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DEC 10 2013

Mr. Todd Mullins
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PPPO-02-2035531-14

Ms. Jennifer Tufts
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Dear Mr. Mullins and Ms. Tufts:

REMOVAL ACTION REPORT FOR THE C-340 METALS REDUCTION PLANT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-1286&D1)

Enclosed for your review and approval is the *Removal Action Report for the C-340 Metals Reduction Plant at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1286&D1. This secondary document satisfies the requirement for a removal completion report, as identified in the *Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0344&D2. This document follows guidance developed during the April 2010 Federal Facility Agreement (FFA) managers meeting regarding removal actions, and the contents are consistent with Section X.A of the FFA. Mobilization occurred in August 2012, and final demobilization took place in August 2013.

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

Sincerely,

Jennifer Woodard

Jennifer Woodard
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosure:
Removal Action Report for C-340 Metals Reduction Plant

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REMOVAL ACTION REPORT FOR THE C-340 METALS REDUCTION PLANT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

Description of the Removal Action Implemented

The demolition of the C-340 Complex was warranted due to the contaminants of concern identified, their associated concentration levels, and relevant process knowledge, as documented in the approved *Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant*, DOE/LX/07-0344&D2 (RAWP) (DOE 2010a). The Comprehensive Environmental Response, Compensation, and Liability Act non-time-critical removal action decommissioning activities described herein included the structural demolition of the C-340 facility; removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping); and removal of residual waste materials.

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

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

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

Completion of this removal action supports the long-term remediation of the Paducah Gaseous Diffusion Plant. Demolishing the C-340 Complex structure has removed a source of a potential contaminant release to the environment. The demolition of the C-340 Complex addresses the substantive Resource Conservation and Recovery Act (RCRA) closure requirements for any areas where hazardous waste was discovered during deactivation, as summarized in DOE's letter, "American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste," of October 6, 2009 (DOE 2009), which was approved by Kentucky on October 20, 2009 (KDEP 2009).

The associated solid waste management units (SWMUs) included in the RAWP for the C-340 Complex are listed in Table 1.

The aboveground portions of the C-340 Hydraulic System, SWMUs 101 and 477, have been removed and disposed of. For SWMUs 378, 379, 380, 381, 382, and 434, all waste has been removed and these SWMUs no longer exist. SWMUs 514, 515, 516, and 521 have been completely removed and equipment disposed of and only the slabs remain. SWMUs 522, 523, 524, and 529 were backfilled with Portland

Table 1. C-340 Complex SWMUs

C-340 Complex	
SWMU No.	**SWMU Name**
101	C-340 Hydraulic System
378	G-340-01 Generator Staging Area
379	G-340-03 Generator Staging Area
380	G-340-04 Generator Staging Area
381	G-340-05 Generator Staging Area
382	G-340-06 Generator Staging Area
434	S-340-01 Satellite Accumulation Area
477	C-340 Metals Plant
514	C-340-D Reject Magnesium Fluoride Storage Silo
515	C-340 "Dirty" Dust Collection System
516	C-340 Derby Preparation Area Sludge Collection System
521	C-340 Saw System Degreaser
522	C-340 Work Pit Located at Ground Floor Level at B-7-B-9
523	C-340 Metals Plant Pit Ground Floor at F-6 to F-11
524	C-340 Pickling Sump B-10 and B-11
529	C-340 Power Plant Sump at Ground Floor Level

cement concrete; the slabs were double washed and rinsed; and two contrasting colors of epoxy fixative were applied (DOE 2010a).

Summary of Results

The demolition project involved removing the transite siding and demolishing the building structure, including any remaining piping and equipment on the slab and packaging it for disposal. Figure 1 is a photo of the C-340 Complex prior to demolition. Figure 2 shows the location of the facility. C-340 demolition did not involve removal of the slab, subslab penetrations, and/or foundations. Photos of the demolition of the C-340 progress are included in Appendix A. The slab was surveyed for radioactive materials, visually inspected for residual materials or staining, and sealed with a fixative. Pits were filled with Portland cement concrete.

Wastes were segregated, packaged, and dispositioned on-site at the C-746-U Landfill and off-site at Energy*Solutions* or Nevada National Security Site (NNSS). Very small quantities of waste generated during the removal action, such as used oil from equipment, maintenance, or unused chemicals, were dispositioned at Clean Harbors; Diversified Scientific Services, Inc. (DSSI); and East Tennessee Materials & Energy Corporation (M&EC). A total of approximately 35 ft^3 of waste was disposed of at these facilities. No equipment was identified that could be recycled or reused inside or outside of the DOE Complex.

Demolition

Transite removal began on August 22, 2012, and was completed on December 19, 2012. The actual structural demolition of the C-340 Complex was initiated on September 26, 2012, and was completed on February 12, 2013. All structural debris was packaged by March 27, 2013, and the application of slab sealant was completed by July 31, 2013. The demolition operations were completed in accordance with

Figure 1. C-340 Complex Prior to Demolition; View is from the Northeast Corner

the D2 RAWP that had been approved by EPA on November 5, 2010. The Commonwealth of Kentucky had approved the D2 RAWP on November 4, 2010.

During the activities that took place prior to beginning demolition, straw bales were placed along all storm water drainage ditches and around drainage grates. These storm water controls utilize best management practices as identified in the applicable or relevant and appropriate requirements (ARARs) and in the RAWP.

Dust suppression was used before, during, and after building demolition and also during waste packaging activities. Suppression methods included water misting with a DustBoss®, hand-held hoses for spot suppression, and the use of fixative. Prior to significant rainfall events, waste piles awaiting packaging were covered with Posi-Shell®, a clay-like spray-on product, to minimize potential for contaminated storm water runoff.

The demolition of the facility was accomplished using standard construction equipment, excavator-mounted shears, and excavator-mounted grapples. Primarily, a special ultra-high-reach excavator was used for taller portions of the facility. Transite was removed using manlifts. Minor demolition was accomplished with plasma and oxy-acetylene cutting torches. Demolition of the structure included removal of infrastructure that was left in place after deactivation. Examples of the infrastructure included piping, stabilized ductwork, and deactivated equipment. This piping and equipment were removed and downsized prior to packaging for disposal.

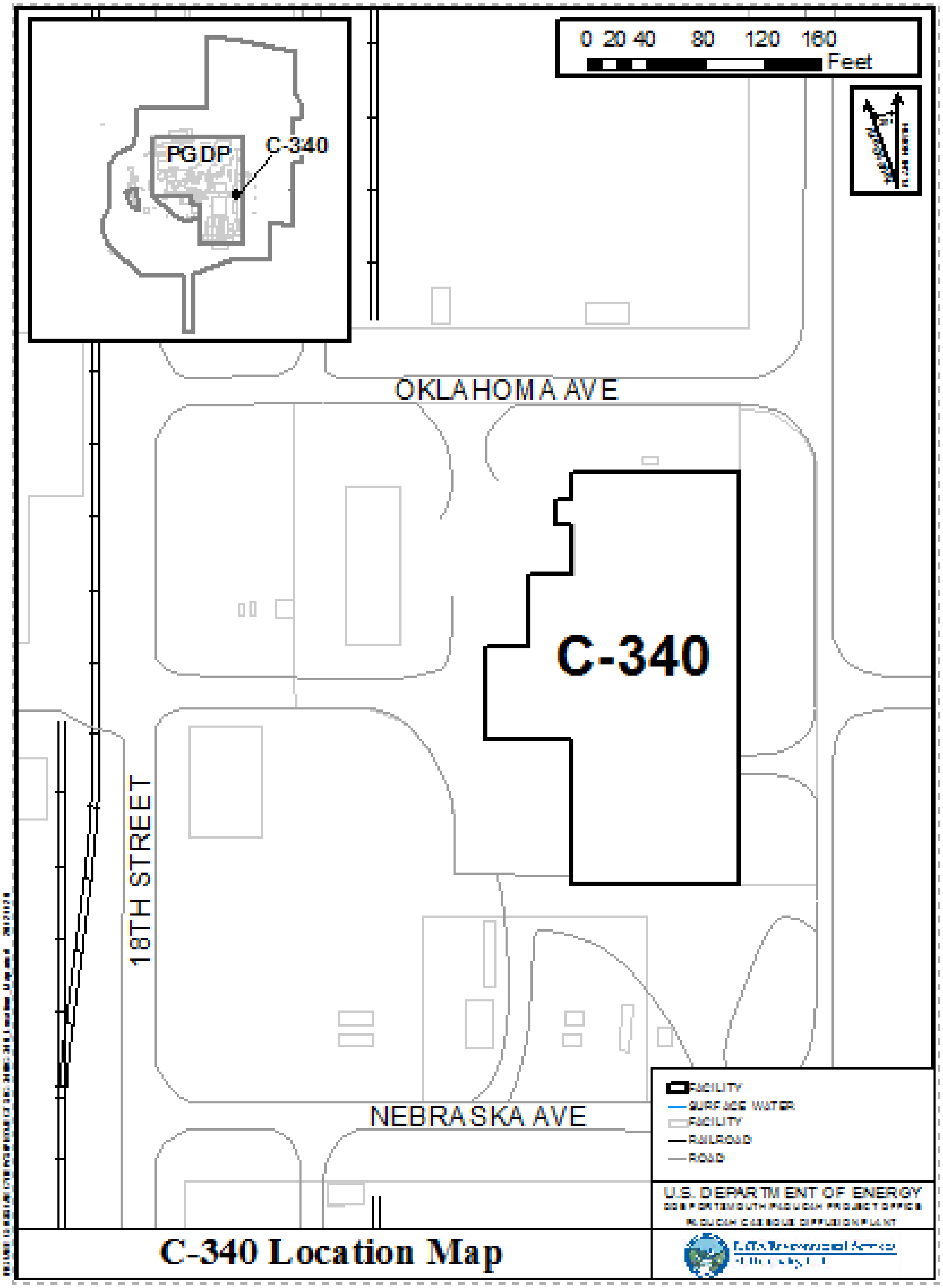

Figure 2. C-340 Complex Location Map

The C-340 Complex demolition proceeded as follows:

- Initiated transite removal on shipping and receiving area;
- Demolished lunch room boundary control station on south end;
- Demolished the shipping and receiving area on the north end of the complex;
- Removed transite on the C-340-B Metals Plant during demolition of the boundary control station and shipping and receiving;
- Initiated demolition at the south end of C-340- B Metals Plant;
- Performed transite removal on north and west side of C-340-A Powder Building and C-340-C Slag unit during demolition of the C-340-B Metals Plant;
- Completed transite removal on remainder of C-340-A Powder Building and C-340-C Slag Unit;
- Demolished the C-340-C Slag Unit; and
- Demolished the C-340-A Powder Building.

During the demolition and removal of transite, asbestos-containing insulation that previously had been inaccessible was made accessible. Abatement of this asbestos was performed at this time, prior to proceeding with demolition.

Slab Verification Survey and Surface Preparation

After the waste was removed, the slab was cleaned; all anchor bolts, piping, and metal framing was removed from the slab using cold cutting and hot work methods, such as metal cutting saws, reciprocating saws, and torches. Sumps and pits were cleaned out and backfilled with Portland cement concrete. Samples were collected from the bottom of the sumps.

The slab was inspected visually to identify any residual materials or staining. No residue or staining was observed. The slab was surveyed in accordance with the Demolition Verification Removal Action Plan to determine if there was residual radioactivity on the slab. This survey was performed following washing of the slab to prepare for epoxy application. Additionally, surveys were performed after application of the fixative to determine appropriate postings and control of the slab. The slab has been posted as a Fixed Contamination Area.

Over 240 data points were collected during performance of the survey. As expected based on historical operations, fixed radiological contamination was found on the slab, with alpha contamination identified at levels up to 7,520 disintegrations per one hundred square centimeters (dpm/100 cm^2), and beta/gamma contamination was identified at levels up to 1,150,000 dpm/100 cm^2. Very few of the survey data points indicated transferrable contamination above levels for posting as a Contamination area, and the application of the epoxy fixative sealed this contamination to the slab. Based on post-fixative application surveys, the slab was posted as a Fixed Radiological Contamination Area. The radiological surveys are provided in Appendix B. Survey numbers 13-FD-0441-S, 13-FD-0474-S, 13-FD-0492-S, 13-FD-0505-S, 13-FD-0533-S, 13-FD-0544-S, and 13-FD-0585-S contain the specific survey information.

During deactivation of the facility, the slab, pits, and sumps floors were sealed with an application of Fiberlock ABC, a hydrocarbon-based fixative. Slab fixative was applied using airless sprayer equipment. Following demolition and final surveying, the slab underwent a double wash and rinse, followed by application of an epoxy-based sealant, Macropoxy 646-100, with Armorseal Rexthane top coat. The top coat of the sealant was applied in a contrasting color.

Sump Verification Survey and Waste Water Disposal

Figure 3 depicts the slab design/construction of the C-340 Complex. The sumps were cleaned out, and samples of the concrete from the pit walls were collected from pits on the C-340 Slab. Three samples and one duplicate were collected from the hydraulic ram pit (SWMU 522), one from the elevator pit, and one from the conveyor trench (SWMU 523). Additionally, a duplicate and a field blank were collected. These samples were analyzed for total polychlorinated biphenyl (PCB) and specific aroclors. Only Aroclor 1248 was detected in any of the samples. Results from the sampling are summarized in Table 2, and the data are provided in Appendix C.

Table 2. PCB Sump Samples

Sample Number	Location	Aroclor 1248 (mg/kg)	Total PCB (mg/kg)
340CONPIT-1	East Wall Near North End of Ram Pit (SWMU 522)	7.89	7.89
340CONPIT-1D (DUPLICATE)	East Wall Near North End of Ram Pit (SWMU 522)	16.9	16.9
340CONPIT-2	East Wall Middle of Ram Pit (SWMU 522)	305	305
340CONPIT-3	East Wall Near South End of Ram Pit (SWMU 522)	32.8	32.8
340CONPIT-4	Northeast Corner of small pit NE of Ram Pit	2.56	2.56
340CONPIT-5	East Wall of Elevator Shaft Pit	1.91	1.91
340CONPIT-6	West Wall of Conveyor Pit (SWMU 523)	3.6	3.6

Approximately 8,000 gal of water was removed from the sumps prior to backfilling with concrete. The water was sampled and analyzed for PCBs, metals, and radioactive contamination. The analytical results indicated presence of PCB greater than discharge limits. Based on these results, treatment of this water by carbon absorption and filtering to remove suspended radionuclides was completed. The water was sampled following treatment; analyzed; and, based on the analysis, was discharged in accordance with ARARs. No residues or stained areas were observed on the walls and floors of the sumps following the removal of the water.

Approximately 7,800 gal of decontamination waste water was generated during this project. This water was characterized, and treatment is complete. The decontamination waste water was treated by carbon absorption, followed by pH adjustment, precipitation, and filtering to reduce dissolved radionuclide levels. Following treatment, this water was sampled, analyzed, and discharged in accordance with ARARs. Treatment and discharge of all waste water was completed on September 24, 2013.

Waste Segregation, Packaging, and Disposal

Implementation of the removal action generated 118,034 ft^3 of demolition debris, not including wastewater. The demolition material was segregated into two primary waste streams. The demolition generated 64,028 ft^3 of debris that met the waste acceptance criteria and was disposed in the on-site C-746-U Landfill, in accordance with ARARs. Disposal of this waste stream, which included the transite removed from the building exterior, was completed in July 2013.

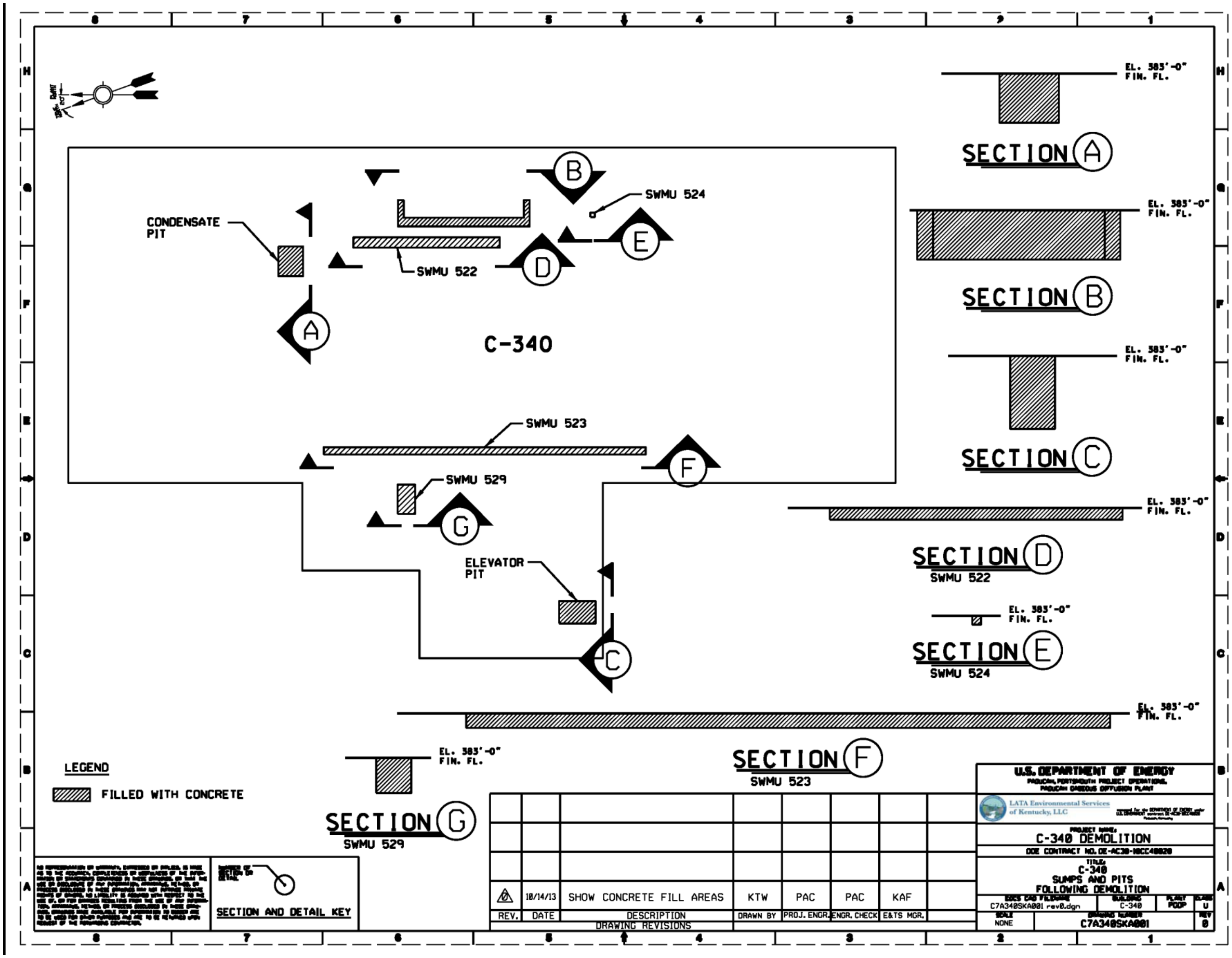

Figure 3. C-340 Concrete Slab after Demolition

Demolition resulted in generation of 53,414 ft^3 of PCB remediation low-level waste (LLW) waste at levels of PCBs above 50 ppm that was disposed of at Energy*Solutions*. This waste included 51,800 ft^3 that was shipped in 28 railcars on July 18, 2013. In addition to the gondola shipments, 1,614 ft^3 of material in intermodals and other containers of PCB remediation waste were shipped to Energy*Solutions*; the final shipment of this material occurred on September 23, 2013.

The demolition generated 456 ft^3 of LLW that required disposition at the NNSS, based on levels of depleted uranium. The final shipment of this material occurred on September 30, 2013.

Approximately 136 ft^3 of mixed waste or hazardous waste was generated during the removal action. This material was dispositioned at Energy*Solutions*, DSSI, M&EC, or Clean Harbors. The final shipment of this material occurred on September 23, 2013.

<u>Contamination Control</u>

During the performance of the C-340 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. This document outlines the requirements necessary to ensure compliance with applicable federal laws and DOE Orders. Routine radiological surveys were performed on predetermined schedules by the radiation protection staff. Additional samples were obtained before, during, and following the completion of work that could impact radiation/contamination levels.

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

There were no personnel contamination events during D&D of the C-340 Complex. During high-reach demolition operations, small pieces of dried fixative and paint were being dislodged from the elevated areas of the C-340 Complex. This lightweight debris was being blown from the upper floors of the building due to wind gusts and was found outside the Contamination Area encompassing the demolition site. Contamination measurements determined that the dried, fixative debris did not possess radioactivity in excess of 10 *CFR* 835 limits, while the heavier dried paint debris did. Individual pieces of contaminated dried paint debris were found to be less than 100 cm^2 in area. Radioactivity on the paint debris was measured up to maximum result of 26,000 dpm beta/gamma and 59 dpm alpha. No detectable removable contamination was detected on the debris. Paint chips were retrieved and dispositioned with demolition debris.

During high-reach demolition operations of the 7th floor of C-340, small pieces of contaminated insulation and contaminated water overspray were blown onto the roadway north of the C-340 Facility. The roadway is outside the Contamination Area that surrounds the demolition site. Initial surveys of vehicles and roadway in the impacted area indicated the presence of removable contamination in excess of 10 *CFR* 835 limits. It is suspected that water used for dust suppression became contaminated after contacting uranium residue within a duct and was blown into the northern buffer area by gusting winds. The residue and insulation were not accessible prior to demolition. Small pieces of insulation also were retrieved from the C-531 Switchyard, located north of the C-340 Complex. Removable radioactivity on the roadway (Oklahoma Avenue) was measured up to a maximum result of 8,600 dpm/100 cm^2 beta/gamma and 1,300 dpm/100 cm^2 alpha. Removable radioactivity on the vehicles parked on the C-340 Facility entrance and roadway was measured up to a maximum result of 3,700 dpm/100 cm^2

beta/gamma and 1,200 dpm/100 cm^2 alpha. The roadway previously had been posted as a Radioactive Materials Area/Fixed Contamination Area due to contaminated windborne paint flakes that were found in this area. Vehicles were decontaminated.

During downsizing of a heater box located in the C-340-B Building on December 12, 2012, the shear cut into the box and encountered a layer of asbestos insulation hidden behind firebrick in the heater. Dust became airborne and overwhelmed the misting dust suppression system and exited the Contamination Area boundary, which was posted along the facility's eastern fence. The dust continued east-northeast across equipment that was located immediately adjacent to the fence and ultimately dispersed. The dust left a white residue on the adjacent equipment (i.e., generators, utility trailer, fire extinguishers, and ladder). Work was stopped, and the area impacted by the asbestos was cleaned up, with resulting material packaged as asbestos-containing waste. The equipment involved was decontaminated. The heater box was dispositioned without further downsizing as asbestos waste. Work activities were redirected during the clean-up and decontamination of equipment due to the presence of the asbestos in the heater box. No workers were in the area immediately downwind of the dust, and the operator downsizing the material was inside an enclosed cab excavator and was wearing disposable anticontamination coveralls with a respirator. An initial assessment by surveying the generator in the area measured removable contamination at 250 dpm/100 cm^2 transferable alpha and 915 dpm/100 cm^2 transferable beta/gamma that exceeded Appendix D of *CFR* 835 limits for removable contamination. The area was posted as a contamination area until decontamination of the equipment and area was completed to release levels. The postings then were removed.

Following this discovery of the hidden asbestos layer, other similar heating equipment in the C-340 Complex was evaluated for the potential for hidden layers of asbestos. A set of clamshell heaters located on the sixth and seventh floors of the C-340-A Powder Building was identified that contained similar nonasbestos firebrick. Samples were collected from behind the firebrick in the heaters, and a concealed, underlying asbestos material was identified. Demolition was deferred in this area to allow abatement of the asbestos-containing material in these clamshell heaters.

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-340 area without written certification that the equipment had undergone a radiological survey and had met the appropriate release criteria.

Area Air Monitoring

Over 3,700 discrete air samples were collected for radiological contamination, asbestos, and metals during the demolition. These samples comprised of breathing zone personnel monitoring samples for workers, area monitors, perimeter monitors, and clearance samples. Of these 3,700 samples, a total of 8 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. A total of 1,651 breathing zone samples was collected. Additionally, 373 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 20 area samples collected for metals or the 5 personnel monitoring samples collected for metals exceeded the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs). A total of 1,386 perimeter samples was collected for asbestos during all phases of the removal action. Three asbestos perimeter asbestos samples that reported at .01009 fibers per cm^3 (f/cc) of air during lead bolt cutting for transite removal; 0.01391 f/cc during transite removal and building demolition; and 0.01024 f/cc during building demolition and material downsizing.

These were compared to an administrative control level for asbestos perimeter sampling of 0.01 fibers per cm^3. Since these samples were at or slightly above the administrative control level and were only 3 samples from a total of 1,386 perimeter samples, changes were not made to work practices or dust control measures based on these 3 samples. A total of 292 breathing zone asbestos samples was collected during the transite removal and asbestos abatement activities. One sample of these exceeded the OSHA PEL. This sample was a personnel monitoring sample collected during demolition by the demolition subcontractor of an asbestos containment, which was reported at 1.89 f/cc, versus an occupational limit of 0.07 f/cc based on a 10 hour work day. The subcontractor employee was wearing disposable anticontamination coveralls and a full-face, powered, air purifying respirator during the containment demolition. The protection factor of the respiratory equipment was not exceeded. Corrective actions, including changing approach for asbestos abatement and providing additional oversight of subcontractor asbestos activities, were implemented as a corrective action following the event that produced this sample. 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. Data summaries for the air monitoring are provided in Appendix D.

Summary of Problems Encountered

No significant problems were encountered during implementation of the RAWP. Minor issues encountered during the demolition included the release of paint chips, fixative, and contaminated insulation outside the demolition area, as well as the discovery of hidden asbestos in the heater boxes and clam shells. Additional detail on these deviations is included in the section entitled, "Contamination Control."

Additionally, the following specific items were identified that were minor deviations from the RAWP. None of these deviations impacted the implementation of the removal action or compliance with ARARs.

(1) RAWP, Section 2.3.6.1, included an expectation that the majority of waste would be LLW and asbestos-containing material. Characterization indicated, however, that nearly 50% of generated demolition debris was LLW PCB remediation waste, with concentrations greater than 50 ppm PCB. The PCB Remediation Waste disposition was completed in accordance with ARARs.

(2) Following completion of demolition and removal of waste, several failures in the building slab were identified that were not present prior to structural demolition. These included holes or damaged areas of concrete that, in a few cases, extended through the slab into the backfill below. To ensure a good bond between the slab and the epoxy fixative, forms were installed and concrete was poured to fill holes. The RAWP did not address potential repairs to the slab following demolition, however, the repairs were necessary to ensure the epoxy coating would adhere, and the repairs did not impact the removal actions' compliance with ARARs.

(3) The sequence of work defined in the Demolition Plan in the RAWP (Appendix A) included filling of pits with flowable fill prior to structural demolition. The field sequence for work was adjusted, resulting in the filling of pits after demolition was partially completed. This sequencing did not impact compliance with ARARs.

Summary of Accomplishments and/or Effectiveness of the Removal Action

The demolition of the C-340 Facility was accomplished in accordance with the D2 RAWP (DOE 2010a). Waste handling, segregation, packaging, shipping, and disposal were accomplished in accordance with ARARs.

Timeline for Completion

Table 3 illustrates the timeline for the D&D phase of the C-340 demolition program. The demolition was initiated on September 26, 2012.

Table 3. Timeline of Demolition of C-340 Complex

Date	Activity
8/22/2012	Initiate Transite Removal
9/26/2012	Begin Demo of C-340 B and Lunch Room
10/3/2012	Begin Demo of Shipping and Receiving
10/4/2012	Completed Demo of Shipping and Receiving
10/8/2012	Begin Demo of MgF_2 Tank
10/9/2012	Completed Demo of MgF_2 Tank
12/19/2012	Complete Transite Removal
10/24/2012	Completed MgF_2 Tank disposal
10/30/2012	Completed Waste Disposal from Shipping and Receiving and Lunch Room
11/14/2012	Begin C-340-B Building Demo
12/7/2012	Begin C-340-B Building Demo
1/4/2013	Begin C-340-C Slag Unit Demo
1/22/2013	Begin C-340-A Building Demo
1/3/2013	Completed C-340-B Building Demo
1/4/2013	Completed C-340-C Slag Unit Demo
2/12/2013	Completed C-340-A Building Demo
2/28/2013	Completed Backfilling of Sumps
7/25/2013	Completed Applying Sealant to Slab
9/30/2013	Completed Shipment of Demolition Debris for Off-site Waste Disposal
8/1/2013	Completed Waste Disposal at C-746-U Landfill
9/24/2013	Completed Treatment and Discharge of Decontamination Water and Water from Sumps

Summary of Any Operation and Maintenance Required

Routine inspection of fixative on slabs and repair as necessary is only operation and maintenance required.

Summary of the Project Cost

The cost of implementing this removal action project, including packaging, transportation, and disposal of demolition debris, was $20.2 million. Table 4 summarizes the cost elements.

Table 4. Summary of Cost Elements

Activity	Cost, $M
Demolition of Structure, Project Management, Slab Preparation, and Sealing, Site Restoration	13.5
Structural Waste Packaging, Transportation, and Disposal	6.7
Total	**$20.2**

References

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DOE 2010a. *Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant*, DOE/LX/07-0344&D2, October 29.

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

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

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

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

APPENDIX A

PHOTOGRAPHS OF C-340 DEMOLITION OPERATIONS

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Figure A.1. C-340 Complex Prior to Demolition

Figure A.2. A Man-lift Is Used to Reach Fixative-sprayed Transite Panels

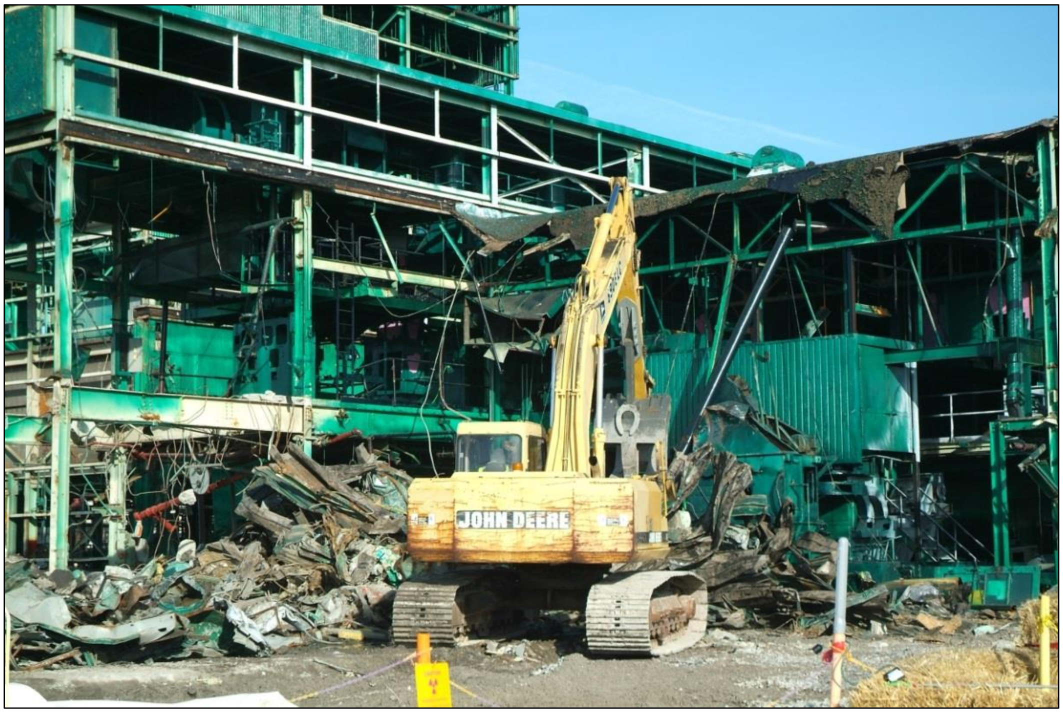

Figure A.3. Excavators with Shear Attachments Were Used to Remove Parts of the Building and Debris Generated by Demolition Activities

Figure A.4. An Ultra-high-reach Demolition Machine Is Used to Remove Parts of the Building That Can't Be Reached by the Smaller Excavators

Figure A.5. An Ultra-high-reach Demolition Machine Is Used to Demolish the Metals Plant from the Top Down

Figure A.6. The Support Beams for the Metals Plant Are Cut To Bring the Building to Slab

Figure A.7. Debris Is Being Sorted into Waste, Part of Which Will Be Shipped to an Approved Disposal Facility and the Rest Taken to the On-site C-746-U Landfill

Figure A.8. C-340 Complex after Demolition

APPENDIX B

RADIATION SURVEY RESULTS

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RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-PD-441 -S Page 1 of 4

Completed Date: 5/15/13 Completed Time: 1600 RWP Number: Pad-PD-29448 rev.0

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item):

Material / Other Job Description: Characterization of section of pad on South side of C-340 foundation

Instrument Information

Contamination / Field Instruments

#								
1 α	Inst. Model #	L-3, 12	Serial #	202002	Cal Due	9/10/13	Probe Model	43-5
	Bkgd (cpm):	1.4	MDC Pt (dpm)	66	MDC Pl (dpm)	87		
	Inst. L_c (cpm)	5	CF Pt:	7.71	CF Pl:	10.14		
2 α	Inst. Model #		Serial #	N/A	Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			
3 β	Inst. Model #	L-3	Serial #	106356	Cal Due	3/27/14	Probe Model	44-9
	Bkgd (cpm):	56	MDC Pt (dpm)	171	MDC Pl (dpm)	136		
	Inst. L_c (cpm)	74	CF Pt:	4.5	CF Pl:	20		
4 β	Inst. Model #		Serial #	N/A	Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			

Laboratory / Smear Instruments

#								
5	Inst. Model #	L-S 2929	Serial #	137614	Cal Due	10/18/13	Probe Model	43-10-1
	α Bkgd (cpm):	2	α MDC (dpm)	21	α Inst. L_c (cpm)	5	α CF Pt:	2.67
	β Bkgd (cpm):	51	β MDC (dpm)	75	β Inst. L_c (cpm)	64	β CF Pt:	2.81
6	Inst. Model #		Serial #	N/A	Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)		α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	

Radiation/Dose Instruments

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

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable): Pre-paint/epoxy survey.

N/A

RCT: Corey Howes | [signature] Badge: 705527 RCT: N/A Badge:

RCT: S. DAVIS | [signature] Badge: 707834 RCT: Badge:

RADCON Supervisor Review: Michael Kreisher [signature] 05-17-2013 Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FO-441 -5

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	~~Removable β/γ cpm/LAW~~		
	bkg(cpm) 1.4		bkg(cpm) 2		bkg(cpm) 56		bkg(cpm) 51		bkg(cpm) N	~~bkg(cpm)~~		
	CF: 0.14		CF: 2.67		CF: 30		CF: 2.81					
	Lc= 10.45		Lc= 5		Lc= 74		Lc= 64		Lc= 0.0	Lc= 0.0		
Item No.	gross cpm	α 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
1	4	26	5	8	354	8940	54	<Lc			Please see map	DR SD
2	16	146	1	<Lc	642	17580	62	↓			↓	↓ ↓
3	44	432	3	3	2144	62640	67				on seam	
4	40	391	4	5	2030	59220	66				on metal cover	
5	22	209	2	<Lc	[illegible]	171300	59				next to opening	
6	25	239	3	3	1422	40980	53				seam	
7			5	8			64					
8	N		3	3	N		58					
9		A	4	5		A	66					
10			2	<Lc			60					
11	98	980	2	↓	4828	143160	48		N		metal cover	
12	N		3	3	N		65					
13		A	0	<Lc		A	49			A		
14	21	199	5	8	256	6000	70					
15	N	A	3	3	N	A	63					
16	22	201	3	3	1624	47040	53					
17	14	128	0	<Lc	930	26220	59					
18	N		1	↓	N		55					
19		A	2	↓		A	49					
20	10	87	6	11	246	5700	69					
21	N	A	1	<Lc	N	A	42					
22	16	148	4	5	150	2820	61					
23	N	A	2	<Lc	N	A	47					
24	17	158	1	↓	1061	30150	52				metal cover	
25	8	67	0	↓	2634	77340	56	↓			↓ break in concrete	↓ ↓

Comments: N/A

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

RAD-F-0008 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-441 -S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 1.4		bkg(cpm) 2		bkg(cpm) 56		bkg(cpm) 51		bkg(cpm)	bkg(cpm)		
	CF: 10.14		CF: 2.67		CF: 30		CF: 2.81					
	Lc= 5		Lc= 5		Lc= 74		Lc= 64		Lc= 0.0	Lc= 0.0		
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	N		3	3	N		61	<Lc			See map	DA SD
27		A	4	5		A	44		N			
28	15	140	0	<Lc	256	6000	52				Porch	
29	N/A		0		N/A		31			A		
30	16	148	4	5	3044	89640	56				break in concrete	
31	N/A		1	<Lc	N/A		50				2'x2' count area	DA

Comments: N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY MAP FORM

Survey Number: B-FD-441-S

Legend:

A Air Sample Location

○ Smear / Direct

□ Beta or Gamma Dose Rate

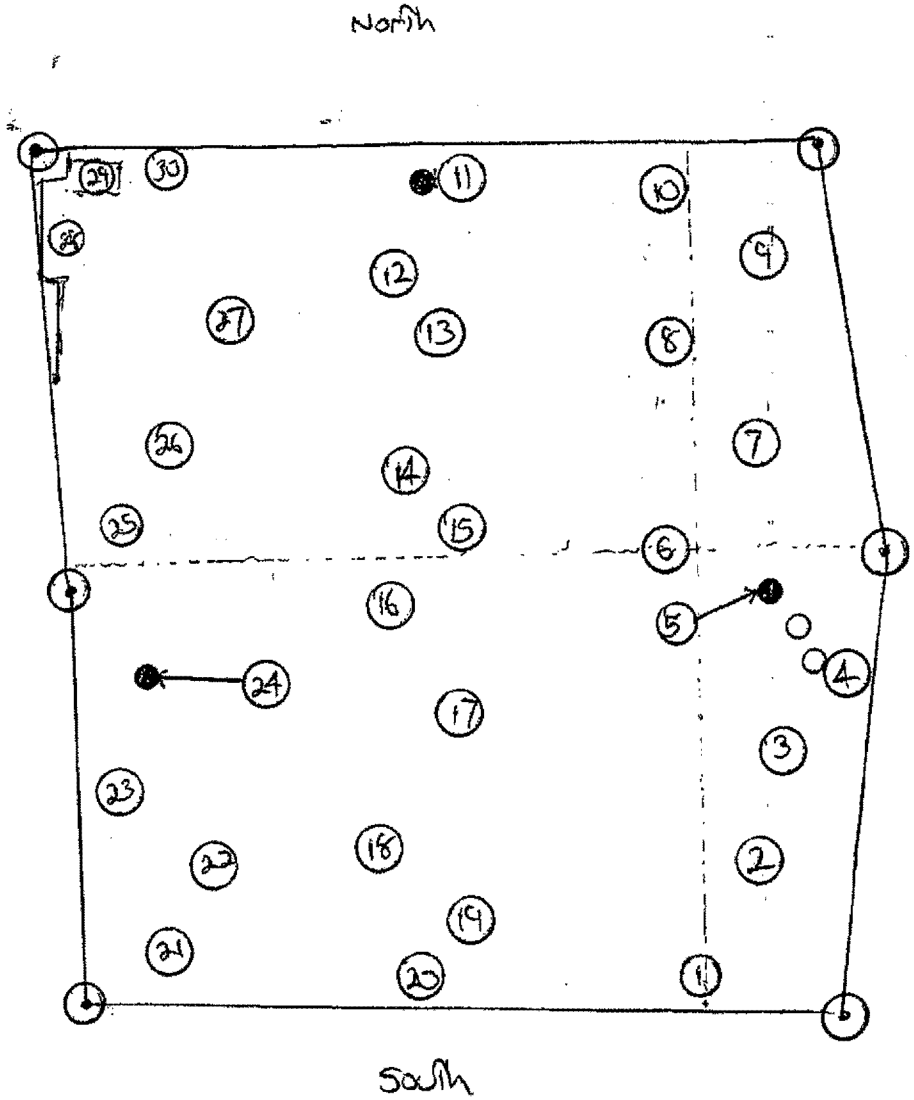
△ Neutron Dose Rate

LAW

⊙ = Stantion

= roped off Area

= Seam



RAD-F-0007 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-PD-0474-S

Completed Date: 5-23-13 Completed Time: 1000 RWP Number: PAD-PD-2944880

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item): PAD

Material / Other Job Description: INFORMATIONAL SURVEY OF PAD PRIOR TO FIXATIVE APPLICATION

Instrument Information

Contamination / Field Instruments

1 α	Inst. Model #	LUD 12	Serial #	202002	Cal Due	9-10-13	Probe Model	43-5
	Bkgd (cpm):	1.4	MDC Pt (dpm)	66	MDC Pl (dpm)	87		
	Inst. L_c (cpm)	5	CF Pt:	7.71	CF Pl:	10.14		
2	Inst. Model #		Serial #		Cal Due	N/A	Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			
3 β	Inst. Model #	LUD12	Serial #	168788	Cal Due	1-28-14	Probe Model	44-9
	Bkgd (cpm):	80	MDC Pt (dpm)	223	MDC Pl (dpm)	1483		
	Inst. L_c (cpm)	181	CF Pt:	4.89	CF Pl:	33.27		
4 β	Inst. Model #		Serial #		Cal Due	N/A	Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			

Laboratory / Smear Instruments

5	Inst. Model #	LUD 2929	Serial #	137619	Cal Due	10-18-13	Probe Model	43-10-1
	α Bkgd (cpm):	0.2	α MDC (dpm)	12	α Inst. L_c (cpm)	1	α CF Pt:	2.67
	β Bkgd (cpm):	38	β MDC (dpm)	66	β Inst. L_c (cpm)	49	β CF Pt:	2.81
6	Inst. Model #		Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)		α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	

Radiation/Dose Instruments

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

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable):

N/A

RCT:	D. Oakes	[signature]	Badge:	705265	RCT:	N/A	N/A	Badge: N/A
RCT:	N/A	N/A	Badge:	N/A	RCT:	N/A	N/A	Badge: N/A

RADCON Supervisor Review: Michael Kreisher [signature] 05-23-2013
Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-0474 -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) 1.4		bkg(cpm) 0.2		bkg(cpm) 80		bkg(cpm) 38		bkg(cpm)	bkg(cpm) N/A		
	CF: 10.14		CF: 2.67		CF: 33.27		CF: 2.81					
	Lc= 5		Lc= 1		Lc= 101		Lc= 49		Lc= N/A 0.0	Lc= N/A 0.0		
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
1	65	645	3	7	362	9,382	72	96	N/A	N/A	CONCRETE PAD (SEE ATTACHED MAP)	RR
2	49	483	35	93	3600	117,110	252	601				
3	80	797	6	15	11,200	369,962	75	104				
4	22	209	7	18	419	11,279	84	129				
5	28	270	7	18	918	27,880	83	126				
6	N/A	N/A	6	15	N/A	N/A	62	67				
7			5	13			61	65				
8			1	2			57	53				
9			6	15			65	76				
10	N/A	N/A	11	29	N/A	N/A	142	292				
11	25	239	18	48	892	27,015	211	486				
12	29	280	24	64	2,458	79,116	304	747				
13	743	7,520	5	13	43	<Lc	75	104				
14	46	452	2	5	381	10,014	43	<Lc				
15	18	168	4	10	446	12,177	60	34				
16	N/A	N/A	11	29	N/A	N/A	87	138				
17			6	15			99	171				
18			1	2			58	56				
19			3	7			60	62				
20	N/A	N/A	1	2	N/A	N/A	51	37				
21	25	239	3	7	354	9,116	60	62				
22	72	716	84	224	22,226	736,797	387	1,009				
23	441	4,458	48	128	9,981	329,406	300	821				
24	24	229	3	7	683	20,062	76	107				
25	27	260	4	10	443	12,077	69	87	N/A	N/A	CONCRETE PAD (SEE ATTACHED MAP)	RR

Comments: NOTE: SURVEY WAS PERFORMED PRIOR TO ANY FIXATIVE APPLICATION, RR

N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-0474 -S

Instrument	1		5		3		5		N/A	N/A		
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 1.4		bkg(cpm) 0.2		bkg(cpm) 80		bkg(cpm) 38		bkg(cpm)	bkg(cpm)		
	CF: 10.14		CF: 2.67		CF: 33.27		CF: 2.81					
	Lc= 5		Lc= 1		Lc= 101		Lc= 49		Lc= N/A 0.0	Lc= N/A 0.0		
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	N/A	N/A	7	18	N/A	N/A	66	79	N/A	N/A	CONCRETE PAD (SEE ATTACHED MAP)	RR
27			5	13			86	135				
28			5	13			42	[illegible]				
29			8	21			69	87				
30			7	18			62	67			CONCRETE PAD (SEE ATTACHED MAP)	
31	N/A	N/A	3	7	N/A	N/A	51	37	N/A	N/A	LWD 2929 COUNTING AREA	RR

Comments: N/A

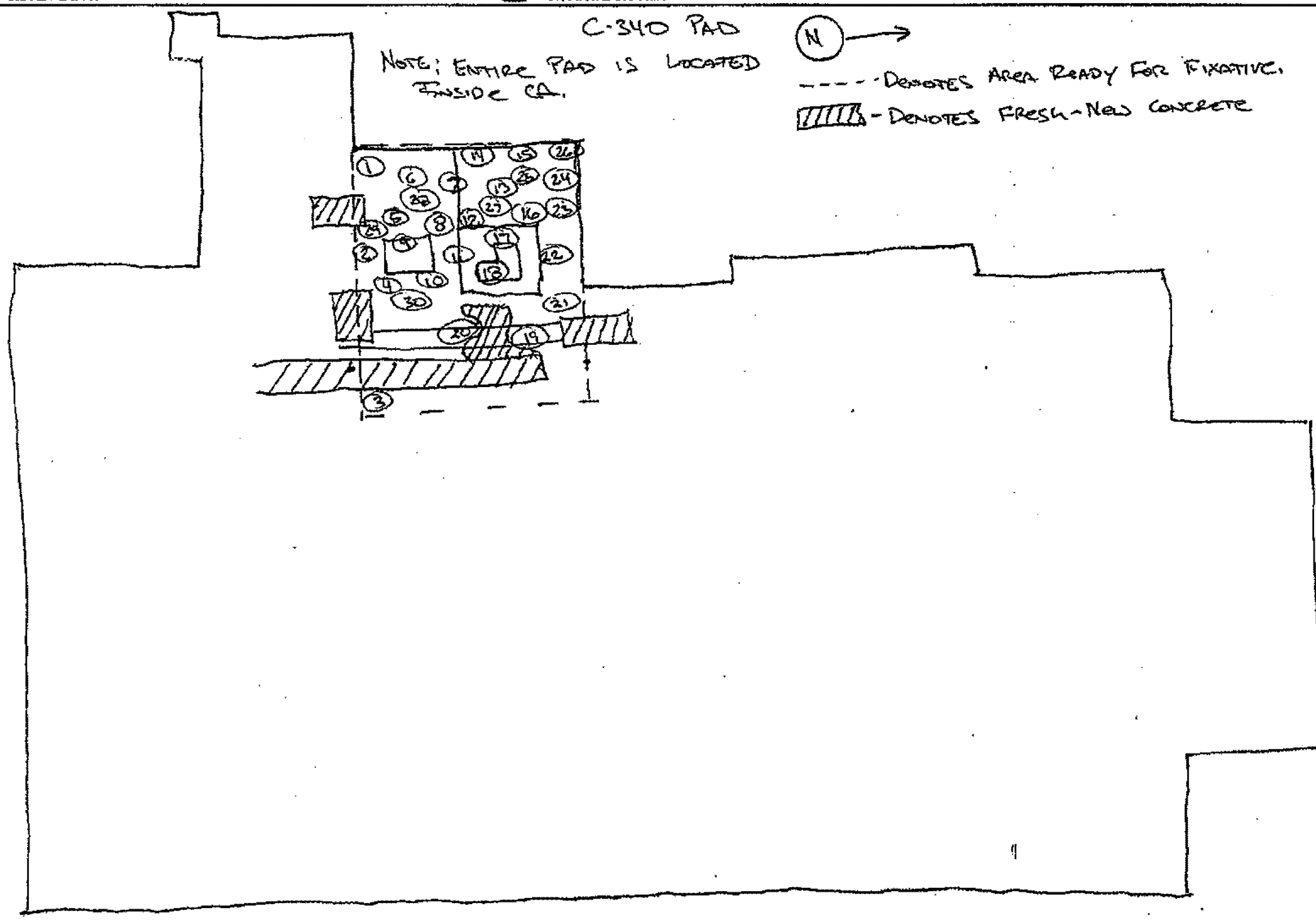
RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY MAP FORM

Survey Number: 13-FD-0474 -S

Legend:
A Air Sample Location
○ Smear / Direct
□ Beta or Gamma Dose Rate
△ Neutron Dose Rate
○〰→ LAW



RAD-F-0007 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FD-0492-S. Page 1 of 4

Completed Date: 5-29-13 Completed Time: 1300 RWP Number: PAD-FD-29448 R0

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item): PAD

Material / Other Job Description: INFORMATIONAL SURVEY OF CONCRETE PAD PRIOR TO FIXATIVE APPLICATION

N/A

Instrument Information

Contamination / Field Instruments

#								
1 α	Inst. Model #	LUD12	Serial #	223445	Cal Due	9-8-13	Probe Model	43-5
	Bkgd (cpm):	0.4	MDC Pt (dpm)	46	MDC Pl (dpm)	61		
	Inst. L_c (cpm)	2	CF Pt:	7.69	CF Pl:	10.12		
2 α	Inst. Model #		Serial #		Cal Due	N/A	Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			
3 β	Inst. Model #	LUD12	Serial #	207217	Cal Due	2-4-14	Probe Model	44-9
	Bkgd (cpm):	61	MDC Pt (dpm)	190	MDC Pl (dpm)	1262		
	Inst. L_c (cpm)	80	CF Pt:	4.81	CF Pl:	32.07		
4 β	Inst. Model #		Serial #		Cal Due	N/A	Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			

Laboratory / Smear Instruments

#								
5	Inst. Model #	LUD2929	Serial #	261408	Cal Due	11-30-13	Probe Model	43-10-1
	α Bkgd (cpm):	0.2	α MDC (dpm)	13	α Inst. L_c (cpm)	1	α CF Pt:	2.72
	β Bkgd (cpm):	53	β MDC (dpm)	77	β Inst. L_c (cpm)	66	β CF Pt:	2.64
6	Inst. Model #		Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)	N	α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	

Radiation/Dose Instruments

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

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable):

N/A

RCT:	D.Quarles / [signature]	Badge:	705665	RCT:	N/A / N/A	Badge:	N/A
RCT:	N/A / N/A	Badge:	N/A	RCT:	N/A / N/A	Badge:	N/A

RADCON Supervisor Review: Michael Kreisher [signature] 05-30-2013 Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-ED-0492-5

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) 0.4		bkg(cpm) 0.2		bkg(cpm) 61		bkg(cpm) 53		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 32.07		CF: 2.64					
	Lc= 2		Lc= 1		Lc= 80		Lc= 66		Lc= N/A 0.0	Lc= N/A 0.0		
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
1	13	128	1	2	348	9,204	65	<Lc	N/A	N/A	SEE ATTACHED MAP	RR
2	18	178	9	24	187	~~4,047~~ 4,041	77	63				
3	37	370	1	2	2465	77,096	59	<Lc				
4	17	168	2	5	285	7,184	67	37				
5	20	198	5	13	141	2,566	63	<Lc				
6	N/A	N/A	3	8	N/A	N/A	63					
7			1	2			43					
8			4	10			61					
9			5	13			59	<Lc				
10	N/A	N/A	5	13	N/A	N/A	71	48				
11	19	188	2	5	635	18,408	56	<Lc				
12	5	47	10	27	2,133	66,449	94	108				
13	22	219	4	10	249	6,029	67	37				
14	9	87	3	8	220	5,099	62	<Lc				
15	24	239	2	5	282	7,087	50					
16	N/A	N/A	3	8	N/A	N/A	42					
17			4	10			61					
18			3	8			62					
19			2	5			61	<Lc				
20	N/A	N/A	13	35	N/A	N/A	61					
21	0	<Lc	2	5	280	7,023	51	<Lc				
22	10	97	3	8	185	3,977	83	79				
23	16	158	1	2	138	2,469	58	<Lc				
24	26	259	3	8	921	27,580	88	92				
25	10	97	5	13	182	3,880	59	<Lc	N/A	N/A	SEE ATTACHED MAP	RR

Comments: NOTE: SURVEY WAS PERFORMED PRIOR TO ANY FIXATIVE APPLICATION. RR

N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-0492-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) 0.4		bkg(cpm) 0.2		bkg(cpm) 61		bkg(cpm) 53		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 32.07		CF: 2.64					
	Lc= 2		Lc= 1		Lc= 80		Lc= 66		Lc= N/A 0.0	Lc= N/A 0.0		
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	N/A	N/A	3	8	N/A	N/A	76	61	N/A	N/A	SEE ATTACHED MAP	RR
27			3	8			55	<Lc				
28			3	8			76	61				
29			4	10			46	<Lc				
30	N/A	N/A	5	13	N/A	N/A	81	74				
31	22	219	6	16	437	12,058	64	<Lc				
32	42	421	13	35	607	17,510	101	127				
33	1	<Lc	4	10	1,730	53,525	68	40				
34	31	310	4	10	712	20,878	75	58				
35	13	128	8	21	125	2,052	81	74				
36	N/A	N/A	7	18	N/A	N/A	99	121				
37			15	40			146	246				
38			13	35			114	161				
39			11	29			147	248				
40			29	78			284	610			See Attached Map	
41	N/A	N/A	0	<Lc	N/A	N/A	41	<Lc	N/A	N/A	LWD 2929 Counting Area	RR

N

A

Comments: N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY MAP FORM

Survey Number: 13-ED- 0492 -S

Legend:

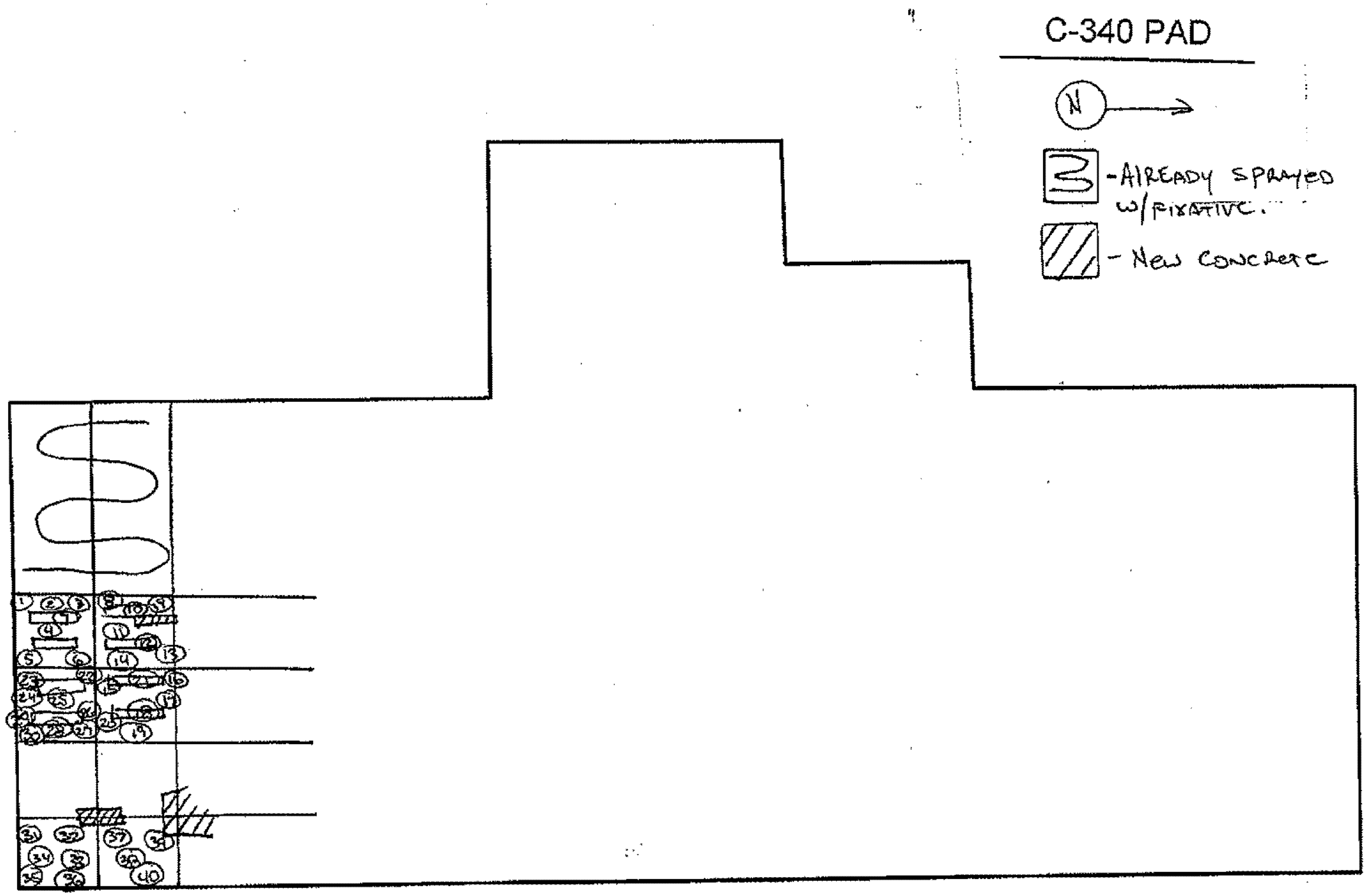
A Air Sample Location

○ Smear / Direct

□ Beta or Gamma Dose Rate

△ Neutron Dose Rate

LAW



RAD-F-0007 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FO-505-S

Page 1 of ~~3~~ 4 [initials] 6-4-13

Completed Date: 6/3/13 Completed Time: 1515 RWP Number: PAD-FO-29448 rev0

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item): Concrete pad in contamination area

Material / Other Job Description: Pre paint survey of mid-South section of concrete pad

N/A

Instrument Information

Contamination / Field Instruments

#								
1 α	Inst. Model #	Lud 12	Serial #	264687	Cal Due	9/30/13	Probe Model	43-5
	Bkgd (cpm):	1	MDC Pt (dpm)	61	MDC Pl (dpm)	80		
	Inst. L_c (cpm)	4	CF Pt:	7.59	CF Pl:	10.38		
2 α	Inst. Model #		Serial #		Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	N	MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:	A		
3 β	Inst. Model #	Lud 12	Serial #	207217	Cal Due	2/4/14	Probe Model	44-9
	Bkgd (cpm):	67	MDC Pt (dpm)	198	MDC Pl (dpm)	1318		
	Inst. L_c (cpm)	87	CF Pt:	4.81	CF Pl:	32.07		
4 β	Inst. Model #		Serial #		Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	N	MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:	A		

Laboratory / Smear Instruments

#								
5	Inst. Model #	Lud 2929	Serial #	261408	Cal Due	11/30/13	Probe Model	~~43-10~~ 43-10-1
	α Bkgd (cpm):	0.2	α MDC (dpm)	13	α Inst. L_c (cpm)	2	α CF Pt:	2.72
	β Bkgd (cpm):	47	β MDC (dpm)	68	β Inst. L_c (cpm)	59	β CF Pt:	2.64
6	Inst. Model #	[redacted]	Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)		α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	

Radiation/Dose Instruments

#								
7	Model #		Serial #		Cal Due		BCF:	[redacted]
	Bkgd (mrem/hr)		LLD (mrem/hr):					
8	Model #		Serial #		Cal Due		[redacted]	
	Bkgd (mrem/hr)		LLD (mrem/hr):					

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable): Some sections not surveyed are new formed poured concrete.

N/A

RCT: Corey Hawes [signature] Badge: 705527 RCT: N Badge:

RCT: N Badge: A RCT: Badge: A

RADCON Supervisor Review: Michael Kretzschmar [signature] 06-04-2013 Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-505 -S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW N	Removable β/γ cpm/LAW A		
	bkg(cpm) 1		bkg(cpm) 0.2		bkg(cpm) 67		bkg(cpm) 47		bkg(cpm)	bkg(cpm)		
	CF: 0.35		CF: 2.72		CF: 32.07		CF: 2.64					
	Lc= 4		Lc= 2		Lc= 87		Lc= 59		Lc= 0.0	Lc= 0.0		
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
1	12	114	3	8	592	16837	52	<Lc			see map/page 4	[illegible]
2	8	73	8	21	3018	94639	120	193			buried area	
3	13	125	10	27	1332	40569	117	185				
4	40	405	1	2	3448	108429	47	<Lc			metal cover	
5	24	239	0	<Lc	786	23056	43					
6	N	N	8	21	N	N	81	143			break	
7	A	A	4	10	A	A	60	34				
8	10	93	5	13	2574	80400	80	87			break	
9	N	N	2	5	N	N	47	<Lc				
10	A	A	3	8	A	A	42	<Lc				
11	4	31	6	16	1560	47881	57	~~26~~ <Lc				
12	N	N	3	8	N	N	64	45				
13	A	A	1	2	A	A	42	<Lc				
14	15	145	8	21	5418	171607	70	61			" break	
15	8	73	12	32	4698	148516	164	309			shower drain	
16	18	177	4	10	274	6639	67	53				
17	N/A	N/A	17	~~44~~ 46	N/A	N/A	100	140				
18	47	478	4	10	4766	151403	86	103				
19	N/A	N/A	15	40	N/A	N/A	112	172				
20	20	197	16	43	23042	736856	95	127			break/buried	
21			17	~~44~~ 46			141	248			"	
22	N		27	73	N		206	420				
23		A	13	35		A	134	230				
24			18	48			136	235				
25			26	70			222	462				

Comments: N/A

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

RAD-F-0008 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-505-S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 1		bkg(cpm) 0.2		bkg(cpm) 67		bkg(cpm) 47		bkg(cpm)	bkg(cpm)		
	CF: 10.35		CF: 2.72		CF: 32.07		CF: 2.64					
	Lc= 4		Lc= 2		Lc= 87		Lc= 59		Lc= 0.0	Lc= 0.0		
Item No.	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	gross cpm	dpm 100cm2	N LAW α cpm/LAW	LAW β/γ cpm/LAW	Sample Location and/or remarks	RCT Initials
26	43	436	19	51	596	16965	159	296			see map	dl
27	78	799	20	54	1214	36784	196	393				
28	N/A		7	19	N/A		56	<Lc				
29	64	654	12	32	7118	226126	76	77		A	Yellow break in concrete	
30	N/A		0	<Lc	N/A		46	<Lc			2929 COUNT AREA	

Comments: N/A

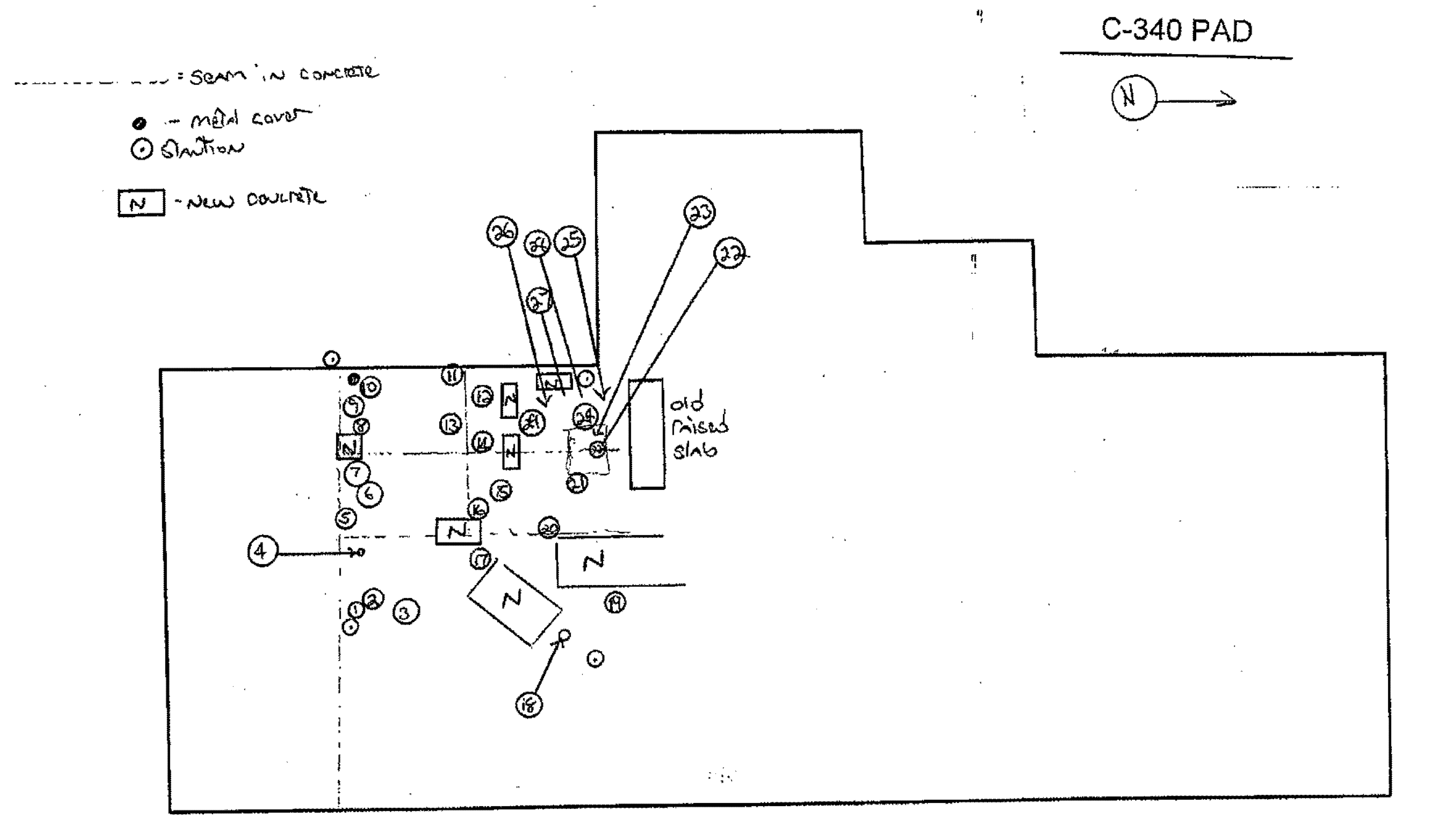
RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY MAP FORM

	Survey Number: 13-FD-505-5

Legend:
A Air Sample Location
○ Smear / Direct
□ Beta or Gamma Dose Rate
△ Neutron Dose Rate
○〰→ LAW



RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FD-514-S | Page 1 of 3

Completed Date: 6/5/13 | Completed Time: 1000 | RWP Number: PAD-FD-29448 R0

Location of Survey-General (Site/Bldg.): C-340 | Specific (Room/Area/Item):

Material / Other Job Description: Pre paint survey of SouthEast section of concrete pad

N/A

Instrument Information

Contamination / Field Instruments								
1 α	Inst. Model #	Lud 12	Serial #	264687	Cal Due	9/30/13	Probe Model	43-5
	Bkgd (cpm):	1	MDC Pt (dpm)	61	MDC Pl (dpm)	80		
	Inst. L_c (cpm)	4	CF Pt:	7.89	CF Pl:	10.38		
2 α	Inst. Model #		Serial #	N	Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	A	MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl:			
3 β	Inst. Model #	Lud 12	Serial #	165789	Cal Due	1/28/14	Probe Model	44-9
	Bkgd (cpm):	49	MDC Pt (dpm)	178	MDC Pl (dpm)	1183		
	Inst. L_c (cpm)	66	CF Pt:	4.99	CF Pl:	33.27		
4 β	Inst. Model #		Serial #	N	Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)	A		
	Inst. L_c (cpm)		CF Pt:		CF Pl:			
Laboratory / Smear Instruments								
5	Inst. Model #	Lud 2929	Serial #	137619	Cal Due	10/15/13	Probe Model	43-10-1
	α Bkgd (cpm):	0.2	α MDC (dpm)	12	α Inst. L_c (cpm)	1	α CF Pt	2.67
	β Bkgd (cpm):	64	β MDC (dpm)	83	β Inst. L_c (cpm)	78	β CF Pt	2.81
6	Inst. Model #		Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)		α Inst. L_c (cpm)		α CF Pt	
	β Bkgd (cpm):		β MDC (dpm)	N	β Inst. L_c (cpm)		β CF Pt	
Radiation/Dose Instruments								
7	Model #		Serial #		Cal Due	A	BCF:	
	Bkgd (mrem/hr)		LLD (mrem/hr):					
8	Model #		Serial #		Cal Due		BCF:	
	Bkgd (mrem/hr)		LLD (mrem/hr):					

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable): All smear locations not required to have direct (Total) reading.

N/A

RCT: Corey Hawes / [signature] Badge: 705527 RCT: N Badge:

RCT: N Badge: A RCT: A Badge:

RADCON Supervisor Review: Michael Kreisher / [signature] 06-07-2013 Date

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FO-514 -S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 1		bkg(cpm) 0.2		bkg(cpm) 49		bkg(cpm) 64		bkg(cpm)	bkg(cpm)		
	CF: 10.38		CF: 2.67		CF: 33.27		CF: ~~2.81~~					
	Lc= 4		Lc= 1		Lc= 66		Lc= ~~10.38~~ 83		Lc= 0.0	Lc= 0.0		
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
1	N/A		1	2	N/A		54	<Lc	N		see map	GA
2	20	197	19	50	5644	186146	142	219				
3	38	384	13	34	3544	116279	98	96			drain	
4	18	177	16	42	4396	144625	149	239			drain	
5	N/A		7	18	N/A		60	<Lc				
6	15	145	2	5	182	4425	63					
7	N/A		3	8	N/A		53					
8	6	52	2	5	6782	224007	59				break in concrete	
9	N/A		2	5	N/A		49					
10	30	301	0	<Lc	396	11546	57					
11	10	93	13	34	611	18697	149	239				
12	13	125	8	21	451	13375	68	<Lc				
13	11	104	4	10	1062	33703	104	112			break in concrete	
14	N/		7	18	N/		58	<Lc				
15		A	7	18		A	91	76				
16	31	311	3	8	2529		76	<Lc				
17	N/		7	18	N/		68					
18		A	0	<Lc		A	60					
19	22	218	23	61	918		172	303		A		
20	N/A		47	61	N/A		253	531				
21	214	2211	10	26	7232		92	79				
22	N/		9	24	N/		90	73				
23		A	6	16		A	46	<Lc				
24	26	260	4	10	2390		67					
25	N/A		5	13	N/A		50					

Comments: 2929 count area: cpm α 0/62 β = <Lc α / <Lc β

N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY MAP FORM

	Survey Number: 13-FO-514-S

Legend:

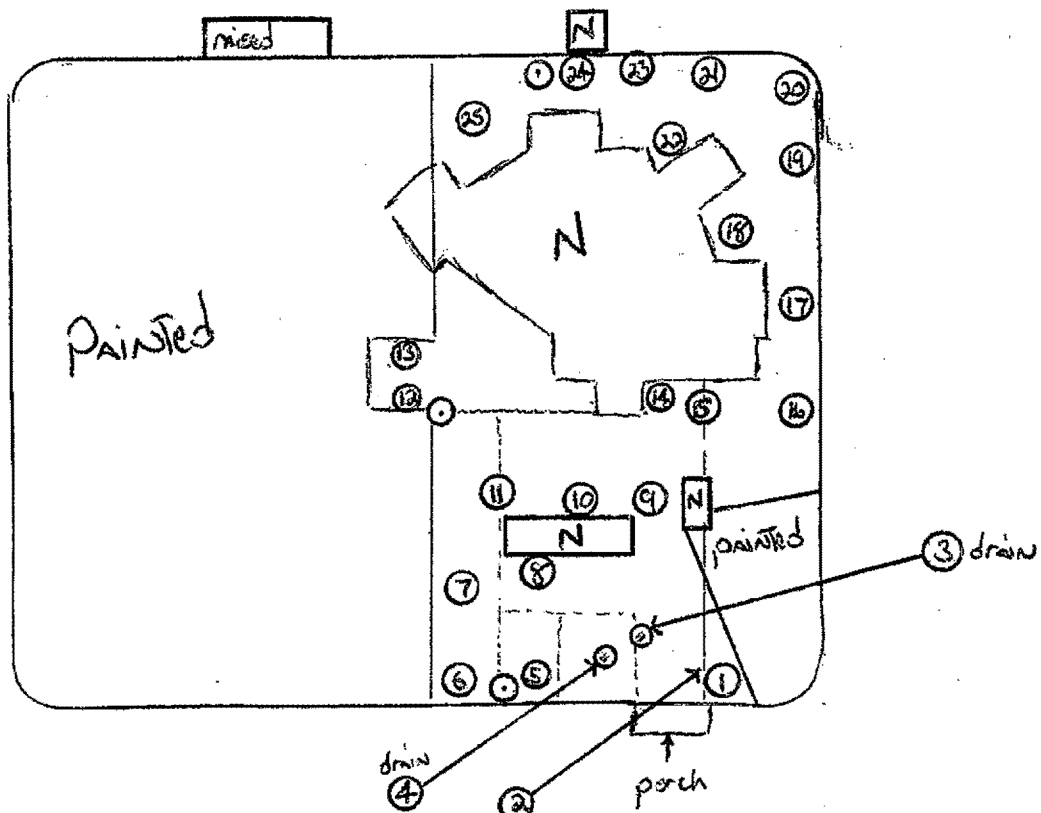
A Air Sample Location	☐ Beta or Gamma Dose Rate	LAW
○ Smear / Direct	△ Neutron Dose Rate	

_______ = Seam

⊙ = Stantion

N = New concrete

North



RAD-F-0007 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FO-533 -S | Page 1 of 3

Completed Date: 6/11/13 | Completed Time: 1310 | RWP Number: PAD-FO-29448 rev.0

Location of Survey-General (Site/Bldg.): C-340 | Specific (Room/Area/Item): Concrete Pad

Material / Other Job Description: Pre paint survey of North End of concrete pad

N/A

Instrument Information

Contamination / Field Instruments

1 α	Inst. Model #: Lud 12	Serial #: 223455	Cal Due: 9/8/13	Probe Model: 43-5			
	Bkgd (cpm): 0.4	MDC Pt (dpm): 46	MDC Pl (dpm): 61				
	Inst. L_c (cpm): 2	CF Pt: 7.69	CF Pl: 10.12				
2 α	Inst. Model #:	Serial #: N	Cal Due:	Probe Model:			
	Bkgd (cpm):	MDC Pt (dpm):	MDC Pl (dpm):				
	Inst. L_c (cpm):	CF Pt:	CF Pl: A				
3 β	Inst. Model #: Lud 3	Serial #: 90201	Cal Due: 1/29/14	Probe Model: 44-9			
	Bkgd (cpm):	MDC Pt (dpm):	MDC Pl (dpm):				
	Inst. L_c (cpm):	CF Pt: 5.13	CF Pl: 34.2				
4 β	Inst. Model #:	Serial #: N	Cal Due:	Probe Model:			
	Bkgd (cpm):	MDC Pt (dpm):	MDC Pl (dpm):				
	Inst. L_c (cpm):	CF Pt:	CF Pl: A				

Laboratory / Smear Instruments

5	Inst. Model #: Lud 2929	Serial #: 261408	Cal Due: 11/30/13	Probe Model: 43-10-1
	α Bkgd (cpm): 1	α MDC (dpm): 18	α Inst. L_c (cpm): 3	α CF Pt: 2.72
	β Bkgd (cpm): 42	β MDC (dpm): 65	β Inst. L_c (cpm): 54	β CF Pt: 2.64
6	Inst. Model #:	Serial #:	Cal Due:	Probe Model:
	α Bkgd (cpm):	α MDC (dpm):	α Inst. L_c (cpm):	α CF Pt:
	β Bkgd (cpm):	β MDC (dpm): N	β Inst. L_c (cpm):	β CF Pt:

Radiation/Dose Instruments

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

Laboratory Results Attached? (This section N/A) Yes No

Comments/Reference Surveys/Released To (as applicable): Pad has been cleaned + is ready to be painted.

N/A

RCT: Corey Hawes / [signature] Badge: 705527 RCT: N / Badge:

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

RADCON Supervisor Review: Michael Kreisher [signature] 06-12-2013 Date

RAD-F-0002 PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-533 -S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 0.4		bkg(cpm) 1		bkg(cpm) 98		bkg(cpm) 42		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 34.2		CF: 2.64					
	Lc= 2		Lc= 3		Lc= 122		Lc= 54		Lc= 0.0	Lc= 0.0		
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
1	12	115	2	3	221	4207	56	40			see map:	[illegible]
2	N/A		10	25	N/A		71	76				
3	4	36	2	3	6426	216418	54	32			break in concrete + metal	
4	N/A		7	16	N/A		75	87				
5	10	97	6	14	3794	126403	65	61			some fixative	
6	N/A		20	52	N/A		73	82				
7	21	209	7	16	958	29412	91	129				
8	N/A		5	11	N/A		58	42				
9	20	198	1	<Lc	350	8618	47	<Lc				
10	N/A		7	16	N/A		59	45				
11			6	14			72	79				
12	22	219	17	44	8930	302054	155	298			break in concrete - darker	
13	23	229	6	14	410	10670	76	63				
14	N/A		10	25	N/A		84	111				
15			2	3			65	61				
16	10	97	2	3	491	13441	54	32			pipe	
17	0	<Lc	8	19	698	20520	81	103			break in concrete + metal	
18	28	279	8	19	1524	48769	103	161				
19	N/A		0	<Lc	N/A		47	<Lc				
20	6	57	1	<Lc	216	4036	61	50				
21	N/A		3	5	N/A		59	45				
22	4	36	1	<Lc	200	3488	57	40				
23	14	138	0	↓	1402	44597	72	79			fixative	
24	N/A		2	3	N/A		50	<Lc				
25	5	47	13	33	6326	212998	73	82			break in concrete w/ yellow	

Comments: 2929 COUNT AREA COUNTS: α 0/44 β = α<Lc/<Lc β dpm.

N/A

RAD-F-0006 (11-08-11) PAD-RAD-1109

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

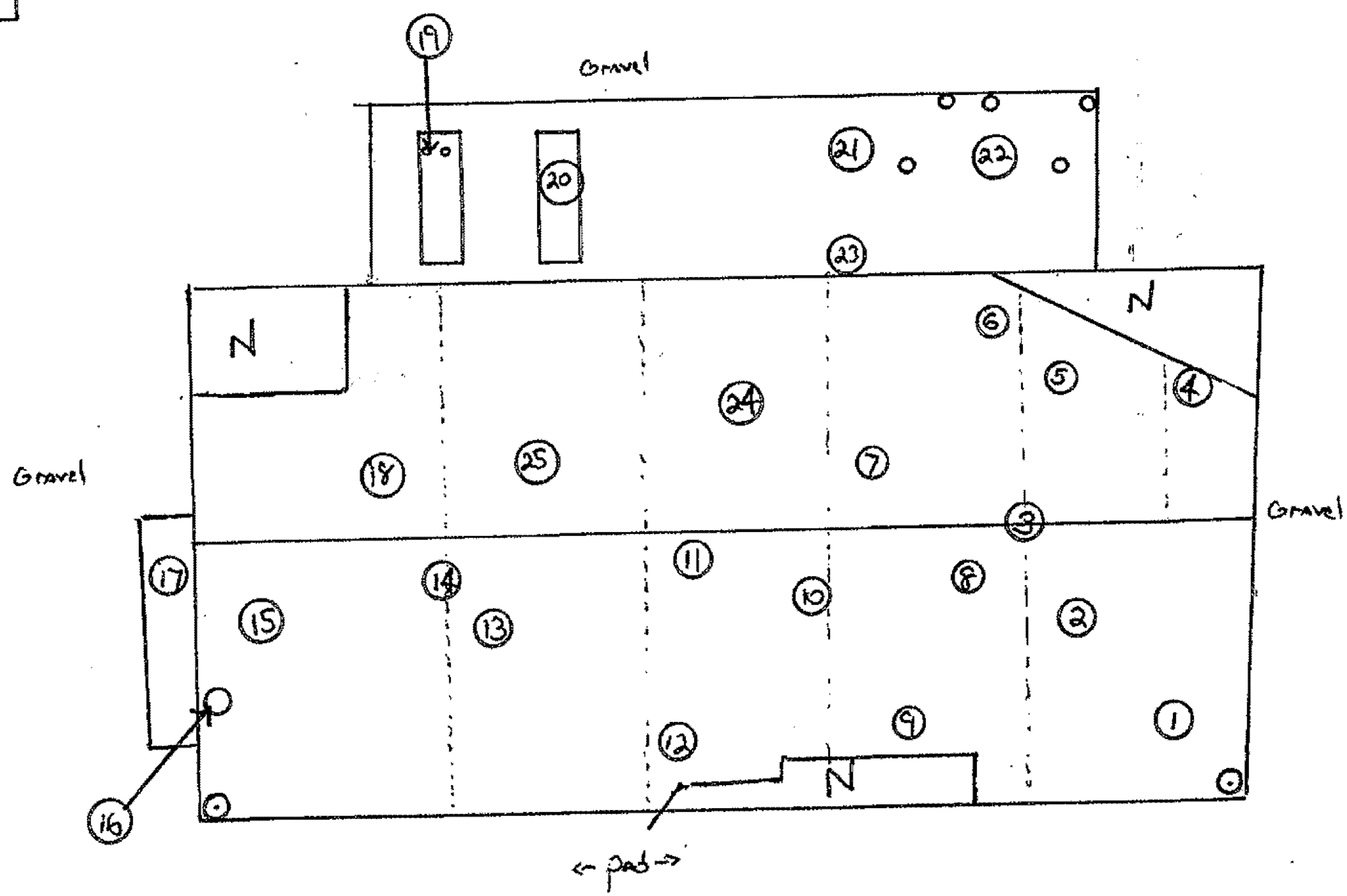
RADIOLOGICAL SURVEY MAP FORM

	Survey Number: 13-FD-~~535~~ 533 -S

Legend:

- A Air Sample Location
- ○ Smear / Direct
- □ Beta or Gamma Dose Rate
- △ Neutron Dose Rate
- ○〰→ LAW
- ⊙ Stanchion
- .... Seam
- N New concrete

North



RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FD-544 -S

Page 1 of 3

Completed Date: 6/17/13 Completed Time: 1242 RWP Number: Pad-FD-29

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item): West concrete pad

Material / Other Job Description: Pre-paint survey of West section (formerly A+C buildings) of concrete pad

Instrument Information

Contamination / Field Instruments								
1	Inst. Model #	Lud 12	Serial #	223455	Cal Due	9/8/13	Probe Model	43-5
	Bkgd (cpm):	0.4	MDC Pt (dpm)	46	MDC Pl (dpm)	61		
α	Inst. L_c (cpm)	2	CF Pt:	7.69	CF Pl:	10.12		
2	Inst. Model #		Serial #		Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	N/A	MDC Pl (dpm)			
α	Inst. L_c (cpm)		CF Pt:		CF Pl:			
3	Inst. Model #	Lud 12	Serial #	168834	Cal Due	7/26/13	Probe Model	44-9
	Bkgd (cpm):	239	MDC Pt (dpm)		MDC Pl (dpm)			
β	Inst. L_c (cpm)	276	CF Pt:	4.55	CF Pl:	30.33		
4	Inst. Model #		Serial #		Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	N/A	MDC Pl (dpm)			
β	Inst. L_c (cpm)		CF Pt:		CF Pl:			
Laboratory / Smear Instruments								
5	Inst. Model #	Lud 2929	Serial #	261408	Cal Due	11/30/13	Probe Model	43-10-1
	α Bkgd (cpm):	0.2	α MDC (dpm)	13	α Inst. L_c (cpm)	1	α CF Pt	2.72
	β Bkgd (cpm):	53	β MDC (dpm)	72	β Inst. L_c (cpm)	66	β CF Pt	2.64
6	Inst. Model #		Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)	N	α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	
Radiation/Dose Instruments								
7	Model #		Serial #		Cal Due	A	BCF:	
	Bkgd (mrem/hr)		LLD (mrem/hr):					
8	Model #		Serial #		Cal Due		BCF:	
	Bkgd (mrem/hr)		LLD (mrem/hr):					

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable): Dry conditions

N/A

RCT: Corey Hawes Badge: 705527 RCT: N/A Badge: N/A

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

RADCON Supervisor Review: Michael Kreisher 06-17-2013 Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-544 -S

Instrument	1		5		3		5					
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 0.4		bkg(cpm) 0.2		bkg(cpm) 239		bkg(cpm) 53		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 30.33		CF: 2.64					
	Lc= 2		Lc= 1		Lc= 276		Lc= 66		Lc= 0.0	Lc= 0.0		
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
1	52	522	7	19	703	14073	89	~~703~~ 35 DM 6/7/13			See MAP	DM
2	N/A		14	38	N/A		70	45				
3	78	785	58	157	10660	316089	504	1191				
4	429	4337	84	228	14291	426197	291	628			yellow	
5	49	492	91	247	4535	130298	384	874	N			
6			10	27			109	148				
7	N/A		145	394	N/A		611	1613				
8			13	35			105	137				
9	48	482	7	19	11005	326533	80	71				
10	61	613	17	47	6761	197812	158	277			drain & break in concrete	
11	N/A		8	21	N/A		64	<Lc				
12			12	32			110	151				
13	116	1170	8	21	2339	63693	66	34				
14	N/A		26	70	N/A		225	454				
15	128	1291	9	24	38257	1153066	92	103			yellow	
16	N/A		17	47	N/A		112	156				
17	42	421	19	51	1045	24446	179	333		A		
18	11	107	8	21	1312	32544	72	50				
19	N/A		5	13	N/A		51	<Lc				
20	0	<Lc	6	16	433	5884	69	42			on flowable fill	
21	25	249	10	27	5499	159536	101	127				
22	50	502	10	27	1182	28601	58	<Lc			protruding pipe	
23	N/A		6	16	N/A		42					
24			2	5			64					
25	N/A		2	5	N/A		51				2929 count area	

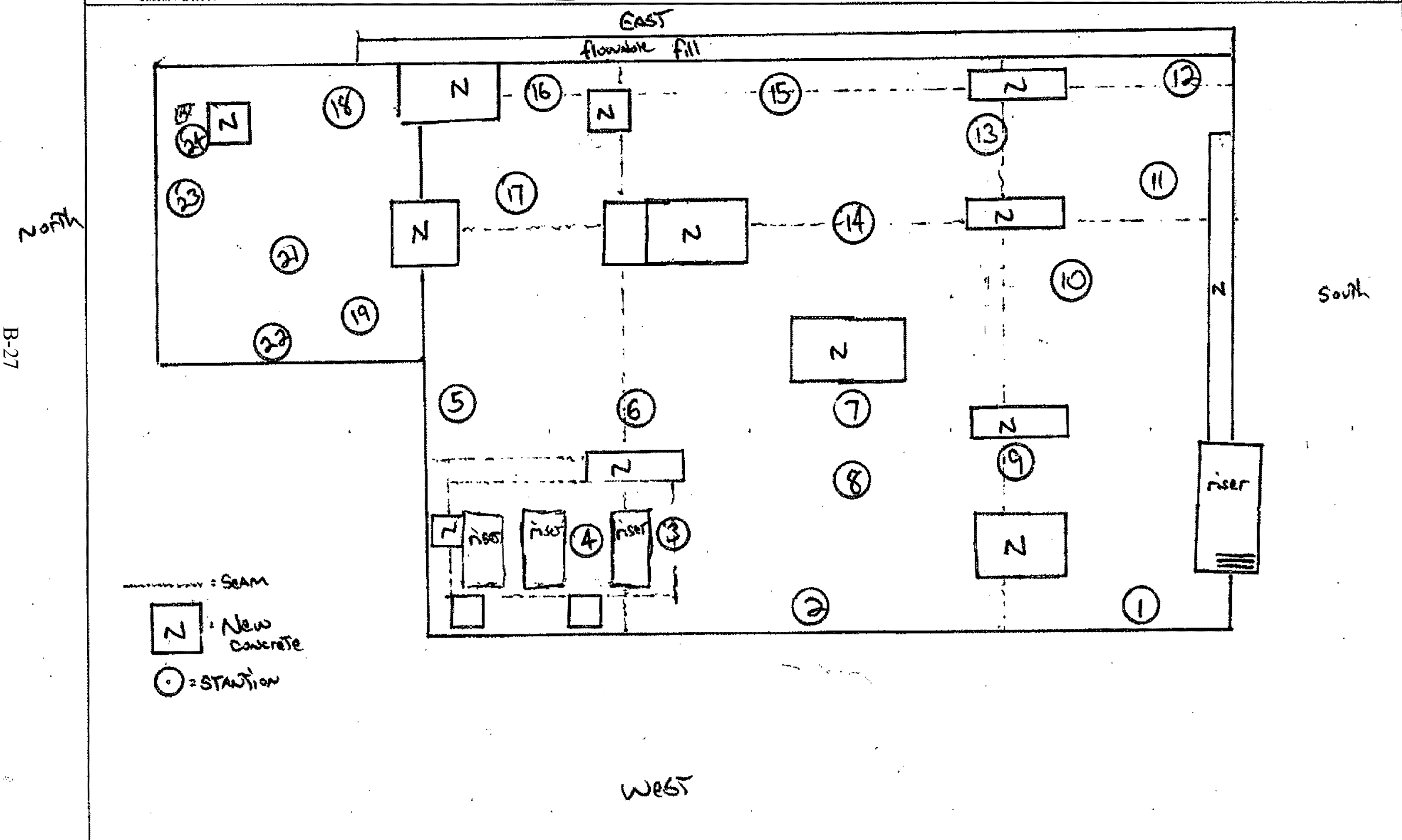
Comments:

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

RADIOLOGICAL SURVEY MAP FORM

	Survey Number: 13-FD-544-S

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



RAD-F-0007 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY COVER FORM

Survey No: 13-FD-0585-S Page 1 of 4

Completed Date: 7-8-13 Completed Time: 1030 RWP Number: PAD-FD-2944-8 R0

Location of Survey-General (Site/Bldg.): C-340 Specific (Room/Area/Item): PAD

Material / Other Job Description: INFORMATIONAL SURVEY OF PAD PRIOR TO PAINTING

N/A

Instrument Information

Contamination / Field Instruments

#									
1 α	Inst. Model #	LUD 12	Serial #	223965	Cal Due	9-8-13	Probe Model	43-5
	Bkgd (cpm):	0.4	MDC Pt (dpm)	46	MDC Pl (dpm)	61		
	Inst. L_c (cpm)	2	CF Pt:	7.69	CF Pl:	10.12		
2 α	Inst. Model #		Serial #		Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)	N	MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:		CF Pl: A			
3 β	Inst. Model #	LUD 12	Serial #	165834	Cal Due	7-26-13	Probe Model	44-9
	Bkgd (cpm):	123	MDC Pt (dpm)	243	MDC Pl (dpm)	1655		
	Inst. L_c (cpm)	149	CF Pt:	4.55	CF Pl:	30.33		
4 β	Inst. Model #		Serial #	N	Cal Due		Probe Model	
	Bkgd (cpm):		MDC Pt (dpm)		MDC Pl (dpm)			
	Inst. L_c (cpm)		CF Pt:	A	CF Pl:			

Laboratory / Smear Instruments

#								
5	Inst. Model #	LUD 2929	Serial #	261408	Cal Due	11-30-13	Probe Model	43-10-1
	α Bkgd (cpm):	1	α MDC (dpm)	18	α Inst. L_c (cpm)	3	α CF Pt:	2.72
	β Bkgd (cpm):	48	β MDC (dpm)	69	β Inst. L_c (cpm)	60	β CF Pt:	2.64
6	Inst. Model #		Serial #		Cal Due		Probe Model	
	α Bkgd (cpm):		α MDC (dpm)	N	α Inst. L_c (cpm)		α CF Pt:	
	β Bkgd (cpm):		β MDC (dpm)		β Inst. L_c (cpm)		β CF Pt:	

Radiation/Dose Instruments

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

Laboratory Results Attached? Yes No

Comments/Reference Surveys/Released To (as applicable):

N/A

RCT: Daniel Quarles / [signature] Badge: 205605 RCT: Tim Loyd / [signature] Badge: 704869

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

RADCON Supervisor Review: Jeff McAlpin / [signature] 7-8-2013
Date

RAD-F-0002 (11-08-11) PAD-RAD-1109

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-0585 -S

Instrument	1		5		3		5		N/A	N/A		
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 24		bkg(cpm) 1		bkg(cpm) 123		bkg(cpm) 48		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 30.83		CF: 2.64					
	Lc= 2		Lc= 3		Lc= 149		Lc= 60		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
1	151	1,524	17	44	19,032	300,510	119	189	N/A	N/A	SEE ATTACHED MAP	[illegible]
2	56	563	3	6	1,752	49,408	68	53				
3	14	138	2	<Lc	295	5,217	80	85				
4	49	492	11	28	907	23,779	76	74				
5	22	219	10	25	924	24,294	72	64				
6	N/A	N/A	0	<Lc	N/A	N/A	59	<Lc				
7			4	9			49	<Lc				
8			2	<Lc			82	90				
9			69	185			576	1394				
10	N/A	N/A	122	330	N/A	N/A	1464	3739				
11	15	148	44	117	155	971	489	1164				
12	22	219	32	85	275	4610	161	299				
13	35	350	3	6	253	3843	70	59				
14	30	300	3	6	503	11,525	66	48				
15	66	664	29	77	1,484	41,279	224	465				
16	N/A	N/A	10	25	N/A	N/A	69	56				
17			6	14			49	<Lc				
18			12	30			85	98				
19			8	20			68	53				
20	N/A	N/A	5	11	N/A	N/A	59	<Lc				
21	19	188	21	55	445	9,766	154	280				
22	22	219	13	33	235	3397	97	130				
23	22	219	5	11	1,150	31,149	50	<Lc				
24	12	117	10	25	315	5,823	63	40				
25	20	198	6	14	1,566	43,766	92	117	N/A	N/A	SEE ATTACHED MAP	[illegible]

Comments: N/A

RAD-F-0008 (11-08-11) PAD-RAD-1109

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

RADIOLOGICAL SURVEY CONTAMINATION FORM

Survey Number: 13-FD-0585-S

Instrument	1		5		3		5		N/A	N/A		
	Total α dpm/100cm2		Removable α dpm/100cm2		Total β/γ dpm/100cm2		Removable β/γ dpm/100cm2		Removable α cpm/LAW	Removable β/γ cpm/LAW		
	bkg(cpm) 0.4		bkg(cpm) 1		bkg(cpm) 123		bkg(cpm) 48		bkg(cpm)	bkg(cpm)		
	CF: 10.12		CF: 2.72		CF: 30.33		CF: 2.64					
	Lc= 2		Lc= 3		Lc= 149		Lc= 60		Lc= N/A 0.0	Lc= N/A 0.0		
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	N/A	N/A	5	11	N/A	N/A	90	111	N/A	N/A	SEE ATTACHED MAP	DR/TL
27			7	17			116	180				
28			12	30			76	74				
29			4	9			83	93				
30	N/A	N/A	6	14	N/A	N/A	68	53				
31	16	158	4	9	207	2,548	70	59				
32	8	77	2	<Lc	267	4,368	51	<Lc				
33	5	47	0	<Lc	1,613	45,192	42	<Lc				
34	16	158	8	20	635	15,529	52	<Lc				
35	10	97	1	<Lc	2,626	75,916	62	40				
36	N/A	N/A	1	<Lc	N/A	N/A	48	<Lc				
37			0	<Lc			42	<Lc				
38			2	<Lc			59	<Lc				
39			6	14			45	<Lc				
40			3	6			58	<Lc			SEE ATTACHED MAP	
41	N/A	N/A	0	<Lc	N/A	N/A	51	<Lc	N/A	N/A	2929 Count Alum	DR/TL

N/A

Comments: N/A

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

RADIOLOGICAL SURVEY MAP FORM

Survey Number: 13-FD-0585-S

Legend:

A Air Sample Location

○ Smear / Direct

□ Beta or Gamma Dose Rate

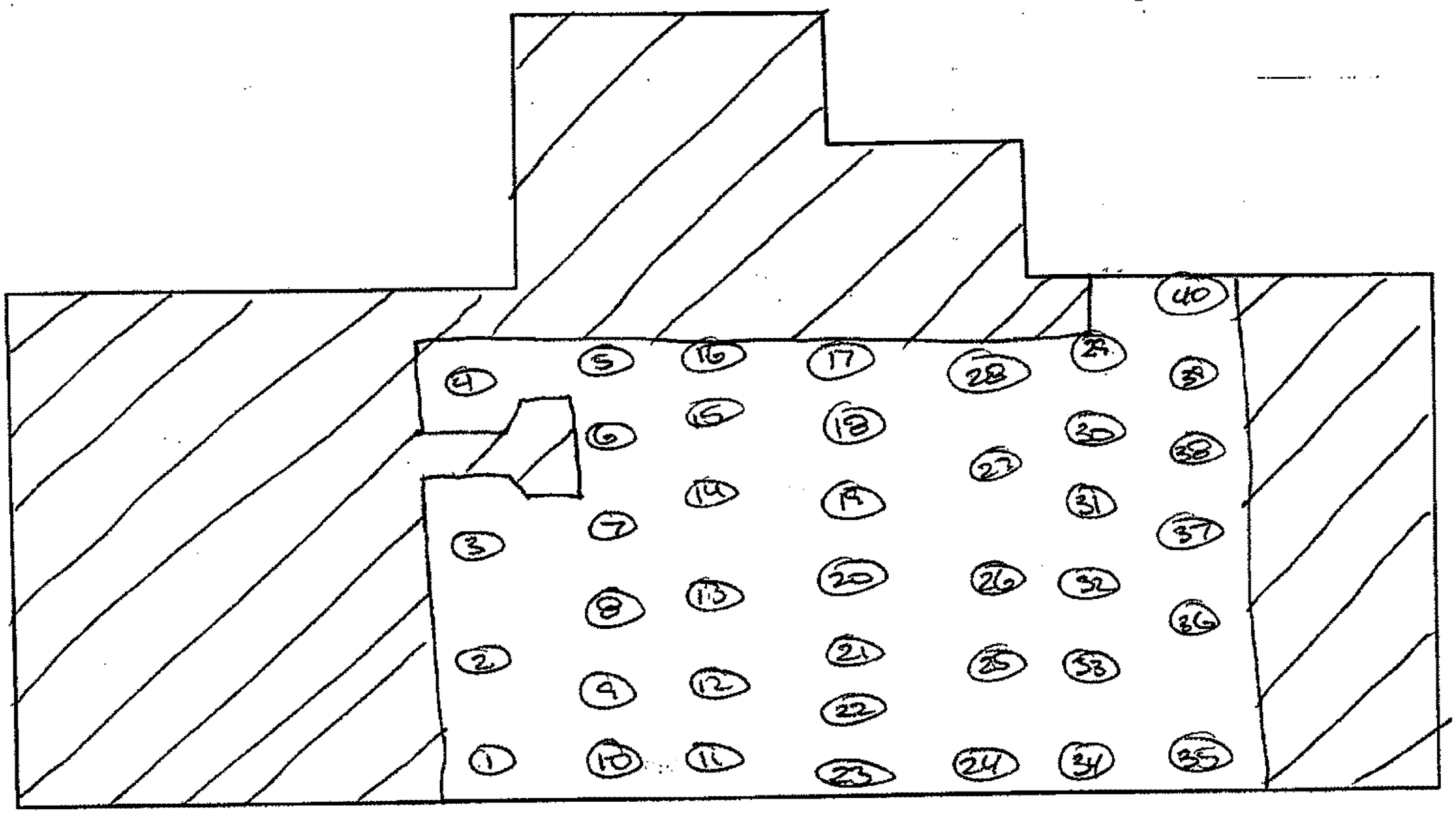
△ Neutron Dose Rate

○〜〜→ LAW

▨ - ALREADY SURVEYED/PAINTED

C-340 PAD

Ⓝ→



RAD-F-0007 (11-08-11) PAD-RAD-1109

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APPENDIX C

SUMP WATER AND PIT SAMPLING ANALYTICAL RESULTS

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PaducahOREIS Report for: DD13-340-CONPIT

340CONPIT-BF	from:	on 2/21/2013	Media: WQ	SmpMethod:
Comments:				

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	0.17		ug/L	U		0.17	PGDP	SW846-8082	/ X /
PCB-1221	0.18		ug/L	U		0.18	PGDP	SW846-8082	/ X /
PCB-1232	0.14		ug/L	U		0.14	PGDP	SW846-8082	/ X /
PCB-1242	0.1		ug/L	U		0.1	PGDP	SW846-8082	/ X /
PCB-1248	0.12		ug/L	U		0.12	PGDP	SW846-8082	/ X /
PCB-1254	0.07		ug/L	U		0.07	PGDP	SW846-8082	/ X /
PCB-1260	0.05		ug/L	U		0.05	PGDP	SW846-8082	/ X /
PCB-1268	0.09		ug/L	U		0.09	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	0.18		ug/L	U		0.18	PGDP	SW846-8082	/ X /

340CONPIT-5	from: C-340-A	on 2/21/2013	Media: SZ	SmpMethod: GR
Comments:	35 g Concrete E. Wall Elevator shaft Pit35 g Concrete E. Wall Elevator shaft Pit			

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	0.77		mg/kg	UY		0.77	PGDP	SW846-8082	/ X /
PCB-1221	1		mg/kg	U		1	PGDP	SW846-8082	/ X /
PCB-1232	0.77		mg/kg	U		0.77	PGDP	SW846-8082	/ X /
PCB-1242	0.46		mg/kg	U		0.46	PGDP	SW846-8082	/ X /
PCB-1248	1.91		mg/kg	X		0.77	PGDP	SW846-8082	/ X /
PCB-1254	0.69		mg/kg	U		0.69	PGDP	SW846-8082	/ X /
PCB-1260	0.77		mg/kg	U		0.77	PGDP	SW846-8082	/ X /
PCB-1268	0.61		mg/kg	U		0.61	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	1.91		mg/kg			1	PGDP	SW846-8082	/ X /

340CONPIT-1	from: C-340-B	on 2/21/2013	Media: SZ	SmpMethod: GR
Comments:	30 g Concrete E. Wall, N. End Ram Pit - North Point of Large Ram Pit30 g Concrete E. Wall, N.			

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1221	2.49		mg/kg	U		2.49	PGDP	SW846-8082	/ X /
PCB-1232	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1242	1.15		mg/kg	U		1.15	PGDP	SW846-8082	/ X /
PCB-1248	7.89		mg/kg			1.92	PGDP	SW846-8082	/ X /
PCB-1254	1.72		mg/kg	U		1.72	PGDP	SW846-8082	/ X /
PCB-1260	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1268	1.53		mg/kg	U		1.53	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	7.89		mg/kg			2.49	PGDP	SW846-8082	/ X /

*Verification/Validation/Assessment

340CONPIT-1D from: C-340-B on 2/21/2013 Media: SZ SmpMethod: GR

Comments: 35 g Concrete E. Wall, N. End Ram Pit Duplicate - North Point of Large Ram Pit35 g Concrete

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	3.83		mg/kg	U		3.83	PGDP	SW846-8082	/ X /
PCB-1221	4.98		mg/kg	U		4.98	PGDP	SW846-8082	/ X /
PCB-1232	3.83		mg/kg	U		3.83	PGDP	SW846-8082	/ X /
PCB-1242	2.3		mg/kg	U		2.3	PGDP	SW846-8082	/ X /
PCB-1248	16.9		mg/kg			3.83	PGDP	SW846-8082	/ X /
PCB-1254	3.45		mg/kg	U		3.45	PGDP	SW846-8082	/ X /
PCB-1260	3.83		mg/kg	U		3.83	PGDP	SW846-8082	/ X /
PCB-1268	3.07		mg/kg	U		3.07	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	16.9		mg/kg			4.98	PGDP	SW846-8082	/ X /

340CONPIT-2 from: C-340-B on 2/21/2013 Media: SZ SmpMethod: GR

Comments: 43 g E. Wall Middle of Ram Pit - Middle Point of Large Ram Pit43 g E. Wall Middle of Ram Pit -

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	15.3		mg/kg	UY		15.3	PGDP	SW846-8082	/ X /
PCB-1221	19.9		mg/kg	U		19.9	PGDP	SW846-8082	/ X /
PCB-1232	15.3		mg/kg	U		15.3	PGDP	SW846-8082	/ X /
PCB-1242	9.19		mg/kg	U		9.19	PGDP	SW846-8082	/ X /
PCB-1248	305		mg/kg	X		15.3	PGDP	SW846-8082	/ X /
PCB-1254	13.8		mg/kg	U		13.8	PGDP	SW846-8082	/ X /
PCB-1260	15.3		mg/kg	U		15.3	PGDP	SW846-8082	/ X /
PCB-1268	12.3		mg/kg	U		12.3	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	305		mg/kg			19.9	PGDP	SW846-8082	/ X /

340CONPIT-3 from: C-340-B on 2/21/2013 Media: SZ SmpMethod: GR

Comments: 37 g E. Wall, S. End Ram Pit - South Point of Large Ram Pit37 g E. Wall, S. End Ram Pit - Sou

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	7.74		mg/kg	U		7.74	PGDP	SW846-8082	/ X /
PCB-1221	10.1		mg/kg	U		10.1	PGDP	SW846-8082	/ X /
PCB-1232	7.74		mg/kg	U		7.74	PGDP	SW846-8082	/ X /
PCB-1242	4.64		mg/kg	U		4.64	PGDP	SW846-8082	/ X /
PCB-1248	32.8		mg/kg			7.74	PGDP	SW846-8082	/ X /
PCB-1254	6.96		mg/kg	U		6.96	PGDP	SW846-8082	/ X /
PCB-1260	7.74		mg/kg	U		7.74	PGDP	SW846-8082	/ X /
PCB-1268	6.19		mg/kg	U		6.19	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	32.8		mg/kg			10.1	PGDP	SW846-8082	/ X /

*Verification/Validation/Assessment

340CONPIT-4 from: C-340-B on 2/21/2013 Media: SZ SmpMethod: GR

Comments: 44 g Concrete NE corner of small pit NE of Ram Pit - Small Ram Pit44 g Concrete NE corner of

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	0.77		mg/kg	U		0.77	PGDP	SW846-8082	/ X /
PCB-1221	1		mg/kg	U		1	PGDP	SW846-8082	/ X /
PCB-1232	0.77		mg/kg	U		0.77	PGDP	SW846-8082	/ X /
PCB-1242	0.46		mg/kg	U		0.46	PGDP	SW846-8082	/ X /
PCB-1248	2.56		mg/kg			0.77	PGDP	SW846-8082	/ X /
PCB-1254	0.69		mg/kg	U		0.69	PGDP	SW846-8082	/ X /
PCB-1260	0.77		mg/kg	U		0.77	PGDP	SW846-8082	/ X /
PCB-1268	0.61		mg/kg	U		0.61	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	2.56		mg/kg			1	PGDP	SW846-8082	/ X /

340CONPIT-6 from: C-340-B on 2/21/2013 Media: SZ SmpMethod: GR

Comments: 32g concrete W. wall Sloping Pit - Conveyor Pit32g concrete W. wall Sloping Pit - Conveyor Pit

Analysis	Results	Counting Error	Units	Result Qual	Foot Note	Reporting Limit	Lab	Method	V/V/A*
PPCB									
PCB-1016	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1221	2.49		mg/kg	U		2.49	PGDP	SW846-8082	/ X /
PCB-1232	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1242	1.15		mg/kg	U		1.15	PGDP	SW846-8082	/ X /
PCB-1248	3.6		mg/kg			1.92	PGDP	SW846-8082	/ X /
PCB-1254	1.72		mg/kg	U		1.72	PGDP	SW846-8082	/ X /
PCB-1260	1.92		mg/kg	U		1.92	PGDP	SW846-8082	/ X /
PCB-1268	1.53		mg/kg	U		1.53	PGDP	SW846-8082	/ X /
Polychlorinated biphenyl	3.6		mg/kg			2.49	PGDP	SW846-8082	/ X /

*Verification/Validation/Assessment

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APPENDIX D

AIR QUALITY MONITORING PROGRAM

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Table D.1. Summary of Results for Area Air Monitoring

Agent	Number of Samples	Range of Results	Occupational Exposure Limit	Units
Asbestos[1]	52	(BDL—0.01356)	0.07	(f/cc)
Aluminum[2]	20	BDL	0.07	(mg/m^3)
Arsenic[2]	20	BDL	0.007	(mg/m^3)
Beryllium[2]	20	BDL	1.4	(μg/m^3)
Cadmium[2]	20	BDL	0.007	(mg/m^3)
Chromium[2]	20	BDL	0.35	(mg/m^3)
Copper[2]	20	BDL	0.014	(mg/m^3)
Iron[2]	20	(BDL—0.00429)	3.5	(mg/m^3)
Lead[2]	20	BDL	40	(μg/m^3)
Magnesium[2]	16	(BDL—0.00113)	7	(mg/m^3)
Manganese[2]	20	BDL	0.14	(mg/m^3)
Nickel[2]	20	BDL	0.7	(mg/m^3)
Selenium[2]	20	BDL	0.14	(mg/m^3)
Silver[2]	20	BDL	0.007	(mg/m^3)
Uranium[2]	20	(BDL—2.92587)	140	(μg/m^3)
Zinc[2]	20	(BDL—0.00036)	1.4	(mg/m^3)

BDL—below detection limit

[1] Analysis performed by Titan Environmental Labs, in accordance with the NIOSH Manual of Analytical Methods, Method 7400, 10-hour time-weighted average.

[2] Analysis performed by ALS Environmental Labs, in accordance with NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.

Table D.2. Summary of Results for Perimeter Asbestos Air Monitoring

Agent	Number of Samples	Range of Results	Administrative Control Level	Units
Asbestos[1]	1,386	(BDL—0.01391)	0.01	(f/cc)

[1] Analysis performed by Titan Environmental Labs, in accordance with the NIOSH Manual of Analytical Methods, Method 7400.

Table D.3. Summary of Results for Personal Air Monitoring (includes subcontractor personal air sampling)

Agent	Number of Samples	Range of Results	Occupational Exposure Limit	Units
Asbestos[1]	165	(0.00061—1.8923)	0.07	(f/cc)
Asbestos[2]	127	(BDL—0.24522)	1	(f/cc)
Aluminum[3]	5	BDL	0.07	(mg/m^3)
Arsenic[3]	5	BDL	0.007	(mg/m^3)
Beryllium[3]	5	BDL	1.4	(μg/m^3)
Cadmium[3]	5	BDL	0.007	(mg/m^3)
Chromium[3]	5	BDL	0.35	(mg/m^3)
Copper[3]	5	BDL	0.014	(mg/m^3)
Iron[3]	5	BDL	3.5	(mg/m^3)
Lead[3]	5	(BDL—1.90664)	40	(μg/m^3)
Magnesium[3]	5	(BDL—0.00296)	7	(mg/m^3)
Manganese[3]	5	BDL	0.14	(mg/m^3)
Nickel[3]	5	BDL	0.7	(mg/m^3)
Selenium[3]	5	BDL	0.14	(mg/m^3)
Silver[3]	5	BDL	0.007	(mg/m^3)
Uranium[3]	5	(BDL—5.2597)	140	(μg/m^3)
Zinc[3]	5	(BDL—0.00085)	1.4	(mg/m^3)

BDL—below detection limit
[1] Analysis performed by Titan Environmental Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7400, 10-hour time-weighted average.
[2] Analysis performed by Titan Environmental Laboratory, Inc., in accordance with the NIOSH Manual of Analytical Methods, Method 7400, 30-minute excursion.
[3] Analyses performed by ALS Environmental Labs, in accordance with the NIOSH Manual of Analytical Methods, Method 7300, 10-hour time-weighted average.