gov, KDEP/Frankfort
corkran.julie@epa.gov, EPA/Atlanta
ffscorrespondence@ffspaducah.com, FFS/Kevil
gaye.brewer@ky.gov, KDEP/PAD
jennifer.woodard@lex.doe.gov, PPPO/PAD
john.kelly@ffspaducah.com, FFS/Kevil
jon.maybriar@ky.gov, KDEP/Frankfort
leo.williamson@ky.gov, KDEP/Frankfort
mark.duff@ffspaducah.com, FFS/Kevil
mike.guffey@ky.gov, KDEP/Frankfort
myrna.redfield@ffspaducah.com, FFS/Kevil
pad.dmc@swiftstaley.com, SSI/Kevil
reinhard.knerr@lex.doe.gov, PPPO/PAD
richards.jon@epamail.epa.gov, EPA/Atlanta
stephaniec.brock@ky.gov, KYRHB/Frankfort

Memorandum of Agreement
for Disposition of C-410 Basement Water at the Paducah Site

- The contaminated water in the C-410 Building basement (Zone 26) at the Paducah Gaseous Diffusion Plant (PGDP) will be removed by the U.S. Department of Energy (DOE) (i.e., pumped out) and treated *ex situ* at Zone 26 using proven ion exchange technology with resins capable of treating the radionuclides [i.e., technetium-99 (Tc-99) and uranium] detected in the water. The ion exchange technology will use standard industry design (off the shelf), but the system may include more than one unit that will be stacked (or run in sequence) to treat radionuclides.

- The ion exchange treatment system will be designed (based on manufacturer specifications) to achieve between 93%–98% reduction in the radionuclides detected in the contaminated water. Verification of treatment efficiency will occur at each interval in the process as explained below.

- Verification of treatment efficiency requires definition of constituent-specific baseline values. The constituent-specific baseline value for Tc-99 and uranium will be calculated as follows:

    - An in-line sampling port will be utilized to pull three samples from the first 3,000 gallons (gal) of contaminated water as it enters into the ion exchange treatment system. The three samples will be averaged to provide the constituent-specific baseline value. Radiological samples will be 3 liters of water. Samples will be collected at five minutes after treatment begins, approximately half-way through the treatment run, and within five minutes of the predicted end of the treatment run. This process will be repeated at the beginning of each interval (i.e., 0 gal, 60,000 gal, and 120,000 gal). Samples will be analyzed for Tc-99 (pCi/L) and uranium (mg/L). The data will be provided two weeks after sample collection, and the results will be shared with the Federal Facility Agreement (FFA) parties, with a follow-up meeting scheduled to discuss the results and agree on the constituent-specific baseline values (Record of Conversation, March 9, 2015). The FFA parties will make themselves readily available within 3-5 days of data receipt for the follow-up meeting.

- The first 3,000 gals of contaminated water will be treated and collected in an aboveground temporary storage tank. The treated water will be sampled at the discharge port after treatment (n=3 samples) for Tc-99 (pCi/L) and uranium (mg/L). Three samples will be averaged to create the post-treatment value for each interval (e.g., 3,000 gal, 60,000 gal, and 120,000 gal). Each sample will be 3 liters of water. DOE will receive the sampling results within two weeks of sample collection and immediately share the results with the U.S. Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP). No water will be discharged during that time. The FFA parties will evaluate the contaminant concentrations in the treated water and verify that treatment efficiencies are in the range of 93%–98% reduction, relative to the constituent-specific baseline.

- This verification process (through sampling a batch of treated water to verify treatment efficiencies) will be repeated after approximately 60,000 gal of the water (one-third of the water) has been treated and dispositioned and again after 120,000 gal of water (two-thirds of the water) has been treated and dispositioned. At each batch sampling interval, if constituent-specific treatment efficiency has been met for Tc-99 and uranium, DOE will disposition the treated water as explained below. The FFA parties fully expect that treatment of the contaminated waters using Best Available Technology and new ion exchange units will yield the targeted contaminant reduction efficiencies. If the constituent-specific treatment efficiencies are not met at any verification interval, then treatment and dispositioning of the C-410 basement water will stop, and the FFA parties will reconvene and decide what additional actions may be necessary to achieve the targeted treatment efficiency.

- Each batch of treated water will be discharged directly from the treatment system into the internal plant ditch system, provided that fresh Apatite material is placed in the unlined portions of the ditch system (as currently in the field–"checkdams" along the ditch) between the treatment system and the first lift station (C-400-L) to further capture and remove residual uranium and ultimately will be discharged from the C-616-F Lagoon through Outfall 001. Outfall 001 discharges to Bayou Creek.

- DOE will characterize the nature and extent of soil/sediment and surface water contamination in the future, as part of another Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) operable unit (e.g., the Surface Water Operable Unit or the Soils Operable Unit), in view of EPA and DOE selecting a final remedy for the unit (including the ditches) as summarized in the Site Management Plan.

- Once the contaminated water is removed from the C-410 basement and successfully treated, any residual solids (e.g., supernatant or sludge) in the bottom of Zone 26 will be characterized, managed, and disposed of in accordance with the action-specific applicable or relevant and appropriate regulation/requirements and TBC included in Appendix C, Table C.3, of the approved *Engineering Evaluation/Cost Analysis for C-410 Complex Infrastructure at the Paducah Gaseous Diffusion Plant*, DOE/OR/07-1952&D2/R1. This waste shall be disposed on-site at the permitted C-746-U Landfill or transported and disposed at an approved off-site waste disposal facility.

- DOE is moving forward with the action presented herein as part of the CERCLA Non-Time Critical Removal Action (*Action Memorandum Addendum for C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0273&D2, November 2009) recognizing that it addresses the concerns EPA raised in their November 26, 2014, letter.

- The conduct of this action does not establish or imply an effluent limit for radionuclide(s) discharge into the surface water at Outfall 001, nor does it establish any precedent, level, or

threshold that requires treatment for other discharges of radionuclides into surface water at PGDP as part of a CERCLA response action.

- The approved CERCLA documents for this project (e.g., Action Memorandum, Removal Action Work Plan) do not require modification to implement the aforementioned actions. A copy of the signed Memorandum of Agreement that incorporates this proposal, including the Attachments, will be incorporated into the C-410 Decontamination and Decommissioning Removal Action Report.

- The treatment system, aboveground storage tank, and associated connections/fittings will be maintained and monitored throughout the period of operation to ensure that there are no releases that could present risk to human health and/or the environment.

- DOE will notify EPA and KDEP once the field work begins (such as mobilization of treatment unit) and prior to initiating the pumping of the contaminated water from Zone 26 of the C–410 Basement. DOE will initiate the field work within 120 calendar days from date of the effective date of the signed Agreement.

Attachment 1: Map of C-410 treated water disposition route (including relevant description of details).

Concurrence:

DOE, EPA, and KDEP, as parties to the Paducah Federal Facility Agreement, hereby agree with the proposed action. EPA and KDEP authorize DOE to proceed with treatment and disposition of the contaminated C-410 water, as proposed.

Jennifer Woodard — 7/30/15

Jennifer Woodard
U.S. Department of Energy

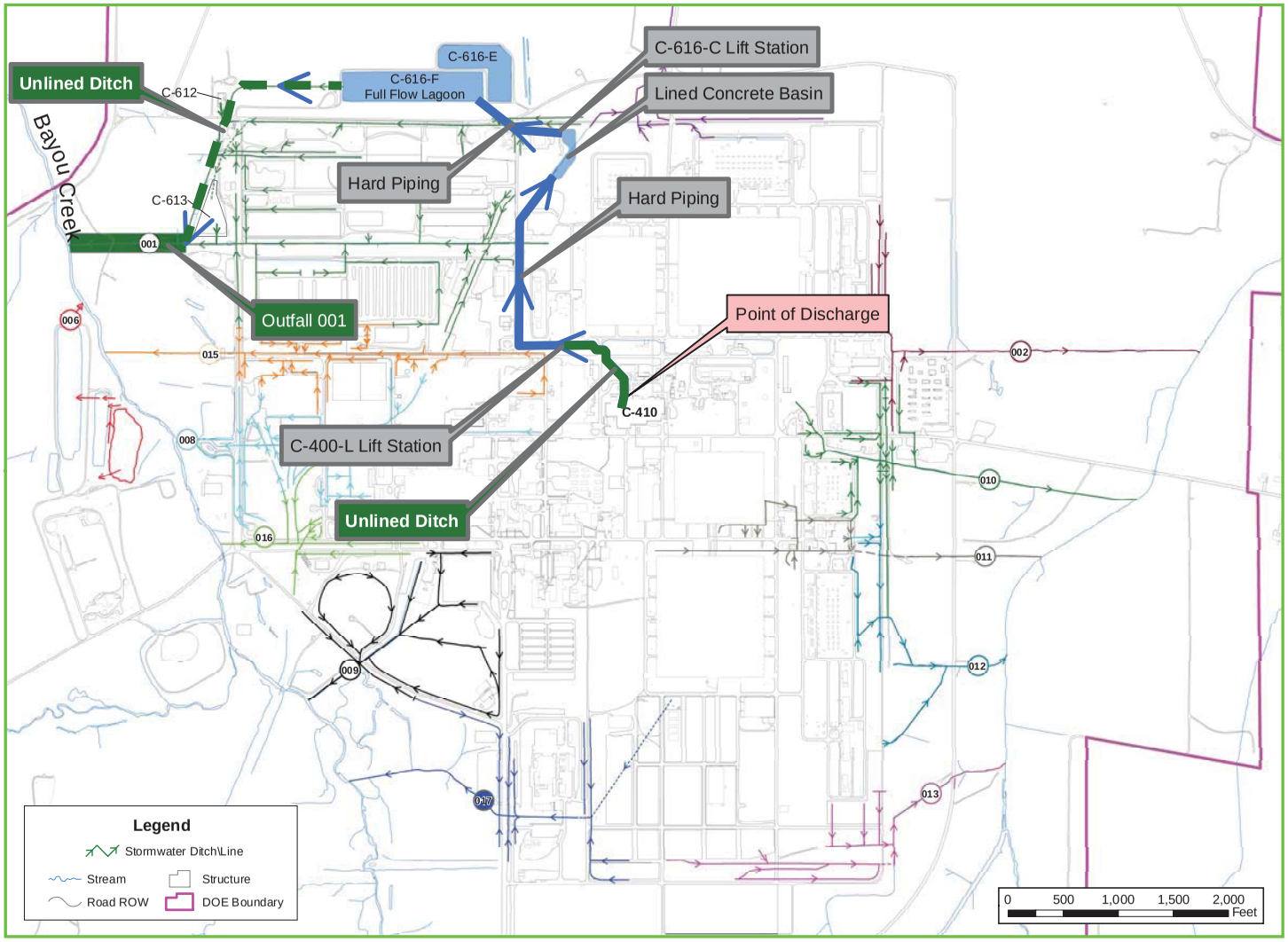
Julie Corkran — 7-31-2015

Julie Corkran
U.S. Environmental Protection Agency

April Webb — 7/31/15

April Webb
Kentucky Department for Environmental Protection

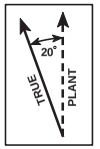
Date



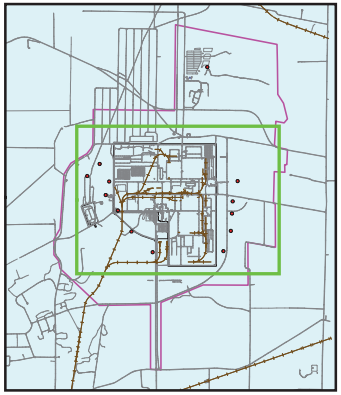
Kentucky Pollutant Discharge Elimination System (KPDES)

002 001, 002, 006, 008, 009, 010, 011, 012, 013, 015, 016, 019, 020* - Fluor

017 017 - BWCS



* Note: KPDES 019 & 020 are in the same location.



U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FLUOR

Attachment 1: C-410 Treated Water Discharge Route

7/30/2015

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