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DOE Contract No. DE-AC05-98OR22700
Job No. 23900
April 19, 2002

Mr. W. Don Seaborg
Paducah Site Manager
Department of Energy
P. O. Box 1410
Paducah, KY 42002-1410

Subject: *Removal Action Work Plan* (RAWP) *for Paducah Scrap Metal Removal and Disposal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/07-2013&D2)

Dear Mr. Seaborg:

Enclosed is the subject document, which includes text changes as suggested in letters dated March 4, 2002, and March 1, 2002, respectively, from the U.S. Environmental Protection Agency (EPA) and the Kentucky Division of Waste Management. A copy of the comment resolution addressing all regulator comments is also enclosed.

Additionally, this document includes scrap metal removal at the C-746-D scrap metal yard.

Fourteen copies of each are to be transmitted to the following at the state regulatory agencies: Ms. Gaye Brewer, Mr. Robert Daniell (seven), Mr. Steve Hampson, Mr. Tony Hatton, Mr. Tuss Taylor (two), Mr. John Volpe, and Mr. Mike Welch. Four copies of each are to be transmitted to the following at EPA: Mr. Jeff Crane and Mr. Carl Froede (three). The remaining three copies of each are for your use. These documents are being distributed in accordance with the *Standard Distribution List for Bechtel Jacobs Company LLC Primary and Secondary Documents (01/31/02).* Suggested text is enclosed for your use in transmitting the documents to the regulatory agencies.

I-01716-0105

Approval of this D2 is required within 30 days of regulatory receipt.

If you have any questions, please contact Tom Wheeler of my staff at 5118.

Sincerely,

Gordon L. Dover
Paducah Manager of Projects

GLD:dj
LTR-PAD/EP-DJ-02-0041

Enclosures: 1. D1 Scrap Metal Disposition RAWP
2. Comment resolution
3. Suggested text

c: Distribution

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DOE/OR/07-2013&D2

# Removal Action Work Plan for Paducah Scrap Metal Removal and Disposal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

**SCIENCE APPLICATIONS INTERNATIONAL CORPORATION**

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

02 008 (doc) RAWP 03/20/02

DOE/OR/07-2013&D2

# Removal Action Work Plan for Paducah Scrap Metal Removal and Disposal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued — April 2002

Prepared for
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Environmental Management Activities at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky 42001
managed by
Bechtel Jacobs Company LLC
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-98OR22700

# CONTENTS

# FIGURES



# TABLES

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# ACRONYMS

| | |
|---|---|
| ACM | asbestos-containing material |
| AHA | Activity Hazard Assessment |
| ALARA | as low as reasonably achievable |
| ARAR | applicable or relevant and appropriate requirement |
| ASTM | American Society for Testing and Materials |
| BJC | Bechtel Jacobs Company LLC |
| CAS | Chemical Abstracts Service |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| *CFR* | *Code of Federal Regulations* |
| COC | chain of custody |
| CPR | cardiopulmonary resuscitation |
| DMIP | Data Management and Implementation Plan |
| DMP | Data Management Plan |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| dpm | disintegrations per minute |
| DQO | data quality objective |
| EE/CA | Engineering Evaluation/Cost Analysis |
| EoU | Envirocare of Utah |
| EPA | U.S. Environmental Protection Agency |
| ES&H | environmental safety and health |
| ESHR | Environmental Safety and Health Representative |
| FCO | field change order |
| H&S | health and safety |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| HEPA | high-efficiency particulate air |
| ISMS | Integrated Safety Management System |
| ISOCS | *in situ* object counting system |
| KAR | Kentucky Administrative Regulations |
| KPDES | Kentucky Permit Discharge Elimination System |
| LDR | Land Disposal Restrictions |
| M&TE | measuring and test equipment |
| MHF | MHF Logistical Solutions |
| MSDS | Materials Safety Data Sheet |
| NCS | nuclear criticality safety |
| NDA | nondestructive assay |
| NFPA | National Fire Protection Association |
| NIOSH | National Institute of Occupational Safety and Health |
| NTS | Nevada Test Site |
| OREIS | Oak Ridge Environmental Information System |
| OSHA | Occupational Safety and Health Act of 1970 |
| PACM | potentially asbestos-containing material |
| PCB | polychlorinated biphenyl |
| PEMS | Paducah Environmental Management System |
| PGDP | Paducah Gaseous Diffusion Plant |
| POD | plan of the day |
| PPE | personal protective equipment |
| ppm | parts per million |

| | |
|---|---|
| PSS | Plant Shift Superintendent |
| PVC | polyvinyl chloride |
| QA | quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| RADCON | Radiological Control |
| RAWP | Removal Action Work Plan |
| RCRA | Resource Conservation and Recovery Act of 1976 |
| RCT | Radiation Control Technician |
| RPD | relative percent difference |
| RPP | Radiation Protection Plan |
| RWP | radiological work permit |
| SAP | Sampling and Analysis Plan |
| SCO | surface-contaminated object |
| SMO | Sample Management Office |
| SOP | standard operating procedure |
| SOW | statement of work |
| SPCC | Spill Prevention Control and Countermeasures |
| STR | Subcontract Technical Representative |
| SVOC | semivolatile organic compound |
| SWMU | solid waste management unit |
| TC | toxicity characteristic |
| TLD | thermoluminescent dosimeter |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TIMS | thermal ionization mass spectrometry |
| TOC | total organic carbon |
| TRU | transuranic |
| TSCA | Toxic Substances Control Act of 1976 |
| TSD | treatment, storage, and disposal |
| TSDF | treatment, storage, and disposal facility |
| VOA | volatile organic analysis |
| VOC | volatile organic compound |
| WAC | waste acceptance criteria |
| WBH | welding, burning, and hot work |
| WMP | Waste Management Plan |
| WS | waste stream |

# EXECUTIVE SUMMARY

The Paducah Scrap Metal Removal and Disposal Removal Action Project was initiated as a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 activity to address existing contamination and the potential for release of hazardous substances to the environment. This Project is one of several discrete efforts to be implemented at the Paducah Gaseous Diffusion Plant (PGDP) to complete the Scrap Metal Disposition Project. These discrete efforts include: classified scrap metal, aluminum ingots, infrastructure, and scrap metal. This Removal Action Work Plan (RAWP) is for the classified scrap metal and the scrap metal discrete efforts and is work being performed under separate subcontract(s) from the other efforts.

The object of this project is to safely remove and disposition approximately 53,000 tons of contaminated scrap metal and miscellaneous materials contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B. The field operations process that is to be employed to perform this project is illustrated in Fig. ES.1. Further details are specified in Chap. A of this RAWP.

This RAWP for Paducah Scrap Metal Removal and Disposal at the PGDP, Paducah, Kentucky, is composed of four individual plans and a project schedule (Chap. B). The four plans consist of the Design Report (Method of Accomplishment); the Sampling, Chemical, and Radiological Analysis and Data Management Plan; the Site Environmental Safety and Health Plan; and the Data Qualilty Assurance Project Plan, which are presented in Chaps. A, C, D, and E of this RAWP, respectively.

Throughout this RAWP, specific details (e.g., specific size or capacity) have been provided to clarify the approach to complete this Project. In those cases where a specific detail does not impact specific regulatory determinations, changes in details will not be necessary to revise the RAWP. Such changes will be identified through individual work packages or communiqués between Bechtel Jacobs Company LLC and WESKEM as contractually appropriate. Examples of changes that would cause for a revision to the RAWP prior to implementation include changes to the overall approach (as presented in Fig. ES.1) or changes that impact environmental emission calculations.

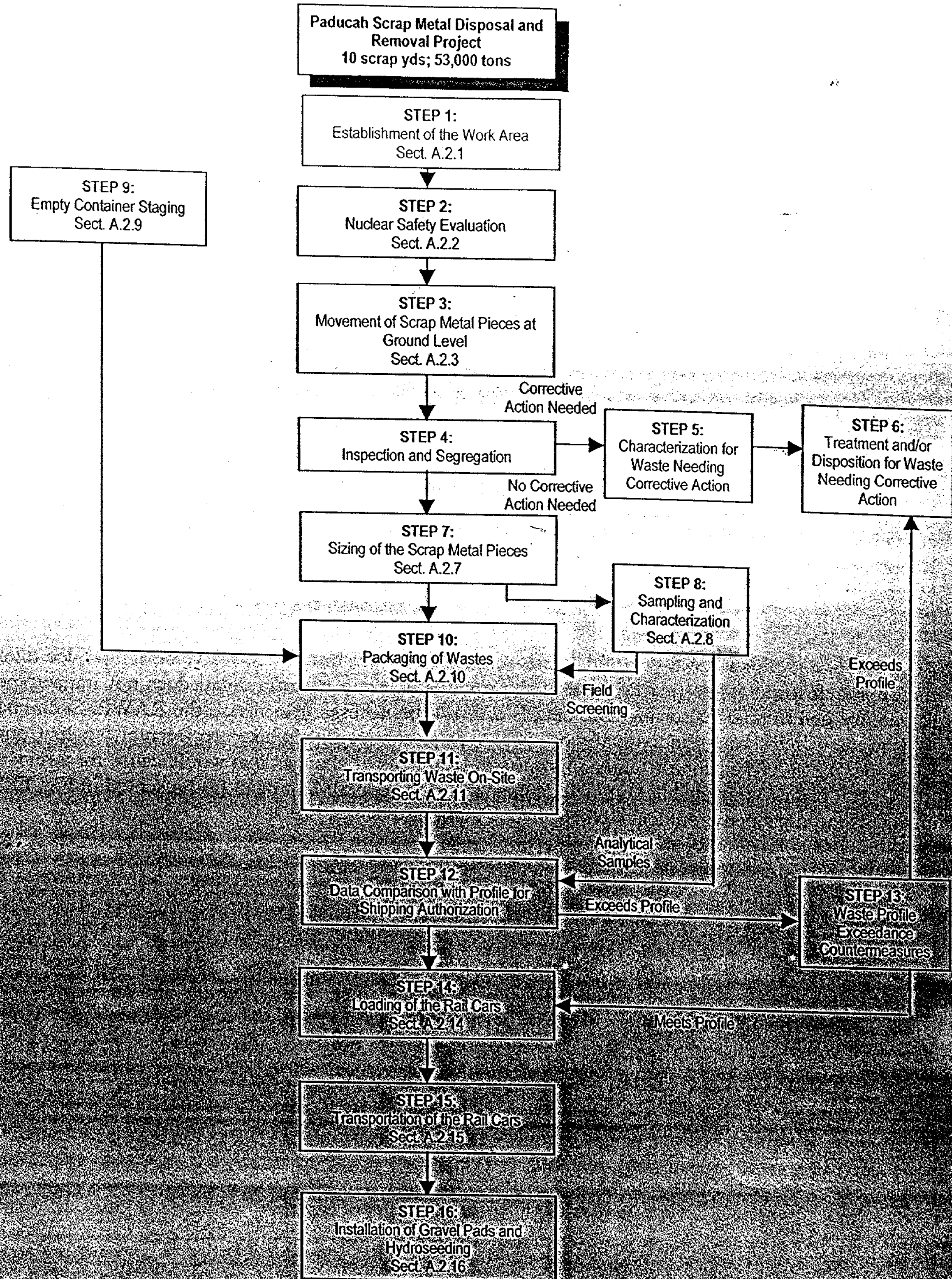



**Fig. ES.1. Simplified process flow diagram for the Paducah Scrap Metal Removal and Disposal Project.**

# A.0 DESIGN REPORT

## A.1 INTRODUCTION

The Paducah Gaseous Diffusion Plant (PGDP) in McCracken County near Paducah, Kentucky, is an active uranium enrichment facility. The uranium enrichment operation is located on land owned by the U.S. Department of Energy (DOE). PGDP is located approximately 4 miles south of the Ohio River and approximately 10 miles west of Paducah in western Kentucky (Fig. A.1). The DOE-owned property encompasses 3600 acres, of which 750 acres are within a fenced security area and constitute the uranium enrichment facility (Fig. A.2). Beyond the DOE property is an extensive wildlife management area of approximately 6500 acres managed by the Commonwealth of Kentucky.

The plant began operations in the 1950s, supplying enriched uranium for both government and commercial needs. PGDP was operated by Union Carbide Corporation until 1984, when Martin Marietta Energy Systems, Inc. (which later became Lockheed Martin Energy Systems, Inc.) was contracted to operate the plant for DOE. In July 1993, the United States Enrichment Corporation, which was established by the U.S. Congress, leased uranium enrichment production facilities from DOE and became responsible for the production of enriched uranium. DOE maintains ownership of the plant and is responsible for environmental restoration and waste management activities. Since 1998, these activities have been managed by Bechtel Jacobs Company LLC (BJC) under a management and integration contract with DOE.

Between 1974 and 1983, contaminated equipment was removed from the process buildings at PGDP as a part of numerous uranium enrichment process (cascade) upgrade programs. These programs included the dismantlement, removal, and on-site storage of contaminated equipment, cell components, and scrap metal from the cascade facilities. Much of the scrap material from these programs is contained in several scrap yards located in the northwestern portion of the fenced area of the plant. Additional material within these scrap yards includes emptied drums and miscellaneous scrap material and equipment that have become contaminated during activities conducted at PGDP.

The purpose of this project is to safely remove and disposition 53,000 tons of contaminated scrap metal, and miscellaneous material contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B, which are located in the northwestern portion of the fenced area of the plant. The scrap yards to be addressed are presented in Fig. A.2 with the exception of C-746-D.

### A.1.1 Project Organization

BJC prepared a request for proposal to competitively bid the necessary work to remove and dispose of the material within the nine unclassified scrap yards. The WESKEM team was awarded the subcontract. WESKEM's team consists of WESKEM, MHF Logistical Solutions (MHF), and Science Applications International Corporation (SAIC). The classified scrap yard has been incorporated into the WESKEM subcontract due to commonalities between the scrap yards, a competitively bid fixed unit ratio for performing work has already been established, classified scrap yard activities can be expedited, and overall project costs can be minimized through shared costs and Lessons Learned. The organizational chart for accomplishing this work, which falls under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), is presented in Fig. A.3. Section A.1 of this Removal Action Work Plan (RAWP) presents activities being performed by the different parties that comprise the Paducah Scrap Metal team. The RAWP is presented in this manner to facilitate understanding of the entire team's roles and responsibilities.

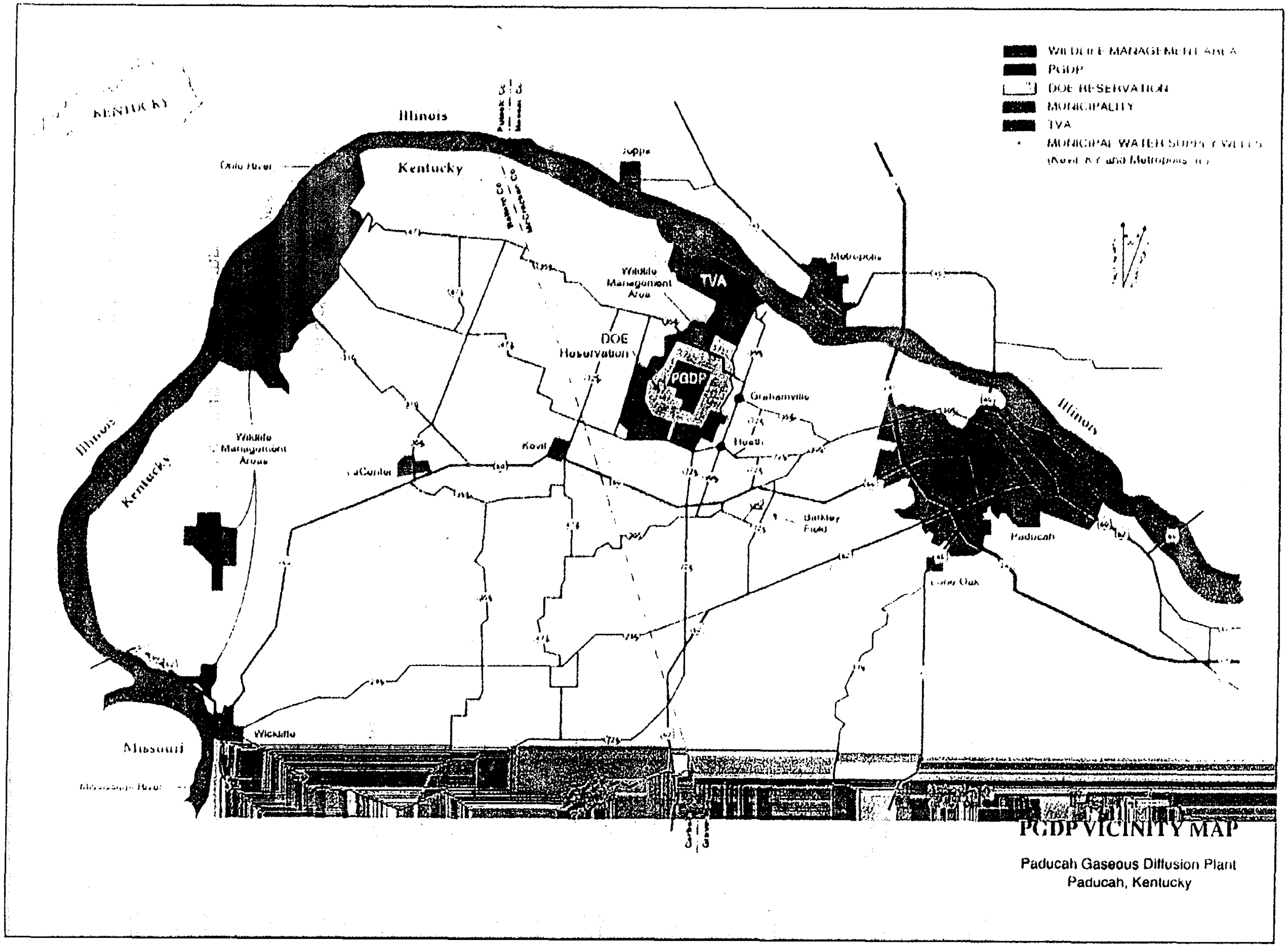



Fig. A.1. Paducah Gaseous Diffusion Plant, Paducah, Kentucky.

For security concerns this figure cannot be released for public viewing.

Fig. A.2. Locations of sites at the Paducah Gaseous Diffusion Plant.

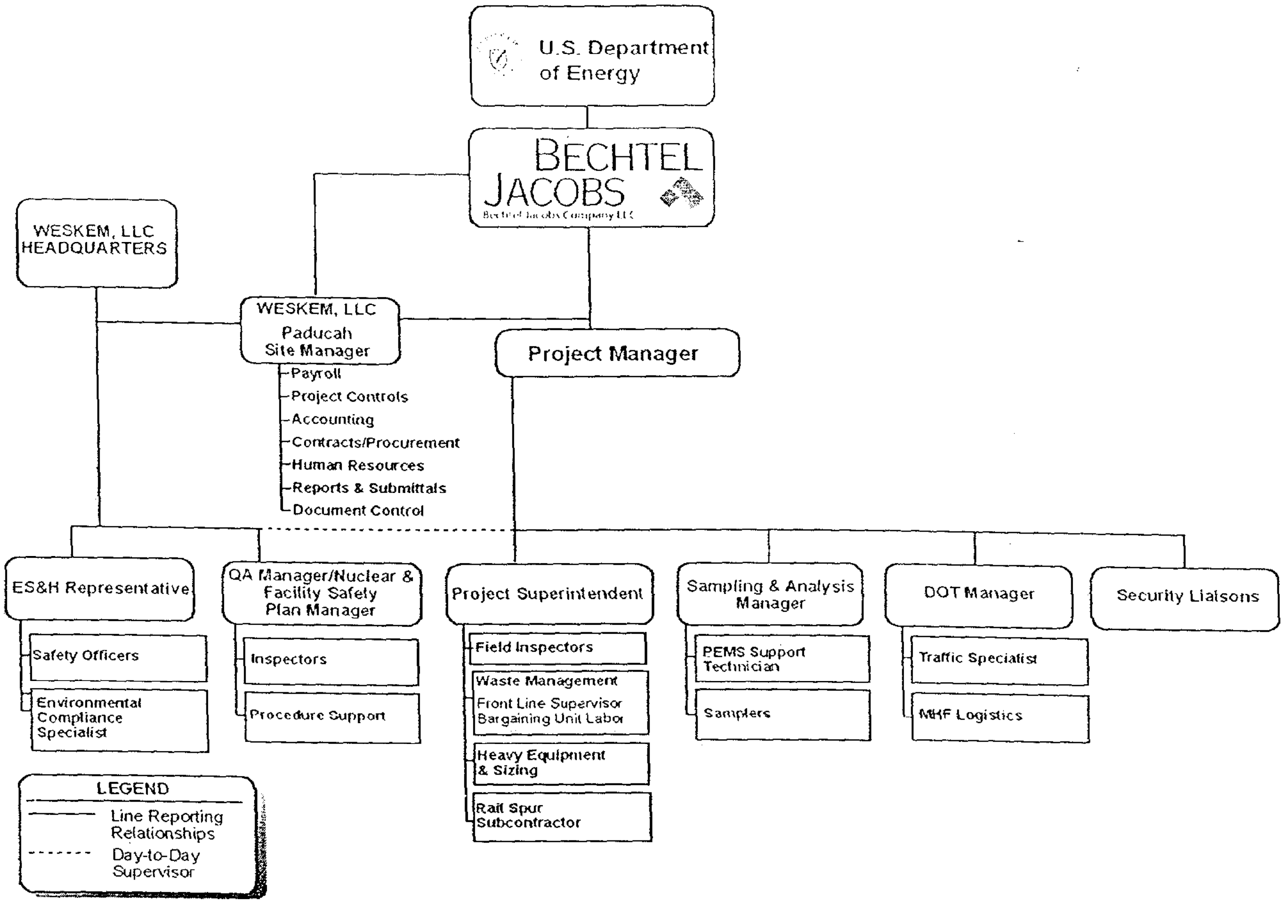



**Fig. A.3. Paducah Scrap Metal Removal and Disposal project team organization.**

## A.1.2 Project Overview

The Paducah Scrap Metal Removal and Disposal project mainly consists of 53,000 tons of contaminated scrap metal and miscellaneous material contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B that are primarily contaminated with small quantities of low-level radioactive contamination. A notable exception is that the C-746-P1 scrap yard is not radiologically posted and in the past was referred to as a non-Radiological Material Management Area. An overview of the history of this scrap material is contained in the Sampling and Analysis Plan and Data Management Plan (SAP & DMP) found in Chap. C. Basically, the method of accomplishment will be to inspect the scrap material, size-reduce and containerize the material, and transport the size-reduced material to the on-site landfill, C-746-U, or to a licensed low-level disposal facility, Nevada Test Site (NTS) and/or Envirocare of Utah (EoU), as appropriate. Many of these scrap yards are located on top of various identified solid waste management units (SWMUs). Therefore, removal of the material in these scrap yards will allow for characterization and remediation of these SWMUs in future separate CERCLA projects. Additional details of the purpose of the project and historical information are provided in Chap. C and in the *Engineering Evaluation/Cost Analysis for Scrap Metal Disposition* (DOE 2001).

Also, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, DOE on-site removal actions conducted under CERCLA are required to fulfill applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the scope and urgency of the action [40 *Code of Federal Regulation (CFR)* 300.415(j)]. Appendix 1 contains the ARARs from the Engineering Evaluation/Cost Analysis (EE/CA) that apply to this project.

In addition, four additional ARARs have been identified during development of the RAWP for inclusion into the Project. These four additional ARARs include the following regulatory citations:

401 Kentucky Administrative Regulations (KAR) 63:005—"Open Burning";

401 KAR 63:020—"Potentially Hazardous Matter or Toxic Substances";

401 KAR 100:019, Section 10—"Standards for Protection Against Radiation"/"Radiation Dose Limits for Individual Members of the Public"; and

902 KAR 100:021, Sections 6 and 7—"Disposal of Radioactive Material"/"Classification of Radioactive Waste for Near-Surface Disposal", and "Radioactive Waste Characteristics."

## A.2 SEQUENCING OF FIELD OPERATIONS

The sequencing of field operations will follow the process flow diagram presented in Fig. A.4. The process is described by establishment of the work area, nuclear safety evaluation, scrap material relocation, size reduction, sampling and characterization, container packaging, container loading, rail car loading, and waste shipment. Specific details of the segregation and collection of material requiring corrective action are presented in the SAP & DMP (Chap. C). The order (sequence) in which the non-classified scrap yards are expected to be processed is as follows: C-746-C1, C-746-E1, C-746-E, C-746-C, C-747-B, C-747-A, C-746-P, C746-P1, and C-746-H4. The C-746-D scrap yard will be processed in parallel with the non-classified scrap yard. Processing the scrap yards in this manner (i.e., by scrap yard C-746-C1 being addressed first) will allow scrap thought to be providing the most environmental insult to be removed more expeditiously. In addition, combined with localized storm water controls and the integrated systems storm water controls (i.e., the sedimentation basin), contaminant sources will be greatly reduced. Also, several scrap yards (beside C-746-D) may be processed in parallel. Having the option to process from more than one scrap yard at a time will minimize workforce downtime and will optimize the packaging density.

### A.2.1 Establishment of the Work Area

The initial task in the processing operations is to establish a work area within the scrap yard from which material is to be removed to set up equipment; allow for safe use of a manlift for a Field Inspector and other appropriate personnel; provide lay-down areas for sampling, size-reducing, and packaging; extending haul roads (using structurally sound haul road media); and provide a buffer staging area for packaged material. It is also expected that baseline sampling will occur at this time to begin processing a waste profile with NTS [or other appropriate treatment, storage, and disposal facility (TSDF)]. In some instances, not all of these activities will be required to establish a work area. Also, some of these activities may actually be conducted during site mobilization (e.g., sampling).

### A.2.2 Nuclear Safety Evaluation

The scrap material piled in the Paducah scrap yards is not presently considered fissile material; however, due to past waste storage practices and based on knowledge that some of the material was removed from locations of the cascade operations at which fissile material was present, processing includes an inspection and review of the scrap material in relationship to nuclear safety.

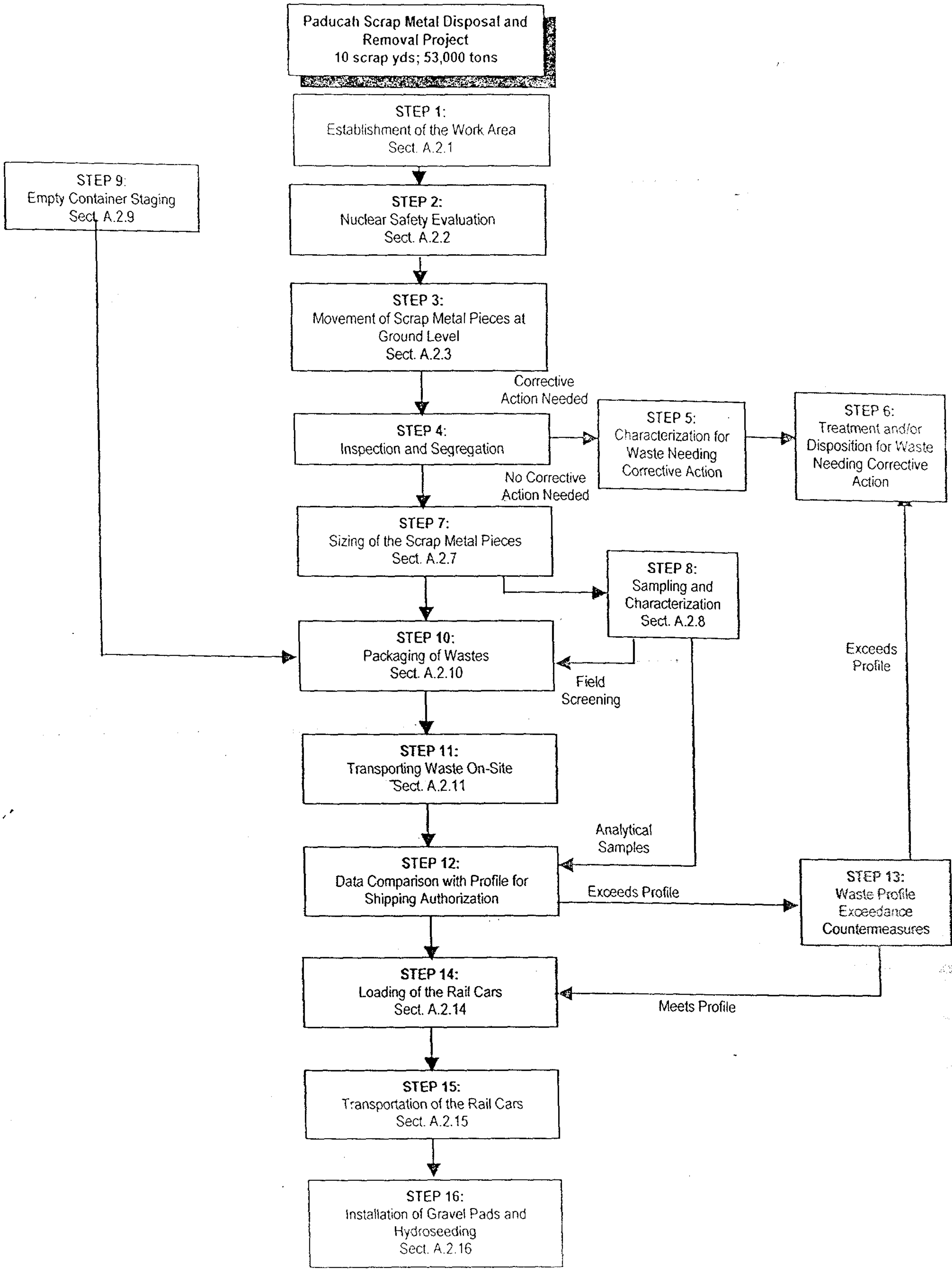



Fig. A.4. Simplified process flow diagram for the Paducah Scrap Metal Removal and Disposal Project.

The work for this project is in a radiological area. Material suspected of containing equal to or greater than 15 g of $^{235}U$ and an assay greater than or equal to 1.0 wt% shall not be moved or otherwise disturbed until BJC nuclear safety approval has been obtained. Also, unknown or otherwise suspect materials or waste, as identified by the Field Inspector, shall be undisturbed until BJC has provided direction. Therefore, the cumulative effect of these requirements is that the scrap piles will be "peeled back like an onion." Although the likelihood of a criticality incident is very low, the impact of such an incident, should it occur, essentially mandates that such careful removal be incorporated into the work process to ensure that such a criticality event will not occur.

Field inspectors with evaluation experience, obtained at the PGDP, will inspect the scrap piles in a man lift or through another appropriate manner. The inspectors will give the approval that material may be removed from the outer perimeter of a given scrap pile (or area within a scrap pile) and mark those pieces that cannot be moved individually without further nuclear safety evaluation. Further nuclear safety evaluation may require sampling or internal visual evaluation. A sampler may assist the Field Inspector and be in a position to take assay wipe samples or use fiber-optic scopes to examine interior sections of process equipment or use another method to ascertain information about the waste. The pieces sampled will be specially marked to identify a hold point at the scrap pile. This hold point will curtail movement in and around the piece until assay wipe results or other analytical results are available. If a deposit of potentially fissile material is discovered, the Field Inspectors will notify BJC nuclear safety staff for further directions. Specific details will be detailed in a Nuclear and Facility Safety Plan that will have precedence over the RAWP.

### A.2.3 Movement of Scrap Metal Pieces to Ground Level

The piles of scrap metal were heaped using a magnetic crane. Therefore, in general, the piles will be taken down from the top to mitigate an avalanche of metal. An uncontrolled movement of metal is a concern from an occupational health and safety (H&S) aspect for team personnel and also negatively impacts a nuclear safety evaluation; therefore, the use of a material handler with either a rotating grapple or a magnet is the preferred excavation/removal method. As excavation/removal progresses, additional scrap handling equipment (e.g., front-end loader) may be used, provided such use fits within the parameters specified for air emission control calculations.

Once the scrap material is placed on ground level, a determination will be made if "rough" decontamination is required to meet the intended TSDF's waste acceptance criteria (WAC). If needed, rough decontamination will be performed. For example, rough decontamination may consist of brushing/scraping a localized deposit of material on the scrap to help meet the intended TSDF WAC; however, to the extent practical, rough decontamination will be avoided. If rough decontamination is used, a localized high-efficiency particulate air (HEPA) filtration system will be employed to minimize air emissions.

### A.2.4 Inspection and Segregation

After material is placed on the ground, Field Inspectors and other appropriate team personnel will be able to better inspect the scrap material to determine if any type of corrective action, as defined in the SAP & DMP, is needed. Overall there are 13 waste streams (WSs) that have currently been identified for this project. These WSs, with their descriptions, are provided in Chap. A. Additional WS details (which may include revising of the number of WSs will be provided in the Waste Management Plan (WMP), which will be generated prior to mobilization.

### A.2.5 Characterization for Waste Needing Corrective Action

Details of characterizing waste above corrective action thresholds are presented in Sect. C.1.6. However, in general, each container of such material is to be characterized to meet the latest version WAC for the DOE (BJC 2001) and/or characterized to meet the WAC of a receiving TSDF. The project intends to use the BJC broad-spectrum contract as one option for wastes that need to be treated.

### A.2.6 Treatment and/or Disposition of Waste Needing Corrective Action

Treatment and/or disposition of waste above corrective action thresholds (Sect. C.1.6) will have to be determined on a case-by-case basis after characterization is complete. As mentioned above, waste that needs to be treated will be sent to a TSDF that has the appropriate licenses and permits to treat the waste. In many cases, the disposition of waste above corrective action thresholds will simply require modification of a waste profile and/or disposal at another appropriate TSDF.

### A.2.7 Sizing of the Scrap Metal Pieces

Sizing of the scrap metal is needed to maximize transport density, meet a TSDF's WAC for any size limitations, and meet the container size requirements needed for transport. Sizing is also needed to meet the on-site landfill WAC. Sizing will occur by either heavy equipment shearing/crushing or hot work, with preference given to heavy equipment shearing/crushing. The WESKEM team is intending to use an excavator that has multiple sizing and crushing options with the machine's multipurpose tool assortment. The tools can shear and cut metal or crush light pipe and drums.

Many different pieces of scrap will require various techniques of size reduction. For example, process converter shells are expected to be sheared in the axial direction. This shearing will either be done by a tool on the excavator or by a metal cutting torch (e.g., plasma arc). The use of the excavator tools will be maximized to prevent heat stress and the air emissions that come from hot work.

When hot work must be employed, the radiological emissions will be controlled by negative-air HEPA ventilation at the cutting zone. Typically, this hot work will be conducted under a portable shelter. However, if size or H&S considerations make this impractical for some material, the BJC Subcontract Technical Representative (STR) or Safety Advocate may waive use of the portable shelter. Fire-watch personnel will be on-station at all times during hot work. The area and procedures for hot work will meet fire code requirements.

### A.2.8 Sampling and Characterization

The Waste Sampler(s) or Radiation Control Technicians (RCTs) will collect wipe samples from the process for characterization of the scrap metal. Occasionally a scoop sample or "coupon" sample will be collected, as appropriate. Sampling and characterization will be conducted in accordance with established plans (e.g., the SAP & DMP) and procedures. The SAP & DMP (Chap. C) will reflect the data quality objectives (DQOs) that are needed for the metal. The data will be assessed for entry into the Paducah Environmental Management System (PEMS) database and final entry into the Oak Ridge Environmental Information System (OREIS) database.

The DQOs for transportation data may be met using radiological survey data. This is especially true for those pieces that will be considered surface-contaminated objects (SCOs) under the transportation regulations. Some of the scrap material will require extensive radiological analysis that will be gained only through physical sampling. These analyses will be developed through statements of work that will be provided to the BJC Sample Management Office (SMO). The analysis will be used to meet the WAC at the on-site landfill or at NTS. Data that have been placed in OREIS will be used to profile these scrap metal wastes for disposal. Other waste characterizations may be necessary to identify Resource Conservation and Recovery Act of 1976 (RCRA), Toxic Substances Control Act of 1976 (TSCA), and asbestos wastes.

Additional information pertaining to the sampling and characterization of the scrap metal and other waste is presented in the SAP & DMP (Chap. C). In addition, Sect. C.1.6 presents various scenarios in which the data obtained are used in the process.

### A.2.9 Empty Container Staging

Empty intermodal containers will be staged in up to four locations, depending on production rate, turnaround time from the disposal facility, and other PGDP site activities (e.g., if PGDP has significant depleted uranium hexafluoride cylinder movement, the project will minimize usage of the storage area west of 10th Street and north of Virginia Avenue). These four storage locations are

- the area within reaching distance of the all-terrain crane
- an area within C-746-P for designated equipment staging
- the Old Drum Mountain area, and
- the storage area west of 10th Street and north of Virginia Avenue.

Empty intermodals will arrive at the plant and be unloaded by an all-terrain crane or a front-end loader fitted with a fork grabble or fork lift. Shipment of empties will be delivered on a schedule to meet production goals as well as minimize demurrage fees. It is anticipated that 150 intermodals will be in use throughout the duration of this project.

Empty intermodals will be moved to the work area by a tandem-axle truck with fixed-neck lowboy trailer, front-end loader with forklift grapple, fork lift, or intermodal truck. They will be staged on a buffer zone/lay-down area inside the work area. The buffer zone/lay-down area will typically contain at least two intermodal containers to allow for continuous production and loading.

In addition, other empty containers will be staged at either the equipment staging area in C-746-P or the Old Drum Mountain area or other appropriate location(s) at PDGP depending upon PGDP site activities and production needs. These containers will include, but not be limited to, 55-gal drums and roll-off bins.

### A.2.10 Packaging of Wastes

Packaging of the majority of the scrap material will be accomplished using intermodal containers. Intermodal containers are approved for use with low specific activity and SCO wastes. The containers typically have a capacity of 40,000 lbs and a volume of 675 $ft^3$. The intermodal containers will be susceptible to punctures by the scrap; subsequently, care will be taken not to puncture the container.

**Note:** Throughout this RAWP, the use of the term "intermodal containers" may also imply utilization of a large shipping container that meets the TSDF's WAC, transportation requirements, and project requirements.

All packaging used for off-site disposal will meet stringent quality assurance (QA) standards, in accordance with 10 *CFR* 830.120, including assessment of the manufacturer and individual inspection of each container. All NTS's container requirements will be met with the intermodal containers. NTS is currently accepting these packages for disposal at its debris cell.

Changes in the size of the intermodal, density of the scrap material, and methodology for packaging the intermodals [provided the conditions are within the evaluation of the activity hazard assessment (AHA)] are considered part of normal operational processing optimization and not deemed a change in the RAWP. Absorbent will be added to the intermodal boxes in the event moisture is retained.

All intermodal packaging will be completed under the NTS WAC requirements. A waste compliance specialist will inspect packages and packaging operations to ensure that all NTS WAC requirements are being met.

Classified wastes will be packaged in accordance with the receiving TSDF's WAC and other PGDP sites' security protocols.

Wastes meeting the on-site landfill WAC will be placed in roll-off bins to await approval of their respective landfill waste disposal package. Much of the non-process equipment scrap metal and non-metal wastes are candidates for disposal in the on-site landfill. These roll-off bins will be covered to prevent rainwater from collecting in the bins.

RCRA and TSCA wastes that are discovered will be packaged in accordance with the WAC of the on-site storage facilities and/or the WAC of the intended TSDF if the waste is to be treated.

### A.2.11 Transporting Wastes On-Site

Once the radiological monitoring results (or subsequent analytical sampling) are acceptable, the waste will be ready for transport. Unless otherwise specified, transporting wastes on-site will be done in accordance with waste standard operating procedure (WSOP) 131, *Handling, Transporting, and Relocating Waste Containers*. Staging will occur at (1) the area within reaching distance of the all-terrain crane, (2) the C-746-P equipment staging area, (3) the Old Drum Mountain area, (4) the storage area west of 10th Street and north of Virginia Avenue, or (5) another PDGP site location mutually agreed to by the BJC STR and the WESKEM Project Manager.

Waste destined for off-site disposal in intermodal containers will also be transported on-site by tandem-axle truck with fixed-neck lowboy trailer or intermodal roll-off truck or appropriately sized fork lift. The containers typically will be placed adjacent to the rail car loading site. An aboveground truck scale, calibrated to National Institute of Standards and Technology standards, will be installed in the scrap yard area, near the rail car loading site. Therefore, the intermodal containers will typically be weighed during their on-site transportation. If additional staging area is needed, the container(s) will be staged at one of the previously defined staging locations.

Wastes meeting the on-site landfill WAC and destined for disposal in the on-site landfill will be managed in roll-off bins (although ST-90 or B-25 boxes may also be used). These bins will be covered and will await acceptance by the landfill of their respective landfill waste disposal package. Filled roll-off bins will remain in the location at which they were packaged, to the extent practical, until acceptance is obtained by the on-site landfill. If an additional staging area is needed, the container(s) will be staged at one of the previously defined staging locations. When acceptance has been granted, the wastes will be transported by roll-off truck driven by a qualified truck driver. Transportation papers will be produced for the material because the truck will cross a public-access roadway. If the on-site landfill is not available, waste targeted for this landfill will be disposed off-site.

Wastes requiring treatment prior to disposition will typically be packaged in 55-gal drums and will be staged at an appropriate location at PGDP (e.g., RCRA storage area) until a time at which the material is ready for transportation/shipment to an appropriate TSDF. These wastes will go directly into storage on a daily basis, therefore, eliminating the need of a 90-day storage area for wastes awaiting pickup.

### A.2.12 Data Comparison with Profile for Shipping Authorization

Once returned from the laboratory, the characterization data related to intermodal containers will be reviewed, dated, and compared to the established waste profile. Once it has been affirmed that the waste is within the limits of the waste profile and the TSDF has issued a Notice to Proceed, the associated intermodal containers will be ready to ship. If the data exceed the established waste profile, the associated intermodal container(s) will not be considered authorized for shipping until the exceedances are appropriately resolved.

### A.2.13 Waste Profile Exceedance Countermeasures

Every waste profile exceedance will be evaluated to determine the appropriate resolution. Many of these scenarios are addressed in Sect. C.1.6. Resolution can include statistical sampling, modification of waste profile providing the exceedance is below the WAC limit, and/or determination that the waste needs to be treated prior to disposal.

### A.2.14 Loading the Rail Cars

After ascertaining the waste is ready for shipment, the full intermodals will be loaded by crane or by forklift onto a rail car for shipment to the licensed disposal facility. It is anticipated that 177-ton rail cars will be used. These rail cars can physically be loaded with up to eight intermodals per rail car. However, if these 177-ton rail cars are not available, other-sized rail cars may be used provided the weight and size limits for the rail car are not exceeded. If rail cars become unavailable, trucking will be used for transport.

The preferred approach for loading rail cars is at the scrap yard by the installation of 200 ft of rail spur at the east end of the C-746-A smelter area. A rail switch will be installed in the active spur and will begin the 200 ft of spur that stop directly south of the C-616 chromium reduction facility. The area where the spur enters the scrap yard was historically not a scrap yard. This area at the eastern end of C-746-C scrap yard was the plant utility department's lay-down area for new and used equipment. This area has no process equipment within its perimeter and should be low in radioactive contamination. The spur foundation will be aboveground, with no excavation required except through the east entrance roadway of C-746-A. This spur will allow direct access to a railway within the scrap yard. This direct access will reduce the need of on-site transport (thereby reducing the potential for moving-vehicle accidents) and will reduce contamination-control issues. If necessary, rail cars may be loaded at other existing locations within the plant site. Upon completion of the Project, the rail spur will be evaluated for future use. Furthermore, preliminary evaluation has determined that no suspected landfills are beneath this portion of the scrap yards.

The intermodal containers will be staged at the rail spur and will await final clearance from BJC RCTs to be loaded onto the articulating flat rail cars. The rail cars will be parked on the spur and loaded using an appropriately sized forklift or lifting device. The wheels of the forklift will be in a contamination control zone, but the lifting boom will be wiped down and cleared by the RCTs to load the packages in the rail car.

An operator will disconnect the intermodal containers from their lifting device. All critical lift and elevated work safety standards will be met. The AHA will fully describe the safety aspects of this loading operation.

BJC RCTs will survey the exterior of the containers and the articulating flat-rail car itself. The rail car will have undergone an acceptance survey when it was received on-site. The rail car will be offered for transport after all appropriate transportation documents have been produced and accepted by BJC. These documents will include a radioactive material manifest listing all of the packages on the rail car.

### A.2.15 Transportation of the Rail Cars

Following analytical determination of each intermodal box meeting the TSDF profile for the subject waste, rail shipments will be scheduled for transportation of the intermodal boxes to the TSDF. Each rail car is expected to have a total capacity of 177 tons (see above) and accommodate eight intermodal boxes with each loaded with up to approximately 16 tons. Additional shipping information will be provided as part of the Transportation Plan, which will be provided prior to field mobilization.

The rail cars will be unloaded at a transportation facility (currently a facility in Cisco, Utah, is to be used), and the intermodal containers will be placed on trucks for the final few miles into NTS. The trucks will go north of NTS to avoid the Las Vegas area and make their way to the NTS burial site. The trucks will be offloaded directly into the debris burial area at NTS. The intermodals will be surveyed and released for transport back to Paducah.

### A.2.16 Installation of Gravel Pads and Hydroseeding

Following removal of the scrap metal, a gravel pad will be placed under the footprint of the pile with a non-limestone material. Hydroseeding will be conducted in all other areas requiring cover. Erosion controls will be maintained throughout the project (see Sect. A.5.2). Areas will be sloped, to the extent practical, to manage storm water. Suspended solids will be minimized to meet clean water provisions.

## A.3 JOB SITE REQUIREMENTS AND ANTICIPATED EQUIPMENT

### A.3.1 Utilities

The utilities listed below are expected to be needed for this project.

- Process water for use in dust control and equipment and localized work-site decontamination activities.
- Potable water for shower facility and restrooms.
- Sewer connections for shower facility and restrooms.
- 110 VAC and 220 VAC power to trailers. Power will be provided from the same source as power need for the work areas.
- 110 VAC and 220 VAC power to work areas. Typically, the power needed for work areas will be provided by localized small diesel generators because there will be multiple work areas that will be operational for only short periods of time. However, where power is needed for essentially the duration of the project, power to that work area will be provided from an overhead-power-line feeder extended from the plant's switchyard. The extended feeder will be a 14kV, 3-phase line capable of supplying up to 10 MW of power. Actual power and distribution requirements will be determined prior to mobilization.
- Telephone hookup for the office trailers and the break trailer.
- Computer data links for the office trailers and the break trailer.

### A.3.2 Staging Areas and Other Site Preparation Work

The facilities listed below are expected to be needed for this project.

- Two office trailers, one break trailer, one shower facility, and parking for vehicles.
- A 20-ft × 300-ft area east of C-746-A for a railroad spur extension.
- Crane operating areas and intermodal container loading areas at the east end of C-746-C1.
- The Old Drum Mountain area for storage.
- An equipment staging area within C-746-P.
- A storage/staging area along rail spur west of 10th Street and north of Virginia Avenue.

### A.3.3 Anticipated Construction, Plant, Equipment, and Material Handling

The construction plant and equipment (including material handling equipment) listed below are expected to be used for the Paducah Scrap Metal Removal and Disposal Project. Details are provided for clarification and are not intended to indicate a RAWP change if a different model, manufacturer, capacity, quantity, or type of equipment is used. Changes will be managed by the Paducah Scrap Metal team (i.e., Project Team), provided such changes are within the parameters of air emission/control calculations.

- Material handler with 54-ft boom and 24,125-lb counterweight; manufacturer: Caterpillar; model: 345BH MH E
- Excavator with 20-ft 3-inch boom and 42-inch bucket; manufacturer: Caterpillar; model: 330BL E
- Wheel loader (i.e., front-end loader) with top-clamp grapple and 4-yd$^3$ bucket; manufacturer: Caterpillar; model: IT62G I
- Man lift, 80-ft boom, 8-ft platform, 4-wheel drive; manufacturer: Genie; model: S80
- All-terrain crane, 90 tons; manufacturer: Grove; model: RT890
- Track mobile, rail car tow motor.
- Multiprocessor head with shear jaw and tank shear jaw; manufacturer: Caterpillar; model: MP 30
- Orange-peel grapple; manufacturer: Caterpillar
- Scrap magnet, 72-inch; manufacturer: Scrapmaster; model: 72D
- Scrap magnet, 66-inch; manufacturer: Scrapmaster; model: 66D
- Hydraulic quick coupler; manufacturer: Caterpillar; model: 330B PG/HYD
- Tandom-axle truck (three each); manufacturer: GMC; model: T8500
- Fixed-neck lowboy trailer, 70,000 lbs (four each); manufacturer: Interstate; model: 70LBG-DD 3 Axle
- Roll-off container (30 each); manufacturer: Galbreth; model: 25 yd$^3$
- Personnel trailer, 20-ft × 16-ft office (two each)

- Personnel trailer, 20-ft × 16-ft break room
- Personnel trailer, 20-ft × 16-ft shower
- Intermodal containers, 675 $ft^3$ (150 each)
- Articulating rail car, 177-ton capacity

The use of this construction plant and equipment (including material handling equipment) is discussed within Sect. A.2. Specific equipment details are still in engineering design. The sizes, capacities, and descriptions presented in this section and throughout this plan are intended to provide the reader with a better understanding of the process. However, detail changes from the plan to actual field implementation will only require the WESKEM team to provide the STR with as-built drawings, where applicable, and will have to be addressed in an AHA.

## A.4 HEALTH AND SAFETY

Overall safety issues are presented and discussed in Chap. D; however, in addition, the Design Report specifically addresses three issues due to the nature of work that is involved and historical concerns at the PGDP: hoisting and rigging, radiation survey methodology, and corrective action scenarios, particularly in regard to radiochemical discrepancies with process knowledge. The typical work schedule will be 40 hours/wk. The specific hours worked in a day will be determined upon further Integrated Safety Management System (ISMS) review by field and safety personnel to also incorporate issues such as heat stress.

### A.4.1 Hoisting and Rigging Lift Information

The only expected hoisting and rigging will involve use of a crane to load and unload intermodal containers. This equipment will be operated by certified heavy-equipment operators. Other lifts will typically use an appropriate-capacity forklift and are considered "ordinary lifts" per BJC procedure BJC-EH-2008, *Hoisting and Rigging Program*. Such lifts include unloading empty containers from trucks in the staging area as they arrive. Moving of empty and full containers between the staging area and work site is also accomplished with the same forklift. This method is specifically designed to avoid critical lifts, thereby enhancing overall project safety. In addition, there is the potential for lifts using the scrap magnets that can fit the material handler or the excavator.

### A.4.2 Radiation Survey Methodology

10 *CFR* 835 sets forth the requirements for occupational radiation protection for DOE-sponsored activities. These requirements will be further addressed in the project-specific BJC Radiation Protection Plan (RPP). To ensure compliance with the federal requirements and the BJC RPP, the contractor will provide controls and support for the purpose of radiation protection.

The BJC Radiological Control (RADCON) Program places emphasis on the protection of the worker and the environment through the use of the "as low as reasonably achievable" (ALARA) process. Contamination levels and radiation exposures to workers are to be minimized to levels that guarantee compliance with applicable BJC ALARA goals, federal limits, and ARARs established for this Project. This will be accomplished through implementation of several functional program elements, including radiation safety training, radiological work permits (RWPs) and access controls, personnel monitoring, workplace monitoring, personnel protective equipment (PPE), and procedures.

Contamination control is of paramount concern with this project, as is the minimization of airborne radioactive particulates. These conditions will continuously be stressed to workers at the job site.

RADCON personnel will perform numerous surveys in support of this project. These will include a pre-job characterization survey of the work zone prior to establishing the work area, in-process surveys, boundary-confirmation surveys, surveys for off-site shipments, and post-job surveys to support demobilization.

RADCON will perform radiological surveys in accordance with the RPP. These will include both direct readings for total contamination and removable contamination measurements using swipes or masslin cloths. Dose rates will be obtained using direct-reading tissue equivalent ratemeters and ionization chambers. General area neutron surveys will be performed on a routine basis to characterize the neutron dose rate.

Contamination limits will be established in accordance with 10 *CFR* 835 and BJC policy. These limits shall be consistent with the anticipated radionuclides. For this project, the on-site limits are:

| | | |
|---|---|---|
| Alpha: | Total: | 1000 disintegrations per minute (dpm) per 100 $cm^2$ |
| Removable: | | 200 dpm per 100 $cm^2$ |
| Beta/Gamma: | Total: | 5000 dpm per 100 $cm^2$ |
| Removable: | | 1000 dpm per 100 $cm^2$ |

The limits for release of equipment and material for unrestricted use off-site are established in accordance with DOE Order 5400.5 and Reg. Guide 1.86. Furthermore, BJC has established administrative control limits for beta/gamma release limits which are 80% of DOE Order 5400.5 and Reg. Guide 1.86 limits. Therefore, the Projects' off-site limits are:

| | | |
|---|---|---|
| Alpha: | Total: | 100 dpm per 100 $cm^2$ |
| Removable: | | 20 dpm per 100 $cm^2$ |
| Beta/Gamma: | Total: | 4000 dpm per 100 $cm^2$ |
| Removable: | | 800 dpm per 100 $cm^2$ |

Additionally, alpha and beta/gamma instruments will be used at all boundary-control stations. Personnel will complete both an alpha and beta/gamma frisk prior to exiting contamination or radiological buffer areas (i.e., contamination control zones). Furthermore, hand and foot monitors will be used to the extent practical.

As the only equipment leaving the work zone on a daily basis will be the intermodals, these shall be staged in a buffer area to minimize contamination. RADCON will survey the exterior surfaces of the intermodals prior to their leaving the buffer area. In addition, any portion of equipment that crosses the buffer area boundary will be surveyed prior to its departing the area.

WESKEM will notify the STR and RADCON in advance of any new equipment arrivals on-site. This equipment will be surveyed prior to entering the controlled area. Also, equipment leaving the site will be surveyed prior to its leaving the controlled area.

RADCON will perform several sampling activities throughout the duration of the project including Breathing Zone General Air Sampling. In addition to gathering the samples, RADCON will also assist in reviewing sample data to determine isotopic mixtures and to verify bioassay parameters, contamination survey limits, and desired air concentration values.

## A.5 ENVIRONMENTAL CONTROL

### A.5.1 Air Emissions

Air emissions monitoring is generally discussed in the Site Environmental Safety and Health (ES&H) Plan (Chap. D). The project will not require modification of the PGDP air monitoring system used to meet plant National Emissions Standards for Hazardous Air Pollutants requirements. The project will incorporate several work practices, as necessary, that will help minimize air emissions, including the following:

- minimizing the height of the drop from the material handler to placement on the ground to the extent practical,

- minimizing dust through use of water suppression, and

- collecting fumes from cutting metal with a metal-cutting torch by localized negative pressure and routing through a HEPA filter.

Water suppression will typically be utilized when dust emanating from the scrap piles is visually determined to be in the breathing zone (i.e., 14 inches in front of employee's shoulders) and other air emission control devices such as localized HEPA filtration is not practical. Dust emanating from the haul roads will not initiate an action of water suppression.

Another air emission issue is the potential handling and packaging of asbestos-containing material (ACM). Although only minimal ACM (friable and non-friable) is expected to be encountered, the project will develop a contingency plan in the event ACM is encountered. This contingency plan will include filing an Asbestos Abatement Project Notification with the Commonwealth of Kentucky's Department for Environmental Protection Division for Air Quality Paducah Regional Office and development of an ACM Handling Plan prior to commencement of activities that would disturb ACM. The ACM Handling Plan will require that during all processing hours, an individual qualified to identify potential asbestos-containing material (PACM) will be present to identify PACM during the inspection and segregation portion of the process line. Any PACM identified by the qualified individual (e.g., asbestos-awareness trained) will be segregated into a separate container for sampling to occur. The following procedures will be used for PACM and ACM: WSOP 258, *Asbestos and Other Fibrous Materials* and WSOP 640, *Bulk Sampling of Material Suspected of Containing Asbestos*.

If the material is determined to be ACM, appropriately trained personnel will be contacted to complete packaging to meet the latest version of the PGDP WAC (BJC 2001) or the NTS WAC, as appropriate.

### A.5.2 Storm Water Emissions

The creation of any new sources of storm water contamination is not anticipated. However, the movement of equipment and reconfiguration of the scrap material may cause changes in the localized storm water movement (whether soil, gravel, or concrete pad surface) may increase the potential for erosion. A conceptual drawing of the project facilities will be provided at the site and will show the following:

- major features of the work area, including anticipated impervious structures and storage areas;

- all open areas that will be potentially disturbed;

- storm water drainage patterns including all conveyance structures and the relative locations of surfaces waters that will receive discharge from the site; and

- location and nature of any stabilization, velocity dissipation, and/or other storm water and sediment management controls (i.e., localized and/or integrated controls) to be used to prevent erosion and sediment transport.

The drawing will be available at the project site throughout the term of field activities.

Inspections will be made at the site, including all sediment and erosion control structures, at least once every 14 d and within 24 hours after any storm event that produces 0.5 inch of precipitation within a 24-hour period after field activities begin. A log of all inspections and repairs and maintenance of sediment- and erosion-control structures will be maintained at the project office on the Paducah Scrap Metal Removal and Disposal project site.

Runoff from the non-classified scrap yards site is contained primarily in ditches running from east to west. These ditches will ultimately discharge to a sedimentation basin and then to Kentucky Permit Discharge Elimination System (KPDES) Outfall 001. Runoff from C-746-D scrap yard discharges to KPDES Outfall 010. An independent subcontractor will manage the ditches' sedimentation basins. Erosion and sediment controls will be implemented to prevent and/or control soil and particulate runoff from the processing area. These controls will include the following:

- stabilization of vehicle travel paths into and around the work area through application of dense-grade, aggregate red gravel, when practical;

- installation/maintenance of silt fencing, consisting of filter fabric and/or straw bales, in the drainage areas surrounding the processing area to filter runoff exiting the work site;

- minimization of disturbance of established vegetation at the site to limit particulate runoff; and

- placement of gravel pads and hydroseeding in areas as soon as possible after access to an area within a scrap yard is no longer needed.

### A.5.3 Land Pollution/Contamination Prevention

Particulates and liquids from movement, dust suppression, and size-reducing operations will be contained in impervious or semi-impervious pans or similar collection devices under the equipment/operations or will be routed to appropriate collections devices (e.g., sedimentation basin) as applicable upon application of ISMS to ascertain benefits versus probability of potential safety issues such as tripping/slipping hazards. This material will periodically be removed, containerized, sampled, and disposed of as described in the SAP & DMP (Chap. C). Stationary equipment will be diked either by temporary diking or self-containing diking to contain any leaks, as appropriate. Additional information will be presented in the WMP, which will be developed prior to field mobilization.

### A.5.4 Waste Generation, Management, and Minimization

Characterization and management of wastes are described in Chap. C. Furthermore, a WMP will be developed and implemented by the WESKEM team prior to field mobilization. This WMP will adhere to requirements and guidelines specified in the latest version of the PGDP WAC (BJC 2001) and other applicable documents, such as the performance/risk evaluation.

### A.5.5 Emergency Management

Potential emergencies, alarms, and actions are discussed in the Site (ES&H) Plan (Chap D).

## A.6 WORK CONTROL SYSTEM

The work control system involves planning, scheduling, tracking, and reporting work to ensure effective project management for the project. The work control requirements are identified across all of the operational elements of this project. WESKEM will employ standard concepts of project management and control to provide

- project plans, budget plans, and progress reports;
- planning and scheduling of project activities for effective use of resources;
- recognition of safety and environmental issues during the planning process and identification of appropriate mitigative measures. Work planning will also identify any access or work permits; and
- accurate tracking of work to maintain schedule and costs.

Primarily, work control is maintained through implementation of a successful QA Program. This program includes a work control procedure (WSOP 321); a document and records management process and procedure (WSOP 112); a Data Quality Assurance Project Plan (QAPP); a project-specific QAPP; control procedures for design (WSOP 300), drawings (WSOP 305), and other functions; and reporting mechanisms (e.g., Occurrence/Price-Anderson Amendments Act Reporting).

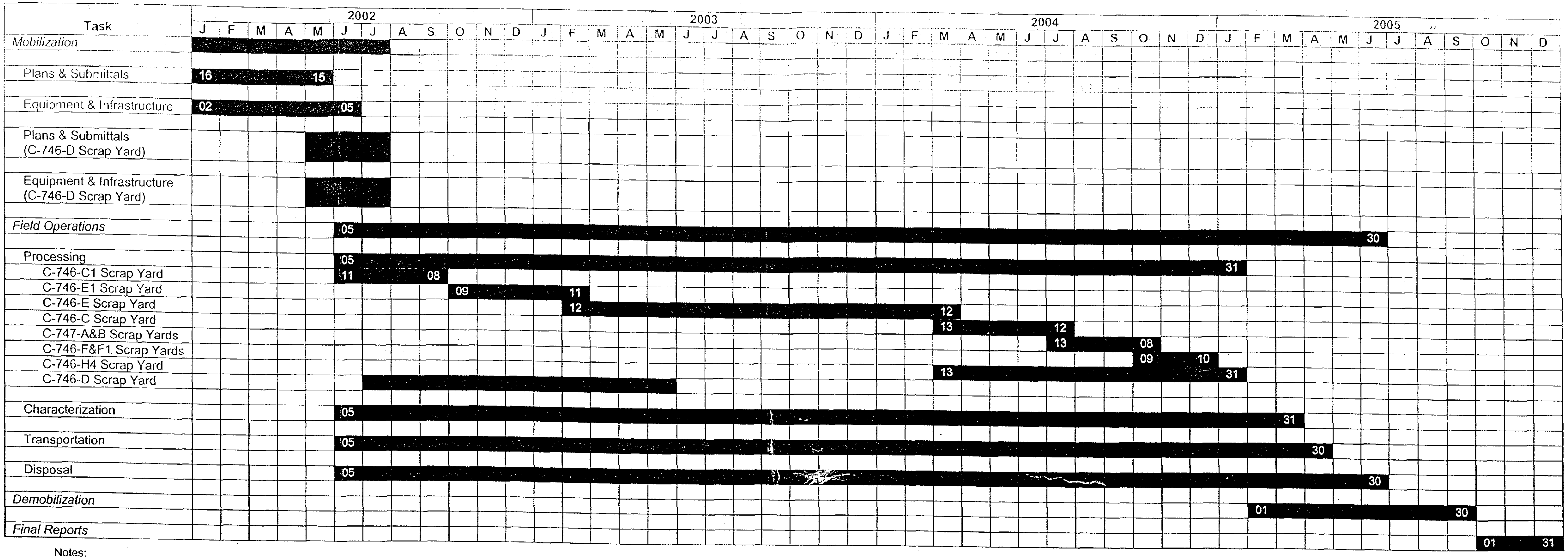
### A.6.1 Document and Records Control

A system shall be defined for the identification, review, acceptance, control, and maintenance of quality records. The system shall include provisions for retention, protection, preservation, revision, traceability, accountability, and retrievability of records. Revision and control of documents and document and records management for this project will be delineated in the project's QAPP, which will be developed prior to field mobilization. Revision and control will be done in accordance with WSOP 112, *Document Control and Records Management*.

### A.6.2 Quality Control

A Data QAPP (Chap. E) has been developed. In addition, a project-specific QAPP will also be developed and implemented that incorporates the requirements of 10 *CFR* 830.120 for nuclear facilities. Elements within the project's QAPP will address the following:

- the quality program,
- training and qualification,
- quality improvement,
- documents and records,
- work processes,
- procurement,
- inspection and acceptance testing, and
- assessment.




Notes:

1 The targeted submittal date for the D1 version of secondary documents is by May 15, 2002. The targeted submittal dates for the D1 and D2 versions of primary documents is January 29, 2002, and April 22, 2002, respectively.

2 The dates provided in this figure are to provide clarification on approximate timetables. The dates the project is managing to are the finish dates for mobilization, field operations, demobilization, and final reports.

**Fig. B.1. Schedule for Paducah scrap metal removal and disposal project.**

## B.0 SCHEDULE FOR COMPLETION OF THE WORK

Figure B.1 shows the project's proposed schedule.

# C.0 SAMPLING AND ANALYSIS PLAN AND DATA MANAGEMENT PLAN

## C.1 PROJECT OVERVIEW

### C.1.1 Background

Between 1974 and 1983, contaminated equipment was removed from the process buildings at PGDP as a part of numerous uranium enrichment process (cascade) upgrade programs. These programs included the dismantlement, removal, and on-site storage of contaminated equipment, cell components, and scrap metal from the cascade facilities. Much of the scrap material from these programs is contained in several scrap yards located in the northwestern portion of the fenced area of the plant. Additional material within these scrap yards includes emptied drums and miscellaneous scrap material, and equipment that has become contaminated during activities conducted at PGDP.

The purpose of this project is to safely remove and disposition 53,000 tons (10,000 tons attributed to the nickel ingots, which are just to be transferred to a better-equipped storage facility on-site) of contaminated scrap metal and miscellaneous material contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B, which aré located in the northwestern portion of the fenced area of the plant. In addition to uranium and $^{99}$Tc, other radionuclides and/or hazardous wastes may have been placed in the scrap yards over the years. Although present in small quantities, there are non-metal scrap materials that are randomly dispersed throughout the scrap yards because these yards were in an uncontrolled area within the DOE fenceline for years. These materials may include debris that partially contains asbestos, other industrial wastes, or RCRA and/or TSCA-regulated polychlorinated biphenyl (PCB) constituents.

A majority of the scrap metal was evaluated by the PGDP Scrap Disposal Committee in the late-1970's and early-1980 to determine disposal alternatives. This evaluation resulted in *Disposal of the PGDP Scrap Metal*, KY/F-127, April 1980 (Union Carbide 1980). In this report, 15,500 tons of the 43,000 tons of scrap metal to be disposed of by this Project was evaluated. Note that of the 53,000 tons identified for this Project, approximately 10,000 tons are attributable to the storage on-site of nickel ingots.

Summary analytical results presented in the report indicate that the average contamination on the nickel-plated steel equipment, excluding jack screws, struts, and UF4 Drums (i.e., Drum Mountain drums), was 33 parts per million (ppm) for U (+/- 12 ppm); <5 parts per billion (ppb) for Np; <0.05 ppb Pu (also not detected on jack screws or struts); and 15 ppb Tc (+/- 7 ppb). The jack screws had a uranium contamination ranging from 36 to 3741 ppm; neptunium contamination of <5 to 42 ppb; and technetium contamination of <5 to 48 ppb. The Struts had a uranium contamination ranging from 6 to 336,000 ppm; neptunium mean contamination of 7 ppb with a variance of +/- 3 ppb; and technetium mean contamination of 22 ppb with a variance of +/- 8 ppb. Material within C-746-D indicated an average contamination of 54 ppm for U (± 22 ppm), 6 ppb for Np (± 2 ppb), < 0.05 ppb for Pu, and 30 ppb for Tc (± 14 ppb). The nickel-plated steel in this 1980 report accounted for 13,350 tons of the mass being addressed by this Project.

Furthermore, the mean contamination levels on scrapped aluminum equipment (excluding compressor blades) was 25 ppm for uranium (variance of +/- 11 ppm), < 5 ppb for neptunium, <0.05 ppb for plutonium, and < 5 ppb for Tc and accounts for 1,250 tons of the material being addressed by this Project. Another 900 tons was accounted for in compressor blades. The range of contamination levels on the aluminum compressor blades was 400 to 1700 ppm for uranium, <5 to 36 ppb for neptunium, <0.05 for plutonium, and <5 to 32 ppb for technetium.

Although these sampling results were not taken in a manner consistent with environmental sampling protocols relevant to this RAWP, the data seems to support historical process knowledge that to the extent practical, the majority of scrap metal was decontaminated prior to placement in the scrap yards. This data is not managed within the OREIS database.

### C.1.2 Project Description

This SAP & DMP is part of an overall project to characterize, remove, package, ship, and store/dispose of materials located aboveground at the aforementioned nine scrap yards at PGDP. Plans to be developed prior to mobilization that interface significantly with this SAP & DMP, in addition to those referred in the RAWP, include the project's QAPP, Data Management Implementation Plan (DMIP), Nuclear Facility and Safety Plan, WMP, and Transportation Plan.

The technical approach to accomplishing this project is presented in the Design Report (Chap. A); however, specific details on sampling and characterization activities are presented in this SAP & DMP.

Once the sample results have been returned from the laboratory; the definitive data have been verified and validated and are within the waste profile of the intended TSDF; and the intended TSDF has issued an approval for shipment, the waste containers (e.g., intermodals) will be loaded onto a transportation conveyance and shall be shipped for disposal to the intended TSDF.

In addition to providing a waste profile, data collected shall be used to

- evaluate whether the waste is RCRA hazardous,
- evaluate whether the waste meets the Land Disposal Restrictions (LDRs),
- evaluate whether WAC-prohibited items are in the waste,
- evaluate whether radionuclides present in the waste are below the limits specified in the TSDF's radioactive materials license,
- provide information for nuclear material control and accountability (if needed), and
- provide information needed to satisfy the U.S. Department of Transportation (DOT) requirements pertaining to off-site shipment of waste.

This plan was prepared to meet or exceed sampling and analysis protocols as specified in U.S. Environmental Protection Agency's (EPA's) Test Methods for Evaluating Solid Waste. This plan provides supplemental instructions to procedures established for sampling and analysis activities. WESKEM and BJC procedures are referenced throughout this plan, as applicable. WESKEM shall ensure that all personnel are trained on the applicable procedures and procedures referenced are accessible to personnel performing the work. Procedure number or title changes will not require a revision to the RAWP but will be managed under work control procedures established by the Project team.

### C.1.3 Waste Stream Descriptions

Table C.1 presents 13 WSs that have been initially identified for this SAP & DMP. The estimated mass of the primary waste (WSs 1 through 9) was obtained from Sect. A.5.1 of the EE/CA for Scrap Metal Disposition (DOE 2001). Additional details of this waste are specified in Appendix 2.

**Table C.1. Anticipated waste streams**

| Waste Stream Number and Name | Waste Stream Description | Estimated Mass (tons) | Type of Container | No. of Cont. |
|---|---|---|---|---|
| WS 1: Scrap metal | Scrap metal in the nine scrap yards other than that defined by WSs 2, 4, 5, and 6 | 28,080 | IM or ROB | 1,664[a] |
| WS 2: Nickel ingots | The nickel ingots from scrap yard C-746-H4 | 9,700 | None | — |
| WS 3: Scrap wood | Cross ties, pallets, etc. | 542 | IM or ROB | 40 |
| WS 4: Mixed solid waste | Material that samplers/segregators characterize as RCRA- and PCB-contaminated | 8 | 55-gal drum | 53 |
| WS 5: RCRA solid waste | Material that samplers/segregators characterize as RCRA-contaminated | 2 | 55-gal drum | 13 |
| WS 6: PCB solid waste | Material that samplers/segregators characterize as PCB-contaminated | 12 | 55-gal drum[b] | 80[b] |
| WS 7: Other solid primary waste | Solid waste not accounted for from WSs 1 through 6 (e.g., plastic pipe) | From WSs 1 through 7 | 55-gal drum, IM, or ROB (case by case) | None[c] |
| WS 8: Classified waste | Classified LLW solid waste | 14,560 | IM- or TSDF WAC-approved container | Note[d] |
| WS 9: Liquid primary waste | Liquid segregated from primary solid waste including residual water, rain water, and dust control water | 100 | 55-gal drum | 500 |
| WS 10: Decontamination water | Waste generated from decontaminating process equipment and sampling equipment | 20 | 55-gal drum | 100 |
| WS 11: Decontamination sludge | Waste generated from decontaminating process equipment and sampling equipment | 4 | Initially placed in 55-gal drum | None[c] |
| WS 12: PPE and plastic sheeting | PPE and plastic sheeting generated during performance of work activities | 13 | Bagged and placed in with generating waste or in 55-gal drum | None[c] |
| WS 13: Other secondary waste | Other secondary wastes that include such items as geotextile sheeting, air filters, and contaminated disposable processing equipment | 6 | Bagged and placed in with IM or ROB, as appropriate, or in 55-gal drum | None[c] |

[a] Material in IMs (for off-site disposal) will be more densely packaged than materials in ROBs (for on-site disposal).

[b] PCB waste may be placed in B-25 boxes. If so, approximately six B-25 boxes of waste would be generated. It is estimated that the scrap metal density in the IM's will be 50 lb/ft$^3$.

[c] Waste will typically be packaged with WS 1.

[d] Will be dependent on size of container.

IM = intermodal.
LLW = low-level waste.
PCB = polychlorinated biphenyl.
PPE = personal protective equipment.
RCRA = Resource Conservation and Recovery Act of 1976.
ROB = roll-off box.
TSDF = treatment, storage, and disposal facility.
WAC = waste acceptance criteria
WS = waste stream

The secondary WSs (WSs 10 through 13) shall initially be segregated by waste type and potential contaminants. This segregation is to promote waste minimization and to keep matrices more prone to being characteristically hazardous from being intermingled with waste that historically does not become characteristically hazardous and to comply with storage and packaging requirements specified in the latest version of the PGDP WAC (BJC 2001).

Additional WS details will be provided in the WMP, which will be submitted to BJC and approved prior to commencement of processing operations.

### C.1.4 Data Quality Objectives

The primary objective of this characterization project is to provide data to characterize each WS and to determine whether each WS meets the requirements and/or WAC of the specified storage, treatment, or land disposal facilities. The elements of the DQO process (state the problem, identify the problem, identify the inputs to the decision, define the boundaries of the study, develop a decision rule, specify tolerable limits on decision errors, and optimize the design for obtaining data) have all been considered in developing this SAP & DMP.

To meet the DQOs of this project, certain parameters of concern are identified in Sect. C.3, based on the nature of the wastes, their points of generation, the relevant regulatory requirements, and the preferred management strategy for their final disposition. Note that the parameters of concern for scrap metal, the primary WS being disposed of, are generally relegated to radiological constituents. Parameters of concern for the other primary WS will be determined on a case-by-case basis; however, Sect. C.3 does present the anticipated parameters of concern. The primary parameters of concern identified from the nature of these wastes, their generating locations, and the relevant regulatory requirements are various radiological parameters, particularly isotopic uranium, total uranium, percent uranium enrichment, and $^{99}$Tc. In addition, several secondary parameters of concern are to be quantitated in more than just confirmatory samples due to historical waste practices at PGDP. These parameters include toxicity characteristic (TC) metals, total semivolatile organic compounds (SVOCs), PCBs, and asbestos.

The data collection methodology component of the DQOs for this sampling effort consists of the sampling methodology, sampling procedures, and analytical protocols. The recommended sampling methodology for WS 1 involves obtaining the following:

- Initial baseline sampling (to establish a waste profile) of stratified scrap metal waste types that represent the highest activity items that can be accessed and sampled safely using snips, bolt cutters, plasma arc torch, or other appropriate sampling device. The items located during a recent walkdown of the scrap yards indicated that aluminum compressor blades, jack screws, nickel-plated struts, and metal turnings could be sampled.

- The initial baseline sampling will include collection of at least 36 grab samples. The number of grab samples was determined by establishing a goal to initially sample to a 90% confidence interval for 90% of the anticipated shipping container population and adding seven additional samples as approximately 20% contingency to cover any sampling and/or laboratory errors while maintaining the desired confidence interval. Of these 36 grab samples, 9 samples (80% confidence interval for 80% of the population plus 10% contingency) are to be collected from the aluminum compressor blades, jack screws, nickel-placed struts, and metal turnings. Each of the samples will be collected from locations representing the highest measured activity locations as determined by standard radiation survey instrumentation and/or nondestructive assay (NDA) equipment and that are safely accessible. This data will be used to establish isotopic scaling factors for characterizing the remaining scrap metal. Furthermore, the data will then be evaluated using SW-846 Chap. 9 methods to ensure a 95%

confidence interval in relationship to regulatory thresholds and WAC limits. Where needed, supplemental samples will be added to reach the desired 95% confidence interval using SW-846 Chap. 9. This sampling methodology is for characterizing the scrap metal being disposed of at an off-site TSDF. For scrap metal that potentially could be disposed of at an on-site TSDF (i.e., the C-746-U Landfill), additional characterization would be required than presented currently in this plan and subsequently would require parameters to be quantitated that would specifically address the on-site TSDF WAC requirements and regulatory requirements. Since the scrap metal targeted for on-site disposal is not planned on being processed until 2004 (i.e., C-746-P & P1 Scrap yards), the sampling details for that waste, if it is still planned on being disposed of on-site, will be delineated at a later date;

- Field screening samples for gross alpha and beta/gamma (and/or isotopic, if possible, using NDA equipment) during initial baseline sampling of the intrusively collected samples;

- Swipe samples collected during initial baseline sampling of the same items that were intrusively sampled;

- Screening data for approximately 10% by mass of material scanned on at least one side during process operations using standard radiation survey instrumentation and/or NDA equipment such as an *in situ* object counting system (ISOCS);

- Definitive confirmation samples from a shipping container equivalent (approximately 675 $ft^3$ or 20 tons) when the screening data collected during process operations (and using the radioisotopic scaling factors developed during initial baseline sampling) indicates an item has reached or exceeded 50% of a maximum isotopic threshold of a TSDF's WAC and when commingled with other waste the shipping container equivalent scrap waste would exceed 10% of a maximum threshold of a TSDF's WAC; and

- Screening data for all shipping containers using standard radiation survey instrumentation and/or NDA equipment such as ISOCS.

Other solid WSs will have their entire containerized population sampled through composite samples, half their population sampled through grab samples, or a separately generated sampling plan with appropriate BJC approval to obtain a 95% one-tailed confidence level, which will have to be determined on a case-by-case basis. For example, metal turnings commingled with flow sweepings/zorball will be characterized individually due to non-radioisotopic contaminants of concern. Also, the recommended sampling methodology for WS 8 is very similar to that of WS 1, with the differences being due to the stratified waste types. The entire population of wastewater will be sampled using 20-point composites (maximum) for waste containerized with 55-gal drums. If the wastewater is transferred to a tanker truck, only one sample from the truck will be required. Table C.3 presents the systematic sampling plan for scrap metal. These results shall be used to characterize the waste.

In addition, each container of waste from the other primary WSs shall be characterized to meet its appropriate disposition location, which shall be determined on a case-by-case basis. Secondary waste associated with the primary wastes shall be characterized based upon its respective analytical data.

The sampling procedures for these wastes shall be consistent with the methods specified in the Data QAPP (Chap. E) or work control package requirements. Several waste matrices are present; therefore, the sampling supervisor shall determine the best sampling method for each matrix. If significant quantities of free-standing liquids are encountered in the scrap, the liquid phase shall be segregated into an appropriate staging container (e.g., poly tank), and a sample collected by composite liquid waste samplers or another appropriate sampling device in accordance with the QAPP requirements or work control package requirements.

Analytical data from sampling of the predominant waste matrix (i.e., scrap metal) shall be generated from field H&S screening and laboratory analyses for the parameters identified in Chap. D. The H&S field screening shall include total organic vapor concentrations using photoionization or flame ionization detectors and gross radioactivity (alpha, beta, gamma) using standard radiation survey meters. Also, field screening may include the use of NDA equipment. Only the radiochemical data will be used for waste characterization as screening data.

The above analytical protocols are specified in the QAPP (Chap. E) and in Sect. C.3. Screening data analytical support services shall meet the quality control (QC) requirements specified in the QAPP, this SAP & DMP, or a screening data work control package.

Analytical protocols for the majority of the regulatory- and technology-based parameters using a fixed-based laboratory shall be standard procedures from EPA's SW-846, EPA-600/4-80-032, or American Society for Testing and Materials (ASTM) methods as specified by the QAPP and Sect. C.3. Under the QAPP, such procedures are defined as definitive data analytical support services. Laboratories providing definitive data analytical support services shall meet the analytical precision, accuracy, representativeness, completeness, and comparability goals and qualifications established in the QAPP, this SAP & DMP, and the project-specific statement of work (SOW).

Analytical *precision* goals for the radiochemical and regulatory-based metals and inorganic parameters (i.e., cyanides and sulfides) shall be 20 relative percent difference (RPD). The analytical precision goals for regulatory-based organic parameters shall be those specified in the relevant method for the specific analytes. In general, these range up to 25 RPD for volatile organic compounds (VOCs) and up to 50 RPD for SVOCs (including herbicides, pesticides, and PCBs). In the event analytical precision goals are exceeded, a determination shall be made through the data validation process relative to the usability of that information.

The *accuracy* goals for radiochemical and regulatory-based metals and inorganic parameters (i.e., cyanides and sulfides) for this investigation shall be 80 to 120%, as expressed in recovery of known analytical spikes into the sample media. Analytical accuracy goals for organic parameters shall be those established by the relevant SW-846 method for the specific analytes. In general, VOC spike recoveries range between 60 and 120%, and SVOC spike recoveries range from 20 to 140%. In the event analytical accuracy goals are exceeded, a determination shall be made through the data validation process relative to the usability of that information.

*Representativeness* expresses the extent to which data reflect a waste's characteristics. Representativeness of samples is ensured by selection of appropriate sampling methodologies and procedures. The sampling method for WS 1 was discussed earlier in this section. Non-wipe scrap metal sample material is to be obtained by using bolt cutters, plasma arc torch, snips, drill, saw, or other appropriate collection device at locations that appear to have high radiation readings and/or visible contamination. For scrap metal in particulate form or of a size smaller than the RCRA definition of "debris," sample material will be collected by a stainless steel scoop or stainless steel spoon. If VOCs are to be analyzed for any waste, the VOC sample will be collected from the first aliquot of the first drum. To the extent practical, sampling procedures specified in this SAP & DMP are standard methods from EPA Region IV Field Operating Procedures, 40 *CFR* 761.130, and the QAPP. The analytical methods selected in this SAP & DMP are standard methods that accurately represent the true concentration of the parameter of interest. The accumulation of QC procedures and information [e.g., RPD values, blank QC concentrations, matrix spike percent recoveries] employed for a given analysis combine to exhibit the representativeness of the data generated.

*Completeness* is the measure of the amount of data obtained from a measurement process that achieves the program goals compared to the amount of data planned to be obtained by the program. The QA completeness objective for this project is to obtain valid analytical results for at least 90% of the samples collected during the project. This implies that completeness of sample collection (the number of samples collected compared to the number of samples planned) must be virtually 100% to allow for some loss of data during the laboratory analytical process. Accountability of samples collected, from field to final disposal, must be 100%.

*Comparability* expresses the confidence with which one data set can be compared to another. Comparability of the data produced for this investigation shall be obtained through the implementation of the identified protocols for sampling and analysis of samples. Implementation of traceable reference materials such as laboratory standards, expression of results in standard concentration units, and successful participation by the laboratories in external performance evaluation programs shall enable the information produced through this investigation to be compared with future data sets, if required.

The reporting limits for these wastes for TC metals and other inorganic parameters (excluding radiochemical constituents) shall generally be 10% of the regulatory thresholds. The reporting limits for the regulatory-based organics shall be the method detection limits or 10% of the regulatory threshold, whichever is greater. The reporting limits for radiochemical constituents shall generally be the method detection limits. Definitive data reporting packages shall follow the requirements specified in the QAPP and appropriate EPA methodology. The regulatory threshold, as discussed in the context of this paragraph, is broadly defined as the RCRA threshold, PGDP water discharge permit limits, or WAC profile for the disposal facility, whichever is most restrictive.

### C.1.5 Characterization Objectives

Analytical data shall be generated through sampling and analysis using EPA SW-846 methods or well-established methods if EPA-approved methods are not available. A Utah-certified laboratory shall perform Toxicity Characteristic Leaching Procedure (TCLP) and all other analyses required to meet the EoU WAC in the event EoU is the disposal facility instead of NTS.

The detection limits and analytical methodology for parameters shall be listed on the approved analytical SOW. These parameters are presented in Sect. C.3 and are discussed in more detail in Sect. C.1.5.1 as to the reason the parameter was required to be quantitated. The parameters for a fixed-base laboratory will be submitted to the BJC Sample Manager, with a copy to the STR, which identifies, per parameter to be analyzed, the matrix, method, analysis, detection limit, detection limit units, number of samples, comments, frequency, group, and analysis type.

As previously mentioned, process knowledge, radiological field screening data, and wipe sampling shall primarily be used to characterize the scrap metal. These data will be correlated to an intermodal or roll-off box.

The parameters of concern for characterization are based on the nature of the wastes, relevant regulatory requirements, and the WAC of the anticipated storage or disposal facility. This section summarizes this information and presents a combined list of analytes for characterization of these wastes.

#### C.1.5.1 Scrap Metal Waste Stream

Based on the nature of these materials and their source locations, the WSs covered by this SAP & DMP may contain or be contaminated with TC metals, TC SVOCs, PCBs, asbestos, and various radionuclides. The radionuclides expected to be present in these wastes at detectable levels include various uranium isotopes, daughter products, $^{99}Tc$, and possibly, although in minimal concentration, certain transuranic (TRU) isotopes and certain fission-product isotopes. Therefore, radiochemical constituents that are to be quantitated include gross alpha, gross beta, gamma spectroscopy scan, isotopic uranium, alpha spectroscopy, and $^{99}Tc$. To establish baseline characterization for the WS, each of the aforementioned constituents are to be initially characterized at a 95% confidence level for 90% of the anticipated containerized population based on four of the scrap metal waste types.

Based on the nature of these wastes, initial baseline testing for ignitability (D001) and corrosivity (D002) characteristics should not be necessary, other than that required by the storage or disposal facility. There is also no reason for these wastes to contain cyanides, sulfides, TC herbicides, and TC pesticides; therefore, characterization of these parameters will be determined by process knowledge. Therefore, there will be no initial baseline characterization samples needed for these constituents.

TC metals are most likely present in the scrap metal; however, it is believed that the TCLP concentration levels would be factors below the regulatory limit (other than scrap metal found to be inherently hazardous). Therefore, definition data are needed to characterize TC metals. In addition, TC SVOCs are not expected to be present; however, their historical use at the plant may have resulted in some residual contamination. Therefore, TC SVOCs need to be a quantitated in at least a confirmatory manner.

Also, there is no reason for TC VOCs to be present because (1) the scrap metal more recently placed in the scrap yards was typically either cleaned or "RCRA-emptied" and (2) the scrap metal that has been exposed to the elements for years has seen extreme temperatures that would drive off many VOCs. Therefore, initial baseline characterization for TC VOCs for the scrap metal is not required. The free liquid content will be determined by process knowledge because absorbent will be used in the containers to absorb any free liquid (residual free liquid). A pool of free liquid would cause the liquid to be decented and managed as another waste stream.

The parameter of concern necessary for a TSCA regulatory determination and compliance with the on-site low-level waste management requirements is definitive data for PCBs. PCBs are not expected to be present in this WS; however, due to the prevalence of PCBs at PGDP, initial baseline sampling is also needed for PCBs.

The parameters of concern (both primary and secondary) identified from the nature of the WSs and regulatory requirements may be combined to form the following set of analytes that should be quantitated to meet the objectives of this plan:

- TC metals (by TCLP),
- TC SVOCs (by TCLP),
- PCBs,
- radiochemical contaminants (by gross alpha/beta and a gamma spectroscopy scan), and
- percent uranium[by thermal ionization mass spectrometry (TIMS)].

Equipment blanks shall be quantitated by total constituent analyses for a limited set of the regulatorybased parameters. Based on the nature of the waste, the selected constituents include total metals, total organic carbon (TOC), gross alpha/beta, and a gamma spectroscopy scan. These analytes for equipment blanks are considered the minimum. Additional analytes, as determined and requested by the BJC Sample Manager, will be documented on the analytical SOW and the chain-of-custody (COC) form, but will not be considered a change. Furthermore, if TOC is to be eliminated as a parameter, SVOCs, and PCBs will be analyzed instead.

### C.1.5.2 Other Primary Waste Streams and Secondary Wastes

Analytical data generated through sampling and analysis for characterizing primary WSs (other than WS 1) and secondary wastes will also use EPA SW-846 Methods or well-established methods if EPA-approved methods are not available. Because data obtained from WS 1 may be used to characterize some of the analytes for other WSs, characterization objectives will be determined on a case-by-case basis for these WSs. Analytical data collected for WS 8 have characterization objectives similar to those established for WS 1.

### C.1.5.3 Decision Limits and Criteria

The primary use of the data collected is to support determination of the regulatory status of the waste and to determine whether the waste meets the WAC of the selected TSDF. In general, the regulatory threshold for the TC constituents is the decision criteria for making a hazardous waste determination based on the TCLP analysis and comparison to the regulatory limits as specified in 40 *CFR* 261.24.

However, in some cases a hazardous waste determination may be made using total analysis instead of TCLP analysis. Definitive data collected in this manner shall use the regulatory limit specified in Appendix F of BJC/PAD-11, for total analysis. If the definitive data exceed the regulatory limit, the sampled waste shall be handled as nonhazardous waste until a sample of the waste is extracted using the TCLP method and the analytical results are compared directly to the regulatory limits. At that time the waste shall be handled as hazardous waste only if the TCLP result exceeds the regulatory limit. If the sample represents waste already packaged and is determined to be hazardous, the packaged waste will be re-evaluated and potentially resampled, analyzed, and characterized if determined that the previous sampling technique was biased too conservatively. Only after a TCLP exceedance from the re-evaluation of the waste will a container of waste be characterized as hazardous.

Regulatory thresholds for reactivity due to cyanides or sulfides will be determined by the evolution of 250 mg of HCN or 500 mg of $H_2S$ from 1 kg of the waste during exposure to a dilute acid solution, even though this past EPA interpretive policy has been rescinded. (There is no equivalent new interpretative policy.) These regulatory thresholds are also established in the relevant SW-846 Methods for releasable HCN or $H_2S$. For the remaining RCRA characteristics, the decision limits will be the regulatory thresholds.

BJC's policy requires PCB-detectable waste to be managed as PCB waste at the plant. Accordingly, if the mean PCB concentration exceeds or equals 2 ppm PCBs, the waste shall be managed on-site in a TSCA-compliant facility.

All of the primary and secondary wastes are assumed to be radioactively contaminated, except for waste from C-746-P1. The only decision criteria based on the radiological characterization data are determinations of whether the wastes exceed limits as special nuclear material TRU wastes, DOT regulations, or the anticipated TSDF's WAC. Any waste with an enrichment level of >0.711% shall be considered special nuclear material for off-site shipment and on-site sample and waste management, while 1.0% shall be considered fissile for on-site sample and waste management. TRU waste is defined as a total concentration of ≥100 nCi/g of alpha-emitting, transuranium radionuclides with half-lives >20 years. The limit for TRU will be 100 nCi/g or greater. TRU waste will be packaged and managed in acceptance with BJC/PAD-11, since the targeted TSDF, NTS, will not accept TRU waste for disposal. For transportation, radiological characterization data shall be used to screen the wastes with respect to low specific activity limits. Also, radiological data shall be used to evaluate waste as compared to the WAC of the anticipated recycling or disposal facilities.

### C.1.6 Corrective Action Scenarios for Decision Limits

This section presents several planning strategies to provide corrective action for safe and compliant management of the waste for several different characterization scenarios. Because the waste characteristics are limited, there is little or no information/data to compare analytical results to another waste profile. Therefore, the following scenarios provide an overview of the Project team's initial management strategy. As the Project team obtains data and process knowledge, these corrective action scenarios may be modified through approval of a work control change and not by change of the RAWP.

#### C.1.6.1 Previously Undetected or Unreported Isotopes Are Detected

*Methodology*: Existing data and process knowledge will initially be used to determine H&S requirements and to initiate waste profiles. Scrap material will be representatively sampled for radiological analysis. However, within the representative population, the samples to be collected will be biased toward those locations that appear more suspect as to levels of contamination as determined by a Field Inspector, sampler, RCT, or other appropriate personnel. Definitive data sample results will be used for further H&S considerations and amendment of the waste profile(s).

*Decision Point*: Receipt of definitive data sample results.

*Criteria*: If definitive data sample results reveal previously undetected or unreported isotopes as compared to the profile radiological isotopes, then response/corrective action will be taken.

*Response/Corrective Action*: The STR will be informed of previously undetected or unreported radiological isotopes present in the waste. A review of the data will be made to ensure that appropriate H&S requirements are in place and to make necessary amendments to the waste profile(s).

#### C.1.6.2 Enrichment of $^{235}$U Is Greater Than 0.711 wt % but Less Than 1.0 wt %

*Methodology*: Suspect material will be sampled for radiochemical screening analyses by gamma spectroscopy scan for $^{235}$U assay determination. Suspect material will remain unpackaged until data are obtained.

*Decision Point*: Upon receipt of gamma spectroscopy scan data and/or TIMS data, the data will be reviewed to determine if the above limits have been met.

*Criteria:* Gamma spectroscopy scan provides results of greater than 0.711 wt % but less than 1.0 wt %.

*Response/Corrective Action*: STR will be informed of enriched $^{235}$U assay result. Confirmation sample will be collected and submitted for TIMS $^{235}$U assay determination if a TIMS sample had not been collected. If the TIMS $^{235}$U assay result confirms that the material assay is greater than 0.711 wt % but less than 1.0 wt%, the waste profile will be amended, as appropriate.

#### C.1.6.3 Enrichment of $^{235}$U Is Equal to or Greater Than 1 wt % but Less Than 15 g $^{235}$U

*Methodology*: Sample material will be sampled and analyzed by gamma spectroscopy scan for $^{235}$U assay determination and $^{235}$U concentration. Assay will be determined by TIMS if gamma spectroscopy scan assay result is equal to or greater than 1.0 wt % $^{235}$U.

*Decision Point*: Upon receipt of analytical results, the data will be reviewed to determine if the above limits have been met.

*Criteria*: Gamma spectroscopy scan or TIMS analysis proves material is equal to or greater than 1.0 wt %, but is less than 15 g $^{235}$U.

*Response/Corrective Action*: If the material contains equal to or greater than 1.0 wt % $^{235}$U and the fissionable assay material does not exceed or equal a mass of 15 g $^{235}$U in a volume of 2 gal or greater, it will be handled as nuclear criticality safety (NCS) exempt. The STR will be notified of the analytical results. The waste container will be labeled to ensure that no other fissionable material is added to the container.

### C.1.6.4 Enrichment of $^{235}$U Is Equal to or Greater Than 1.0 wt % and Greater Than or Equal to 15 g $^{235}$U

*Methodology*: Sample material will be sampled and analyzed by gamma spectroscopy scan for $^{235}$U assay determination and $^{235}$U concentration. Assay will be determined by TIMS because gamma spectroscopy scan assay result is equal to or greater than 1.0 wt % $^{235}$U.

*Decision Point*: Upon receipt of analytical results, the data will be reviewed to determine if the above limits have been met or exceeded.

*Criteria*: Gamma spectroscopy scan or TIMS analysis proves material is equal to or greater than 1.0 wt % and is greater than or equal to 15 g $^{235}$U.

*Response/Corrective Action*: Containers of material that meet or exceed the mass limit of 15 g $^{235}$U require spacing controls to reduce the chance of a criticality accident. The area will be evacuated and secured. A 10-ft buffer area will be established, with flagging around the material associated with the analytical results that exceed the safe mass concentration of $^{235}$U. The STR will be notified immediately of this condition. Project team personnel will develop a plan, to be approved by DOE, on how to further process/disposition the subject material.

### C.1.6.5 Reading Exceeds the Waste Profile Levels

*Methodology*: Sampling data will be compared to the waste profile.

*Decision Point*: Upon receipt of analytical results, the data will be reviewed to ensure the waste profile is accurate.

*Criteria*: The TSDF's waste profile levels will be compared to analytical results.

*Response/Corrective Action*: If analytical results exceed the waste profile limits, an amendment to the profile will be submitted to the TSDF.

### C.1.6.6 $^{238}$U Concentration Exceeds Ten Times the Baseline

*Methodology*: At a minimum, every container will have data that can be related to $^{238}$U either by a sample that will be collected and analyzed by a gamma spectroscopy scan or RCT data that can be evaluated using scaling factors developed from baseline samples.

*Decision Point*: Upon receipt of $^{238}$U results, the data will be reviewed.

*Criteria*: The data will be compared to ten times the baseline, average, or one-half the WAC level.

*Response/Corrective Action*: (1) If less than ten times profile and WAC are not exceeded, take no action. (2) If results are greater than ten times profile, but WAC are not exceeded, amend profile. (3) If results exceed WAC, determine and implement sampling plan and notify STR.

#### C.1.6.7 Other Abnormal Radiological or Chemical Data Results or Findings

*Methodology*: Field screening sample analyses and/or profiling/confirmation sample analyses will be conducted.

*Decision Point*: The data will be reviewed upon receipt and confirmation of definitive data results.

*Criteria*: Comparison to ten times the baseline, average, one-half WAC level, regulatory level, and H&S radiological and chemical criteria (e.g., hazardous constituents and PCBs).

*Response/Corrective Action*: (1) If less than ten times profile and WAC are not exceeded for radiochemical parameters, take no action. (2) If results are greater than ten times profile, but WAC are not exceeded for radiochemical parameters, amend profile. (3) If results exceed WAC, determine alternate disposition route and/or characterization approach (because characterization will typically be biased toward residual material on scrap metal) and notify STR. (4) If readings exceed regulatory levels, properly store the material, determine and implement sampling plan, and notify STR.

## C.2 ORGANIZATION AND RESPONSIBILITIES

Overall coordination and implementation of the sampling and analysis activities described in this plan are the responsibility of the WESKEM Project Manager, WESKEM Sampling and Analysis and Data Manager, and the Contractor Sample Manager. They shall require input and support from personnel from WESKEM and from various BJC organizations and subcontractors. The roles and responsibilities of these personnel are listed in Table C.2.

## C.3 DESIGN OF SAMPLING ACTIVITY

### C.3.1 Notification

The Project Manager shall coordinate with the STR and/or BJC SMO regarding the time, date, and location(s) of the sampling event(s) prior to the initiation of sampling activities. This coordination is required to allow scheduling of programmatic oversight activities. Coordination shall be documented by land or electronic mail. The Project Manager, or designee, shall notify project personnel regarding the time and date of the sampling event.

### C.3.2 Presampling Meetings

The Project Manager, or designee, shall schedule and conduct a presampling meeting prior to the sampling event. The objectives of this meeting shall be to discuss the sampling event logistics and other details, resolve any technical or operational issues, and ensure that schedules are agreed upon by all responsible organizations. Furthermore, to ensure safe performance (including zero accident performance) of the work to prevent accidents, injuries, exposures, and environmental spills, the five core functions of the ISMS will be discussed and reviewed with sampling personnel, with particular attention to the method the team will employ to implement the fifth core function (collect feedback and implement actions for continuous improvement) to balance quality objectives with continuous improvement.

Table C.2. Roles and responsibilities

| Role | Responsibility |
|---|---|
| DOE Project Manager | Provide overall management direction for the project |
| STR | Manages the project for BJC. Provides contractor interface support with the WESKEM Project Manager |
| Project Manager | Implements and provides coordination for the project to ensure that all the required information is obtained to meet requirements for disposition of the waste |
| Project Superintendent | Provides overall direction for field sampling in regard to work order to be sampled and work hours. Coordinates such direction to Sampling and Analysis and Data Manager, or designee |
| Sampling and Analysis and Data Manager | Ensures that a SAP & DMP are developed that addresses the project's DQOs and that the analytical data are statistically evaluated and reports the findings and recommendations |
| Sampling Supervisor | Directs the technical implementation of the SAP & DMP at the sampling location. Directs the activities of the sampling team and ensures that the requirements of the SAP & DMP are met by the field crews. This individual will be the "lead" person from the sampling team |
| Contractor Sample Manager | Issues SOW based on the requirements specified in the SAP & DMP to qualified laboratories. Coordinates data needs with the STR and the WESKEM Sampling and Analysis and Data Manager |
| QA Manager | Provides QA assistance for sampling activities and review of analysis data. Coordinates QA surveillance of sampling activities |
| Environmental, Safety, and Health Representative | Coordinates health and safety coverage for sampling activities and resolves all health- and safety-related issues including industrial hygiene and radiation protection concerns |
| Radiation Control Technicians | Provides ingress and egress support and clears samples for shipment to the laboratory. |
| DOT Manager | Prepares a shipment checklist and documentation package. Prepares waste stream profile for submittal to targeted treatment/disposal facilities. Prepares the waste for shipment |

BJC = Bechtel Jacobs Company LLC.
DOE = U.S. Department of Energy.
DOT = U.S. Department of Transportation.
DQO = data quality objective.
QA = quality assurance.
SAP & DMP = Sampling and Analysis Plan and Data Management Plan.
SOW = statement of work.
STR = Subcontract Technical Representative.

### C.3.3 Presampling Activities

The following general guidelines apply to the sampling activities required by this plan. These guidelines should be followed unless otherwise stated in the AHA, the RWP, or the project's QAPP.

- The AHA pertaining to sampling shall be completed and approved prior to the initiation of sampling.
- The AHA that addresses the sampling work shall be initiated by the Sampling Supervisor and coordinated with and issued by the Environmental, Safety, and Health Representative (ESHR). The AHA shall be maintained at the work site.
- WESKEM shall provide an ESHR to the project to provide guidance and enforce compliance in all safety- and health-related concerns.
- PPE to be worn during the sampling and analysis activities shall be established by the ES&H Plan, the AHA, and/or the RWP by the RADCON personnel and the ESHR.
- The QA Manager shall be notified by the Project Manager, or designee, of project schedules and activities and shall provide QA surveillance of the sampling project, as required.
- Any monitoring deemed necessary by the ESHR (i.e., lower explosive limit, organic vapor, or any other type of monitoring while containers are opened) shall be recorded, and a copy of the results shall be kept with the logbook. The determination to inspect and/or sample overpressurized or bulging containers (i.e., uncrushed drums) is the decision of the STR and the ESHR. Activities involving such waste in such a condition shall follow requirements specified in WSOP 162, *Identification and Safe Handling of Pressurized Waste Containers*.
- All personnel performing work inside a radiological boundary area are required to have current training in the following areas as prescribed by the RWP and/or the safety and health work permit:
  - — Hazardous Waste Operations and Emergency Response training per Occupational Safety and Health Act of 1976 (OSHA) (29 *CFR* 1910.120) and Radiological Worker II (PGDP-specific).
  - — The Project Manager, or designee, shall verify with the training coordinator that training requirements are met for each individual working on the project prior to sampling.
  - — The Sampling Supervisor shall request from the RADCON personnel a characterization survey of the sampling area prior to the staging of containers.
  - — The Sampling Supervisor shall request an evaluation of the radiological concerns for the sampling project from the RADCON personnel. The RADCON personnel shall perform a radiological survey of the area, establish any radiological boundaries, and issue an RWP if required. The RWP shall be maintained at the work site. All samples shall be monitored for radiological levels before leaving the sampling area.

### C.3.4 Post-Sampling Activities

The samplers shall be responsible for housekeeping in the sampling area and shall ensure that the sampling area is clean when sampling is complete. Specific activities include the following:

- Sampling personnel shall properly manage waste generated from the sampling activity such as PPE, sampling debris, and other accumulated trash as necessary.

- A RADCON technician shall provide a post-work radiological contamination survey of the sampling area and close out the RWP.

- The Sampling Supervisor shall provide a final inspection of the sampling work area to verify that all clean-up activities have been completed.

### C.3.5 Response to Mitigate/Prevent Abnormal Conditions

The following emergency response guidelines should be followed in addition to the guidelines set forth in Chap. A:

- If a container ruptures and threatens the safety of personnel or the environment, the appropriate emergency action response shall be implemented according to PGDP Spill Prevention Control and Countermeasure Plan (SPCC) (Paducah Gaseous Diffusion Plant, Paducah, KY), BJC/PAD-246 (CDM 2001).

- Initial response to a spill shall be as directed by the Project Superintendent. If sampling personnel are unable to contain the spill, PGDP Plant Shift Superintendent (PSS) shall be notified.

### C.3.6 Segregation/Sampling Strategy

This section presents a summarized strategy on how to segregate and sample the waste by matrix that shall facilitate packaging and storage/disposal of the WSs at a minimum risk and cost and that shall provide successful completion of DQOs and characterization objectives. The segregation activities are expected to result in the waste population by WS as identified in Sect. C.1.3.

Prior to performing segregation and sampling activities, a team consisting of at least one sampler familiar with PGDP-generated waste, a Field Inspector, the ESHR, and/or the Sampling and Analysis and Data Manager will develop an AHA, procedure, and other work control document to address segregation and sampling activities. During the document development process, the team will identify the characteristics of the scrap material that will cause the material to be suspect in regard to RCRA, PCBs, special nuclear material, and elevated radiological readings (e.g., oily stains may be PCB-contaminated). These identifying characteristics will then be provided and explained to personnel involved in segregation and sampling the waste (e.g., training).

The sampling team, along with a Field Inspector, RCT, and ESHR or designee, will then perform baseline sampling to establish waste characteristics for developing the TSDF (e.g., NTS) waste profile during the establishment of the work area (Chap. A). These personnel will apply the identifying characteristics previously compiled and also develop questions or other identifying characteristics discovered during baseline sampling. Also, Field Inspectors and RCTs will also be collecting radiological samples, as deemed necessary, to further radiologically characterize the work area and establish process knowledge that can be used to expedite process operations.

During process operations, the Field Inspectors will flag those materials that need further evaluation from an NCS perspective. The Field Inspector will work with the RCT to obtain necessary radiological information for material needing further NCS evaluation. Material approved by the Field Inspector for further processing will then be transferred to an area for inspection and segregation to occur as it relates to regulated materials. Inspectors/segregators will be looking for items/conditions such as inherently hazardous material (lead pipe), historically PCB-contaminated material at PGDP (gaskets), and visible oil staining. Items that are suspect will be removed from the inspection/segregation area and placed in another designated location in the work area to allow for sampling (constituents to be determined on a case-by-case basis). Items not suspect will then be wipe-sampled by RCTs, size-reduced, and if necessary, sampled by the samplers per a container allotment. The RCT samples will determine if it is destined for off-site disposal or on-site disposal.

After data are obtained for NCS and other suspect regulated materials do not indicate exceedances, the waste can be processed in the same manner as the non-suspect material. If exceedances do occur, the waste will need to be further characterized and appropriately packaged in accordance with the anticipated TSDF's WAC or BJC direction (for NCS issues).

### C.3.7 Sampling Activities

The Sampling and Analysis and Data Manager shall ensure that sampling activities adhere to the requirements listed directly in this plan or indirectly through reference or signed field changes. Signed copies of the SAP & DMP shall be distributed prior to the initiation of sampling activities.

#### C.3.7.1 Sampling Logbook

Field documentation shall conform to guidance detailed in WSOP 151, *Waste Logbooks*. The samplers shall maintain a logbook to provide a daily record of all sampling activities. This logbook shall be maintained in accordance with the project's Document Control and Records Management Plan. PGDP Project Identification Code (e.g., SM) shall be included in each daily logbook entry for this sampling event. Each daily logbook entry must include, as a minimum, the following:

- waste description (e.g., color, texture, moisture content);
- container IDs sampled;
- customer sample IDs;
- WS name; and
- COC number(s).

Completed copies of the logbook shall be provided to the Sampling and Analysis and Data Manager and the QA Manager.

#### C.3.7.2 Sample Collection

During the sampling event for the non-classified scrap yards, three types of analytical samples: (1) field screening (H&S and characterization), (2) characterization (definitive confirmation of characterization field screening and definitive data to characterize waste to a 95% confidence interval), and (3) field QC samples, shall be collected and submitted for analysis. Approximately 8000 radiochemical H&S field screening samples are expected to be collected. Approximately 205 characterization samples (including other primary and secondary waste) and 46 field QC samples are expected to be collected. The 46 field QC samples include 8 field blanks, 13 equipment rinsates, 12 trip blanks, and 13 field duplicates. Field QC samples provide information regarding sample contamination and assist with assessment of sampling errors.

During the sampling event for the classified scrap yard, three types of analytical samples are to be collected: (1) field screening (H&S and characterization), (2) characterization (definitive confirmation of characterization field screening and definitive data to characterize waste to a 95% confidence interval), and (3) field QC samples, shall be collected and submitted for analysis. Approximately 4000 field radiochemical screening samples are expected to be collected. A minimum of 56 characterization and 17 field QC samples are expected to be collected. The 17 field QC samples include 3 field blanks, 4 equipment rinsates, 8 trip blanks, and 2 field duplicates. Field QC samples provide information regarding sample contamination and assist with assessment of sampling errors.

Characterization and field QC samples shall be collected as specified in this section.

All samples shall be collected at the PGDP site. Specific equipment for taking samples shall be determined by the sampling team and approved by the Sampling and Analysis and Data Manager or designee, but must be consistent with Region IV EPA sampling methodologies and documented in the sampler's logbook.

Each waste matrix must be sampled in a manner that obtains a representative sample, as well as provides the safest and most efficient working environment possible for the samplers.

The Sampling Supervisor, Sampling and Analysis and Data Manager, and samplers shall determine which sampling methods shall be used, and any deviations from the SAP & DMP and/or QAPP shall require the initiation of a Field Change Form and must be documented in the sampler's logbook.

Sample-container, preservation, and holding-time requirements shall be in accordance with the EPA Engineering Support Branch standard operating procedures (SOPs), the QAPP, and the project-specific SOW. These requirements are summarized in Table C.3. Trip blank samples shall be shipped to the field in pre-preserved condition. Field preservation of samples shall be documented in the field logbooks and on the COC documents.

***Radiochemical field screening samples***

The sample collection methods require the samplers to monitor material at no less than four different locations that approximately comprise an intermodal container or roll-off box using standard RCT surveying instrumentation. Sample requirements and analytical parameters are listed in Table C.3.

***Complete characterization samples for waste profiling and definitive data***

In general, the sample collection methods require the samplers to

- collect material through systematic selection or by forming samples that are representative of the proportions and are correlated to specific intermodals or packing containers,
- combine each sample separately using an approved method and document the mixing method in the sampler's logbook, and
- collect representative analytical samples from these combined materials.

Sample requirements and analytical parameters are listed in Table C.3.

**Table C.3. Samples, parameters of concern, and analytical protocols for PGDP Scrap Metal wastes[a]**

| Sample number | Parameters of concern | Analytical protocols |
|---|---|---|
| WS 1: Scrap metal | PCBs | SW-846 8081 |
| Waste profile establishment | TCLP metals[b] | SW-846 1311 and 6010/7000 series |
| 95%/90% CI | TCLP SVOCs[b] | SW-846 1311 and 8270 |
| SA = 36 | Alpha spectroscopy scan[f] | Alpha spectroscopy/RL-7120 |
| RTAT = 30 days | Gross alpha/gross beta | SW-846 9310/ RL-7111 |
| | Gamma spectroscopy scan[c] | Gamma spectroscopy/RL-7124 |
| | Total U, isotopic U, and assay[d] | TIMS/AS-7300 |
| | $^{99}$Tc | Liquid scintillation counting/RL-7116 |
| WS 1: Waste profile establishment | Gross alpha | RADCON and/or NDA field equipment |
| Field Screening Samples | Gross beta[h] | |
| SA = 36 | Gross gamma[h] | |
| RTAT = 5 minutes up to 2 hours | | |
| WS-1: Scrap metal | Gross alpha[c] | RADCON and/or NDA field equipment |
| Waste profile establishment | Gross beta[b] | |
| Field Screening Swipe Samples | Gross gamma[d,h] | |
| SA = 36 | | |
| RTAT = 2 hours | | |
| WS 1: Scrap metal radiochemical | Gross alpha (possibly eliminate based on scaling | RADCON and/or NDA field equipment |
| Characterization field screening using | factors) | |
| RADCON or NDA equipment | Gross beta | |
| SA = 6800 | Gross gamma[h] | |
| RTAT = 5 minutes up to 2 hours | | |
| WS 1: Scrap metal | Gross alpha/gross beta | SW-846 9310/ RL-7111 |
| Definitive confirmation samples | Gamma spectroscopy scan[c] | Gamma spectroscopy/RL-7124 |
| SA = 30 (estimate) | Total U, isotopic U, and assay[d] | TIMS/AS-7300 |
| RTAT = 3 days | $^{99}$Tc | Liquid scintillation counting/RL-7116 |
| WS-1: Scrap metal | Gross beta/gamma | RADCON and/or NDA equipment |
| Screening data for shipping containers | | |
| SA = 1,400 | | |
| RTAT = 5 minutes up to 2 hours | | |
| WS 3: Scrap wood | Paint filter test | SW-846 9095 |
| SA = 20 | Moisture content | ASTM D2216-92 |
| RTAT = 30 days | Total metals[e] | SW-846 6010A/7060A/7740 |
| | Mercury | SW-846 7471A |
| | Total VOCs | SW-846 8260A |
| | Total SVOCs | SW-846 8270B |
| | PCBs | SW-846 8081 |
| | TCLP VOCs[b] | SW-846 1311 and 8260 |
| | TCLP metals[b] | SW-846 1311 and 6010/7000 series |
| | TCLP SVOCs[b] | SW-846 1311 and 8270 |
| | Gross alpha/gross beta | SW-846 9310/ RL-7111 |
| | Gamma spectroscopy scan[c] | Gamma spectroscopy/RL-7124 |
| | Total U, isotopic U, and assay[d] | TIMS/AS-7300 |
| | $^{99}$Tc | Liquid scintillation counting/RL-7116 |
| | Total organic halides | SW-846 9020A |
| | Bulk density | ASTM D854-92 |
| WS 3: Scrap Wood | Ignitability | SW-846 1020A |
| SA = 8 | Releasable cyanide | SW-846; Chap.7, Sect. 7.3.3.2[g] |
| RTAT = 30 days | Releasable sulfide | SW-846; Chap.7, Sect. 7.3.4.2[g] |
| | TCLP herbicides[b] | SW-846 1311 and 8150A |
| | TCLP pesticides[b] | SW-846 1311 and 8081 |
| | Alpha spectroscopy scan[f] | Alpha spectroscopy/RL-7120 |
| WS 4: Mixed Waste | TCLP metals[b] | SW-846 1311 and 6010/7000 series |
| SA = 27 | TCLP SVOCs[b] | SW-846 1311 and 8270 |
| RTAT = 30 days | PCBs | SW-846 8081 |
| | Gross alpha/gross beta[i] | SW-846 9310/ RL-7111 |
| | Gamma spectroscopy scan[i,k] | Gamma spectroscopy/RL-7124 |
| WS 5: RCRA Waste | TCLP metals[b] | SW-846 1311 and 6010/7000 series |
| SA = 7 | TCLP SVOCs[b] | SW-846 1311 and 8270 |
| RTAT 30 days | Gross alpha/gross beta[i] | SW-846 9310/ RL-7111 |
| | Gamma spectroscopy scan[i,k] | Gamma spectroscopy/RL-7124 |
| WS 6: PCB Waste | PCBs | SW-846 8081 |
| SA = 40 | Gross alpha/gross beta[i] | SW-846 9310/ RL-7111 |
| RTAT 30 days | Gamma spectroscopy scan[i,k] | Gamma spectroscopy/RL-7124 |

**Table C.3. Samples, parameters of concern, and analytical protocols for PGDP Scrap Metal wastes[a] (continued)**

| Sample number | Parameters of concern | Analytical protocols |
|---|---|---|
| WS 7: Other primary waste streams<br>SA = 0<br>RTAT = 30 days | Analytes for these WSs will be determined on case-by-case basis and in accordance with BJC/PAD-11, Rev. 3 | Depends on matrix and analyte. Primarily to be characterized based on WS 1 or WS 3 data, as applicable |
| WS 8: Scrap metal<br>Waste profile establishment<br>95%/95% CI<br>SA = 35<br>RTAT = 30 days | PCBs<br>TCLP metals[b]<br>TCLP SVOCs[b]<br>Alpha spectroscopy scan[f]<br>Gross alpha/gross beta<br>Gamma spectroscopy scan[c]<br>Total U, isotopic U, and assay[d]<br>$^{99}$Tc | SW-846 8081<br>SW-846 1311 and 6010/7000 series<br>SW-846 1311 and 8270<br>Alpha spectroscopy/RL-7120<br>SW-846 9310/ RL-7111<br>Gamma spectroscopy/RL-7124<br>TIMS/AS-7300<br>Liquid scintillation counting/RL-7116 |
| WS 8: Waste profile establishment<br>Field Screening Samples<br>SA = 36<br>RTAT = 5 minutes up to 2 hours | Gross alpha<br>Gross beta[h]<br>Gross gamma[h] | RADCON and/or NDA field equipment |
| WS 8: Scrap metal<br>Waste profile establishment<br>Field Screening Swipe Samples<br>SA = 36<br>RTAT = 2 hours | Gross alpha[c]<br>Gross beta[h]<br>Gross gamma[d,h] | RADCON and/or NDA field equipment |
| WS 8: Scrap metal radiochemical<br>Characterization field screening using<br>RADCON or NDA equipment<br>SA = 4000<br>RTAT = 5 minutes up to 2 hours | Gross alpha (possibly eliminate based on scaling factors)<br>Gross beta<br>Gross gamma[h] | RADCON and/or NDA field equipment |
| WS 8: Scrap metal<br>Definitive confirmation samples<br>SA = 20 (estimate)<br>RTAT = 3 days | Gross alpha/gross beta<br>Gamma spectroscopy scan[c]<br>Total U, isotopic U, and assay[d]<br>$^{99}$Tc | SW-846 9310/ RL-7111<br>Gamma spectroscopy/RL-7124<br>TIMS/AS-7300<br>Liquid scintillation counting/RL-7116 |
| WS 8: Scrap metal<br>Screening data for shipping containers<br>SA = 1000 (estimate)<br>RTAT = 5 minutes up to 2 hours | Gross beta/gamma | RADCON and/or NDA equipment |
| WS 9: Liquid primary waste<br>SA = 25<br>WS 10: decontamination water<br>SA = 4<br>RTAT = 30 days | pH<br>Total metals<br>Mercury<br>Total VOCs<br>Total SVOCs<br>PCBs<br>Gross alpha/gross beta<br>Gamma spectroscopy scan[c]<br>Total U, isotopic U, assay[d]<br>Alpha spectroscopy scan[f]<br>$^{99}$Tc | SW-846 9040B<br>SW-846 6010A<br>SW-846 7470A<br>SW-846 8260A<br>SW-846 8270B<br>SW-846 8082<br>SW-846 9310/ RL-7111<br>Gamma spectroscopy/RL-7124<br>TIMS/AS-7300<br>Alpha spectroscopy/RL-7120<br>Liquid scintillation counting/RL-7116 |
| WS 11: Decontamination sludge<br>SA = 8<br>RTAT = 30 days | Paint filter test<br>TCLP VOCs[b]<br>TCLP metals[b]<br>TCLP SVOCs[b]<br>PCBs<br>Gross alpha/gross beta<br>Gamma spectroscopy scan[c]<br>Total U, isotopic U, and assay[d]<br>Alpha spectroscopy scan[f]<br>$^{99}$Tc | SW-846 9095<br>SW-846 1311 and 8260<br>SW-846 1311 and 6010/7000 series<br>SW-846 1311 and 8270<br>SW-846 8081<br>SW-846 9310/ RL-7111<br>Gamma spectroscopy/RL-7124<br>TIMS/AS-7300<br>Alpha spectroscopy/RL-7120<br>Liquid scintillation counting/RL-7116 |
| Field duplicates<br>SA = 13<br>RTAT = same as original | Same as original | Same as original |

**Table C.3. Samples, parameters of concern, and analytical protocols for PGDP Scrap Metal wastes[a] (continued)**

| Sample number | Parameters of concern | Analytical protocols |
|---|---|---|
| Field blanks<br>SA = 8<br>Equipment blanks<br>SA = 13<br>RTAT = 30 days | Total metals[e]<br>TOC<br>Gross alpha/gross beta<br>Gamma spectroscopy scan[j] | SW-846 6010A<br>SW-846 9060<br>SW-846 9310/ RL-7111<br>Gamma spectroscopy/RL-7124 |
| Trip blanks<br>SA = 12<br>RTAT = 30 days | Total VOCs | 8240/8260 |

[a] Specific analytical protocols, container type, preservation, and holding time requirements will be identified in the analytical statement of work. Bottle and preservation requirements will be generated through the Paducah Environmental Management System. This table is only a guide.

[b] TCLP metals include arsenic, barium, cadmium, chromium, mercury, lead, selenium, silver, copper, and zinc. The metals to be determined by their appropriate 7000-series SW-846 Method are arsenic (Method 7060), mercury (Method 7740), and selenium (Method 7470). TCLP VOCs, SVOCs, herbicides, and pesticides shall only include toxicity characteristic constituents.

[c] Activities of gamma emitting isotopes to be quantitated are $^{241}$Am, $^{243}$Am, $^{137}$Cs, $^{60}$Co, $^{237}$Np, $^{239}$Np, $^{40}$K, $^{234m}$Pa, $^{226}$Ra, $^{234}$Th, $^{234}$U, $^{235}$U, and $^{238}$U, and the mass of $^{235}$U.

[d] Isotopic uranium includes $^{234}$U, $^{235}$U, $^{236}$U, and $^{238}$U.

[e] Total metals include arsenic, barium, cadmium, chromium, lead, selenium, silver, copper, zinc, aluminum, antimony, beryllium, calcium, nickel, thallium, and vanadium. Arsenic is to be determined by Method 7060, and selenium is to be determined by Method 7740.

[f] An alpha spectroscopy scan includes $^{238}$Pu, $^{239/240}$Pu, $^{228}$Th, $^{230}$Th, and $^{232}$Th.

[g] Alternatively, total cyanide by Method SW-846 9010A can replace releasable cyanide, and total sulfide by Method SW-846 9030A can replace releasable sulfide.

[h] Different if possible, it could be a different channel on radiation monitoring device, or require two measurements (one with and one without a shield)..

[i] If the gross alpha or beta activity cannot be correlated to the measured concentration of uranium to the satisfaction of the Sampling and Analysis and Data Manager, the Sampling and Analysis and Data Manager will initiate an investigation to ascertain the reason for the deviation. If needed, as determined by the Sampling and Analysis and Data Manager, this investigation could require the sample to be analyzed for an alpha spectroscopy scan, a TIMS analysis, and $^{99}$Tc.

[j] Gamma-emitting isotopes to be quantitated are $^{241}$Am, $^{137}$Cs, $^{60}$Co, $^{237}$Np, Uranium, $^{234}$U, $^{235}$U, and $^{238}$U.

[k] If the $^{235}$U weight percent is analyzed to be greater than 0.711 by gamma spectroscopy, the sample needs to be analyzed by TIMS for total uranium, isotopic uranium, and assay, where isotopic uranium is defined in note d above.

ASTM = American Society for Testing and Materials.
NDA = nondestructive assay.
PCB = polychlorinated biphenyl.
RADCON = radiation control.
RCRA = Resource Conservation and Recovery Act of 1976.
RTAT = requested turnaround time.
SA = anticipated number of samples.
SVOC = semivolatile organic compound.
TCLP = toxicity characteristic leaching procedure.
TIMS = thermal ionization mass spectrometry.
TOC = total organic carbon.
VOC = volatile organic compound.
WS = waste stream.

### *Field QC samples*

The number of required QC samples is based on requirements that shall be specified in the QAPP and are typically used by WESKEM in support of DOE/BJC projects. To ensure reliability of the analytical data and to meet the DQOs for the project, the following QC samples shall be obtained during the sample collection:

- Field Blank: A field blank is defined as a sample that serves as a check on environmental contamination at the sample site. Distilled, deionized water is transported to the site, opened in the field, transferred into each type of sample bottle, and returned to the laboratory for analysis of all parameters associated with that sampling event. It is also acceptable for field blanks to be filled in the laboratory, transported to the field, and then opened. Field blanks may be used as reagent blanks, as needed. One field blank is required per sampling event. A new sampling event is considered to occur when sampling activities cease over a 72-hour period.

- Equipment Blanks: Equipment blanks are samples of ASTM Type II water passed through decontaminated sampling equipment. These samples are used as a measure of decontamination process effectiveness and environmental contamination. One equipment rinsate for each type of waste matrix or 1 for every 20 samples of a specific waste matrix, whichever is greater, shall be analyzed for the parameters in Table C.3.

- Trip Blanks: Trip blanks are used to detect cross contamination by VOCs during sample shipping and handling. Trip blanks are prepared in the laboratory and consist of ASTM Type II water (or other similar characteristic water) in volatile organic analysis (VOA) bottles. Trip blanks shall accompany each rigid container (ice chest) shipped to the laboratory containing samples for VOA. Trip blanks shall be analyzed for VOCs only.

- Field Duplicate Samples: Field duplicate samples help determine sampling variance. Samples submitted for VOAs shall not be homogenized. Requirements for field duplicates shall be taken in accordance with WSOP 158, *Collection of Field Quality Control Samples*. One duplicate for every 20 samples per matrix (e.g., water, scrap metal, wood) shall be analyzed for the same set of analytical parameters as the sample it is duplicating.

### *Laboratory QC samples*

The primary laboratory expected to be employed for the project is a state of Utah-approved, fixed-base laboratory, the C-710 Laboratory. This laboratory has an approved Laboratory QA Plan that meets requirements in SW-846 and has laboratory SOPs consistent with SW-846 for the data needed to meet the project's DQOs because it has been pre-approved by BJC. In addition, the laboratory has the necessary equipment for the analysis and detection reporting limit needed for this project. The laboratory will perform the laboratory QC samples in accordance with their contract with BJC and the analytical SOW.

### *Preshipment samples*

Although it is currently planned to send the waste to NTS, the WESKEM team will also be prepared to send the waste to EoU in the event it is determined to be a better TSDF for the particular waste. If waste is to be sent to EoU, it must be accompanied by at least one preshipment sample. Each such sample will consist of 10 lbs of material (5 each, 2-lb samples) and will be submitted to EoU prior to shipping of the waste. This sample will be collected if EoU becomes the preferred disposal facility over NTS.

### *Sample packing and shipping*

Handling, shipping, and storage of samples will adhere to custody requirements of WSOP 150, *Sample Chain-of-Custody*, and will ensure that sample integrity for analytical purposes is maintained. The general procedures required to properly package, ship, handle, and store containers of samples are described below.

- As soon as the samples are collected and packaged, the samples shall be placed in an ice chest with ice packs and temperature-check bottles as described in WSOP 154, *Temperature Control for Safe Storage*, as appropriate. Sample packing requirements shall also be followed in accordance with WSOP 121, *Shipping Analytical Samples*.

- During transport of the samples from the field to the laboratory, the COC requirements specified in WSOP 150 shall be met. Samples sent for off-site analyses by air carrier shall comply with International Airport Transport Association requirements concerning packaging and labeling. Samples sent for off-site analyses by highway shall comply with DOT requirements for packaging and handling.

### C.3.8 Sample Identification, Numbering, and Labeling

Sample identification, numbering, and labeling shall be consistent with the QAPP. Samples collected for this project shall be assigned a unique sample identifier to be placed on the sample labels and tags. This sample identifier (i.e., number) convention will be developed in coordination with the BJC Sample Manager and the BJC Data Manager. In addition, one of the following codes is to be added to the end of a sample identifier number for a QC sample:

- "F" for field blank,
- "E" for equipment blank,
- "T" for trip blank, or
- "D" for duplicate sample (Note: A duplicate sample will not be given a sample number that can be linked directly back to the original sample without utilization of another source like a logbook).

Sample labels shall contain sufficient information to identify the sample in the absence of other documentation. The label shall be directly affixed to the sample container; completed with black, water-resistant ink; and include the following information, at a minimum:

- project number,
- unique sample number,
- sample location,
- sample medium,
- analysis to be performed,
- sampling date and time,
- organization collecting the sample, and
- preservation method.

The data shall be transcribed in the laboratory's sample log upon receipt of the samples.

## C.4 DATA MANAGEMENT

This chapter summarizes requirements for reduction and reporting of analytical data generated from sampling the project's waste. Review and verification procedures for evaluation of these data shall conform to the requirements of the Data QAPP and the DMIP, which will be developed prior to mobilization. Data management shall be completed in accordance with Data and Documents Management and Quality Assurance Plan (DOE 1998); WSOP-171, *Quality Assured Data*; Paducah Project Environmental Measurements System Configuration Management Plan and User Guide (BJC 1999); and the project's DMIP, as applicable. Data management activities include data assessment, data validation, data verification, data reporting, data archiving, and using the measurements system. Data verification and data archiving are to be conducted by the BJC Data Manager, with the WESKEM team Sampling and Analysis and Data Manager, or designee, providing any necessary interface.

### C.4.1 Field Data Assessment

Data collected during field activities shall be evaluated by checking the procedures used and comparing the data to previous measurements. The QA Manager, or designee, and appropriate field personnel shall be responsible for checking field results to ensure that field measurement and sampling protocols have been observed. These reviews shall check date and time sampled, preservation, SOPs, calibration method and frequency, and COC documentation. For field data that are to be used for waste characterization, WSOP-166, *On-Site Measurements, Verification, and Validation*, will be followed.

### C.4.2 Data Validation, Verification, and Assessment

The sample results shall be validated and assessed by WESKEM as required by the QAPP and the following procedures: WSOP-177, *Radiochemical Data Verification and Validation;* WSOP-178, *Wet Chemistry Verification and Validation;* WSOP-179, *Polychlorinated Dibenzodioxins/Polychlorinated Dibenzofurans Verification and Validation;* WSOP-181, *Volatile and Semivolatile Data Verification and Validation;* WSOP-182, *Pesticide and PCB Data Verification and Validation;* WSOP-183, *Inorganic Data Verification and Validation;* WSOP-171, *Quality Assured Data,* or other BJC-approved validation procedure(s). Data verification shall be conducted by BJC or its designee. Analytical QC samples (e.g., matrix spikes, surrogates) shall be performed for each analytical matrix as required for SW-846 data packages and as specified in the QAPP. Analytical precision and accuracy goals for the sample results shall be as stated in this plan. Reviewers are responsible for ensuring that data reduction calculations are documented and checked by qualified personnel. Written reports shall include reduced and summarized data. Data validation qualifiers shall then be entered into the PEMS database.

### C.4.3 PEMS Data Management

PEMS shall be used for sample scheduling, collection, and tracking of each characterization sample and associated data from point of collection through final data reporting. Several of the items to be tracked through the PEMS database include field forms, COC records, hardcopy data packages, and electronic data deliverables.

The project data shall be entered into PEMS on a routine basis with the goal being that measurement and observation data are entered into PEMS within 3 days of collection. All project data shall be verified by someone other than the person who made the original entries. Furthermore, appropriate waste sampling activities shall also be entered into PEMS and shall be tracked by the Waste Project Identification Number.

## C.5 SAMPLING AND DOCUMENTATION REQUIREMENTS

Sampling and documentation requirements shall be in accordance with the QAPP and the WSOPs listed below:

| Procedure Number | Procedure Title |
|---|---|
| WSOP-121 | *Shipping Analytical Samples* |
| WSOP-133 | *Sampling Fissionable Waste Material* |
| WSOP-150 | *Sample Chain-of-Custody* |
| WSOP-151 | *Waste Logbooks* |
| WSOP-152 | *Sample Tracking, Laboratory Coordination, and Sample Handling Guidance* |
| WSOP-153 | *Special Labeling Requirements for Samples* |
| WSOP-154 | *Temperature Control for Sample Storage* |
| WSOP-158 | *Collection of Field Quality Control Samples* |
| WSOP-159 | *Composite Sample Preparation* |
| WSOP-160 | *Sampling Containerized Wastes* |
| WSOP-169 | *Development, Completion and Control of Data Forms and Logbooks* |
| WSOP-630 | *Decontamination of Sampling Containers and Sampling Devices* |
| WSOP-641 | *Airborne Asbestos Sampling* |

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**Station 3:** Frisk (if exiting a RADCON area)

Perform radiological survey of hands, shoes, and any other areas that may have become contaminated. Remove any personal contamination with tape, moistened towel, or soap and water by or at the direction of the BJC-supplied RCT.

**Station 4:** Field wash

Wash face and hands prior to taking anything by mouth. This may be done with soap and water or disposable disinfectant towels.

### D.12.3.2 Level D Modified Protection Doffing/Decontamination

**Station 1:** Equipment drop

Place potentially contaminated equipment in a designated area.

**Station 2:** Tape removal

Remove all tape (if used) from outer clothing and place in appropriate waste container.

**Station 3:** Boot covers, outer disposable garment, and gloves removal

Carefully remove boot covers, outer contamination-resistant garment, and gloves.

**Station 4:** Frisk (if exiting RADCON area)

Perform radiological survey of hands, bottoms of shoes, and any other areas that may have become contaminated. Remove any personal contamination with tape, moistened towel, or soap and water by or at the direction of the BJC-supplied RCTs.

**Station 5:** Field wash

Wash hands and face prior to eating, drinking, smoking, etc. This step may be accomplished with soap and water or disposable disinfectant wipes.

### D.12.3.3 Level C and Level B Protection Doffing/Decontamination

**Station 1:** Equipment drop

Place potentially contaminated equipment in a designated area.

**Station 2:** Segregated equipment drop

Deposit equipment used on-site (e.g., tools, sampling devices, containers, monitoring instruments, clipboards, etc.) on plastic sheets or in different containers with plastic liners. Segregation of the equipment at the drop site reduces the possibility of cross contamination.

**Station 3:** Outer boot and glove removal

Remove tape from outer boots and outer gloves. Remove outer boot covers and outer gloves. Deposit gloves and boot covers in plastic trash bags.

**Station 4:** Disposable outer garment removal or collection of reusable laundered garments

Remove disposable outer garment, deposit in a plastic trash bag, and dispose of in accordance with the project work plan.

**Station 5:** Respiratory protection and disposable inner glove removal

The respirator is the next-to-last item to be removed. Place the cartridges/canisters in a plastic trash bag and dispose of in accordance with the project work plan. Place the respirator in a plastic bag dedicated for used respirators only. Remove disposable inner gloves last and deposit them in a plastic trash bag in accordance with the project work plan.

**Station 6:** Frisk

Perform whole-body radiological survey, concentrating on hands, shoes, and any other areas that might have become contaminated. Remove any personal contamination with tape, moistened towel, or soap and water.

**Station 7:** Field wash

Wash hands and face prior to eating, drinking, smoking, etc. This step may be accomplished with soap and water or disposable disinfectant wipes.

## D.13 RADIOLOGICAL PROTECTION

Title 10, Part 835 of the *CFR* sets forth the requirements for occupational radiation protection for DOE-sponsored activities. These requirements are addressed by BJC in the Project's RPP. The WESKEM team's responsibility is to develop a process that incorporates the fundamentals of radiological protection and adherence to the project's RPP.

The WESKEM team has incorporated fundamentals into the process by placing emphasis on the protection of the worker and the environment through use of the ALARA process, identification and use of appropriate PPE, and appropriate training for project personnel. The WESKEM team's process minimizes direct worker exposure to potential hazards by use of equipment with appropriate controls (e.g., HEPA), minimization of tasks not required to meet a disposal facility's WAC, and minimization of sampling activities through appropriate use of process knowledge and statistical sampling techniques and methods.

## D.14 AIR MONITORING AND SAMPLING

A real-time air monitoring program will be used to assess employee exposures to airborne contaminants. Radiological exposures will be monitored by BJC and other chemical exposures will be monitored by WESKEM. Conservative action levels have been established to ensure that employee exposures are below applicable exposure limits. Air monitoring will be conducted continuously during processing for radiochemical parameters. Real-time monitoring will be conducted as specified in the safety and health work permit for chemical parameters. The requirements below apply to all air monitoring conducted on this project.

- Monitoring instruments will be checked for proper calibration, per the manufacturer's instructions, at least once during each day of use.

- All field personnel will be notified of available monitoring results in the following morning safety briefing or immediately, if action is required. Monitoring results will be available for review by all site personnel.

- Monitoring results will be recorded in field logs to indicate time periods monitored, tasks monitored, location, identify of instrument, identity of operator, and results. The results may be summarized to reflect repetitive readings (such as 9:00 to 10:00 – 0 ppm with photoionization detector and flame ionization detector.)

The monitoring requirements below will apply to this project.

| Hazard or measured parameter | Area | Interval | Limit (i.e., action level) | Action | Tasks |
|---|---|---|---|---|---|
| Airborne organics with PID or FID | Breathing zone (14 inches in front of employee's shoulder) | During removal of material from the scrap yards and size-reducing of material as determined by ESHR | >25 ppm on a sustained basis or short-duration readings >50 ppm | Withdraw and evaluate:<br>–Identify contaminants<br>–Notify Project Superintendent and Corporate ESHR<br>–Controls may include engineering, administrative, or personal protective measures | Removal of material from the scrap yards, size-reducing of material, other tasks as determined by the ESHR |
| Airborne dust (visual and miniram or equivalent) | BZ for areas of scrap pile removal | Continuously | Visible dust in BZ | Require the use of water spray or other suppression techniques | Removal of scrap, inspection of scrap |
| Noise | In the areas accessed by employees near noisy equipment | Subjectively noisy operations to be monitored or assumed to exceed 85 dBA | 85 dBA | Require the use of hearing protection | Excavator use, generator use, use of other noisy equipment |

BZ = Breathing Zone.
ESHR = Environmental Safety and Health Representative.
FID = flame ionization detector.
PID = photoionization detector.

## D.15 POLLUTION PREVENTION AND WASTE MINIMIZATION

With pollution-reduction goals and continual improvement targets in the foreground, WESKEM will conduct waste disposal system project activities in a manner protecting human health and the environment.

- Managers will ensure that work is planned to prevent pollution, minimize waste, and conserve resources and that work is conducted in a cost-effective manner that eliminates or minimizes environmental impact.

- Pollution prevention and waste minimization practices will be monitored and measured as standard practice to support annual waste minimization program goals.

- Performance measures will be established by project personnel in pollution prevention and waste minimization areas.

- All personnel will identify, evaluate, and control workplace hazards to ensure that work is conducted safely and in a manner that protects the environment and the public.

- All personnel will ensure that environmental effluents, emissions, and wastes associated with their work are ALARA (also referred to as "E-ALARA").

- Waste segregation practices will be implemented (e.g., nonhazardous materials from hazardous materials or wastes and nonradioactive materials or wastes from radioactive materials and wastes).

- WESKEM is responsible for signing RCRA hazardous waste manifest(s) with waste minimization program certification.

- Management will establish waste minimization targets.

- RCRA waste minimization certification areas will be documented.

Zero environmental accidents or releases is a WESKEM waste minimization project goal. This goal is targeted in the work planning process. Personnel will pursue technically and economically feasible techniques to accomplish pollution prevention, waste minimization, and resource conservation in the workplace. In all situations, consideration will be given to purchasing and using of environmentally preferable products and products that are designed to minimize the use of natural resources and waste generation. Source reduction, reuse, recycling, and segregation will be implemented.

WESKEM will operate consistent with site-wide SPCC Plans, site-wide RCRA Contingency Plans, and BJC spill procedure(s), ESS-EP-126, *Spill Prevention, Control, and Countermeasures Program;* ESS-EP-133, *Clean Water Act Best Management Practices Program for the Control of Liquid Discharges;* and SPP-4102, *Cleanup of Spills Involving PCBs*.

## D.16 HAZARD COMMUNICATION PROGRAM

Project requirements are listed below.

- Copies of the project hazardous materials inventory, statements of intended use, and MSDSs will be provided to BJC prior to bringing chemicals on-site.

- An inventory of hazardous chemicals will be maintained on-site. The inventory will include name, CAS number (where applicable), approximate quantity, and storage location.

- MSDSs for all hazardous chemicals used on-site will be kept on-site and available to employees.

- All hazardous chemical containers will be labeled to indicate at least the identity of the material and the hazard.

- All personnel who work with or around hazardous chemicals will receive on-site training addressing the location of the MSDSs, hazards of those chemicals, appropriate protective measures, recognition of potential exposure, and emergency measures.

- Confirmed or suspected human carcinogens will not be used on-site unless a suitable substitute cannot be found.

## D.17 FIRE PROTECTION

WESKEM shall take all necessary and appropriate precautions to prevent fires in accordance with OSHA 1926 Subpart J, "Welding and Cutting." All methods of welding, arc and torch cutting, and open-flame brazing, open-flame burning, open-flame solder, and other portable torch open-flame operations require a welding, burning, and hot work (WBH) permit in accordance with WESKEM W-235-PWOS, "WESKEM Safety and Health Permit Roles and Responsibilities." Flame-resistant clothing and fire-watcher requirements for personnel protection for WBH operations as specified in hot-work permits shall be followed.

Internal combustion engines will not be permitted to operate in buildings unless authorized by the BJC STR. Storage of flammable fuels will be carefully monitored. All fuel storage areas and storage tanks must have written approval by the BJC STR. Marking and labeling of fuel tanks shall meet the requirements of OSHA 29 *CFR* 1926.59. All heating devices and their locations must be inspected by the BJC STR Safety Advocate before use. Fueling areas and tanks shall comply with all applicable National Fire Protection Association (NFPA) and OSHA requirements. Refueling shall not take place inside buildings.

Flammable or combustible liquid storage shall comply with NFPA 30 and OSHA 1926.152. All gas cans shall be free of deformities and constructed of metal, with self-closing lids and flame arresters. Fuel cans shall be labeled as to their contents. Fuel cans shall not be transported in vehicle passenger enclosures (e.g., vans, truck cabs, inside vehicles). Fuel cans must be secured during transport. All equipment shall be fueled through funnels or spouts to prevent spills.

Regulatory-acceptance deviations from the above fire protection protocols shall be permitted only upon the review and written approval by the BJC STR and Safety Advocate.

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# E.0 DATA QUALITY ASSURANCE PROJECT PLAN

This Data QAPP has been developed for use in activities to remove and dispose of 53,000 tons of contaminated scrap metal and miscellaneous materials contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B to ensure that appropriate levels of QA and QC are achieved. The Data QAPP is a subset of the project's overall QAPP, which covers the 10 *CFR* 830.120 QA elements, and is intended to be used in conjunction with the SAPs, waste analysis plans, instructions, and/or procedures. This QAPP also focuses on the general characterization objectives for the project and specifies the sampling procedures, analytical protocols, and QA requirements for characterization of the waste in accordance with project strategies and requirements. This QAPP defines procedures that will be followed in the collection, custody, and handling of data used in the project. These procedures are intended to define the methods applied to achieve the QA/QC goals established for these actions. The background, scope, and objectives for this work are defined in the associated RAWP and the SAP & DMP (Sect. C of the RAWP).

All QA/QC procedures will be in accordance with applicable professional technical standards, EPA requirements, government regulations, DOE Orders, guidelines, and requirements. This QAPP has been prepared to meet the requirements of 10 *CFR* 830.120, EPA *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* EPA-600/4-83-004, QAMS-005/80, and *EPA Requirements for Quality Assurance Project Plans, Interim Final* (EPA QA/R-5).

This QAPP has been developed to focus on data from planning, collection, analysis, assessment, and use. It does not contain all EPA QA/R-5 criteria; however, the QAPP does reference other documents that cumulatively address certain criteria (e.g., the SAP, DMP, and QAPP). EPA QA/R-5 states, "Documentation, such as an approved work plan, SOPs, etc., may be referenced in response to a particular required QAPP element to reduce the size of the QAPP." Table E.1 presents a crosswalk between certain QA/R-5 elements and the project documentation that addresses the specific element.

## E.1 PROJECT DESCRIPTION

As previously stated, this Project's goal is to remove and disposition 53,000 tons of contaminated scrap metal and miscellaneous material contained in scrap yards C-746-C, C-746-C1, C-746-D, C-746-E, C-746-E1, C-746-H4, C-746-P, C-746-P1, C-747-A, and C-747-B. This project is managed through the BJC Environmental Management Program.

The technical approach to accomplishing this project is specified in more detail in the Design Report and the SAP & DMP of this RAWP, but is summarized here to clarify how the removal and packaging approach is integrated with the sampling approach.

The material from each scrap yard will be removed from the scrap yard (i.e., waste pile) and transferred to a staging/sorting area where the waste that does not appear to be scrap metal or exceed a corrective action threshold as identified in the SAP & DMP will be segregated by a field team. This field team will include at least one individual (e.g., the Field Inspector) who has experience and knowledge of how to recognize potential asbestos, PCB, inherently hazardous RCRA metals, and other PGDP common wastes. In addition, this field team will be trained to segregate the waste or contact an appropriately trained person for the type of waste to be segregated (e.g., trained to handle asbestos).

The scrap material will then be size-reduced through use of cutting tool attachments such as shears that accompany a trackhoe/excavator. In addition, if necessary, the process will also have the capability to

Table E.1. Crosswalk of EPA QA/R-5 to the Data QAPP and related project documents

| EPA QA/R-5 Elements | | Project Documentation |
|---|---|---|
| A4 | Project/Task Organization | Overall presented in RAWP Chap. A. Interface and management processes will be included in the Project's QAPP |
| A6 | Project/Task Description | Specified in the Design Report |
| A7 | Quality Objectives and Criteria for Measurement Data | See Sect. C.1 of the SAP & DMP. Also addressed in Sect. E.3 of the Data QAPP. In addition, a Data Management Implementation Plan is to be developed prior to mobilization |
| A9 | Documentation and Records | Presented in the project's QAPP. Additional requirements for analytical laboratories will be specified by the Bechtel Jacobs Company Sample Management Office in an analytical SOW |
| B1 | Sampling Process Design | See Sects. C.1 and C.3 of the SAP & DMP |
| B2 | Sampling Methods Requirements | See Sects. C.1 and C.3 of the SAP & DMP. Also addressed in Sect. E.5 of the Data QAPP and by the Analytical SOW. Existing procedures will either be revised or a new procedure will be developed to accommodate sampling of all material for this project |
| B3 | Sampling Handling and Custody Requirements | See Sects. E.5 and E.6 of the Data QAPP and the analytical SOW |
| B4 | Analytical Methods Requirements | See Sects. C.1 and C.3 of the SAP & DMP. Also, addressed in Sect. E.5 of the Data QAPP and by the analytical SOW |
| B5 | Quality Control Requirements | See Sects. C.1 and C.3 of the SAP & DMP. Also addressed in Sects. E.7 and E.10 of the Data QAPP |
| B6 | Instrument/Equipment testing, Inspection, and Maintenance Requirements | WESKEM has an existing Paducah Program that addresses this criterion and accompanying subcriterion. This procurement process will be incorporated into the overall Project QAPP<br>WESKEM has an existing Paducah Program that addresses this criterion and accompanying subcriterion. This procurement process will be incorporated into the overall Project QAPP. Some parts of this Program are addressed in Sects. E.7 and E.11 of the Data QAPP |
| B7 | Instrument Calibration and Frequency | WESKEM has an existing Paducah Program that addresses this criterion and accompanying subcriterion. This procurement process will be incorporated into the overall Project QAPP. Some parts of this Program are addressed in Sects. E.7 and E.11 of the Data QAPP |
| B8 | Inspection/Acceptance Requirements for Supplies and Consumables | WESKEM has an existing Paducah Program that addresses this criterion and accompanying subcriterion. This procurement process will be incorporated into the overall Project QAPP |
| B10 | Data Management | See Sect. C.4 of the SAP & DMP, Sect. E.9 of the Data QAPP. In addition, a Data Management Implementation Plan is to be developed prior to mobilization. |
| D1 | Data Review, Validation, and Verification Requirements | See Sect. C.4 of the SAP & DMP, Sect. E.9 of the Data QAPP. In addition, a Data Management Implementation Plan is to be developed prior to mobilization |
| D2 | Validation and Verification Methods | See Sect. C.4 of the SAP & DMP, Sect. E.9 of the Data QAPP. In addition, a Data Management Implementation Plan is to be developed prior to mobilization |
| D3 | Reconciliation with Data Quality Objectives | See Sect. C.4 of the SAP & DMP, Sect. E.9 of the Data QAPP. In addition, a Data Management Implementation Plan is to be developed prior to mobilization |

| | |
|---|---|
| EPA | Environmental Protection Agency. |
| QAPP | Quality Assurance Project Plan. |
| RAWP | Removal Action Work Plan. |
| SAP & DMP | Sampling and Analysis Plan and Data Management Plan. |
| SOW | statement of work. |

size-reduce through use of a metal cutting torch. The size-reduced scrap material destined for NTS and/or EoU will be loaded into an intermodal using a trackhoe/excavator with grappler, clamshell bucket, or magnet, while the size-reduced scrap material destined for the C-746-U Landfill will typically be loaded into a roll-off bin through the use of similar equipment. It is also possible that a front-end loader or a crane with an electromagnet may be used, depending upon a more detailed work flow evaluation that will be conducted during premobilization activities. In addition, the secondary wastes associated with this process, such as PPE and plastic sheeting, will also be packaged into the intermodal or roll-off bin. Once a container is loaded, it will be transferred to the staging area until sample results associated with that intermodal have been returned from the laboratory. Once the sample results have been returned from the laboratory, the associated field screening data and definitive confirmation data have been verified and validated and are within the disposal facility waste profile, and the disposal facility has issued a Notice to Proceed, a rail car loaded typically with six intermodals per rail car will be shipped to the disposal facility or the roll-off bin will be transferred to the C-746-U Landfill.

In addition to providing a waste profile, data collected shall be used to

- evaluate if the waste is RCRA hazardous,
- evaluate whether the waste meets the LDRs,
- evaluate if WAC prohibited items are in the waste,
- evaluate whether radionuclides present in the waste are below the limits specified in NTS's and/or EoU's Radioactive Materials license,
- provide information for nuclear material control and accountability (if needed), and
- provide information needed to satisfy the DOT requirements pertaining to off-site shipment of waste.

The SAP & DMP was prepared to meet or exceed sampling and analysis protocols as specified in EPA *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition.

## E.2 ORGANIZATION

Each organization performing work on this project will adhere to the appropriate requirements of this plan and will prepare implementing procedures where needed. All project team personnel have the right, obligation, and authority to stop work if imminent risks to safety, environment, or mission are identified. The employee should notify responsible management of the apparent risk so that appropriate action can be taken. Stop-work authority is implemented in accordance with WESKEM SOP (WSOP) 223, *Suspend/Stop Work*, which empowers personnel to administer stop-work actions in cases where the severity of conditions adverse to quality warrants immediate action or employees have safety and/or quality concerns. If activities are stopped as a result of unsatisfactory work, an internal field review will be conducted before restarting work activities. Each individual assigned to the project is responsible for the quality of his/her work.

### E.2.1 Project Personnel Responsibilities

All work activities including sampling activities will be implemented during the project to ensure that quality objectives are met. All project personnel are responsible for QA/QC processes during implementation of the Technical Work Plan. Project personnel responsibilities are discussed below.

### E.2.1.1 Bechtel Jacobs Company

*Subcontract Technical Representative*

The STR will report project progress and results to the Paducah Site Manager and the DOE Program Manager and is responsible for

- ensuring that appropriate QA/QC requirements are included in subcontracts and that subcontractor technical commitments are met,
- incorporating the appropriate QA requirements for this project in all project activities,
- consulting with the PGDP Quality Manager on all quality-related matters, and
- initiating stop-work actions when conditions or procedures adverse to quality warrant immediate action.

***Quality Manager***

The Quality Manager reports to the PGDP Site Manager and is responsible for

- helping the Project Manager establish the QA measures outlined in the SAP & DMP and this QAPP,
- evaluating the effectiveness of QA activities through audits and surveillances and reporting results to the STR and Site Manager,
- providing guidance to resolve quality problems encountered during field activities and ensuring that corrective action is taken and appropriately documented,
- participating in the field readiness review, and
- initiating stop-work actions when the severity of conditions adverse to quality warrants immediate action.

***Safety Advocate***

The Safety Advocate reports to the PGDP Site Manager and is responsible for

- helping the STR and ESHR establish the safety measures outlined in the RAWP,
- evaluating the effectiveness of safety activities through audits and surveillances and reporting results to the STR and Site Manager,
- providing guidance to resolve safety problems encountered during field activities and ensuring that corrective action is taken and appropriately documented,
- participating in the field readiness review, and
- initiating stop-work actions when the severity of conditions adverse to safety warrants immediate action.

### *Health Physics Support*

It is anticipated that three health physics technicians will be needed on-site to support this project. They are responsible for implementing the RADCON Program, developing and implementing radiation safety plans, and developing and implementing radiation work permits.

### E.2.1.2 WESKEM Paducah Scrap Metal Removal and Disposal Project Team

The WESKEM Paducah Scrap Metal Removal and Disposal Team responsibilities and interfaces for the implementation of the QAPP on this subcontract are described below.

### *Project Manager*

The Project Manager is responsible for the successful completion of project deliverables. The Project Manager ensures implementation of requirements and provides coordination of project personnel and activities. In particular, the Project Manager is responsible for:

- interfacing with site and project personnel and other associated organizations;
- assisting the Site ESHR when necessary;
- overseeing on-site sampling activities;
- providing adequate funding and resources to effectively support the QA requirements applicable to the project and individual tasks;
- maintaining cognizance of QA issues and problems and affecting resolution;
- ensuring work is performed within the ISMS;
- determining in-field procedural variances necessary to respond to site-specific conditions and obtain concurrence of the STR;
- investigating quality problems during sampling operations, determining their root cause, proposing solutions, implementing corrective actions, and obtaining the concurrence of the QA Manager on the appropriateness of the corrective action; and
- documenting and reporting to the STR unforeseen site-specific changes and corrective actions.

### *Project QA Manager*

The Project QA Manager directly reports to WESKEM Headquarters for QA/QC program implementation. The Project QA Manager functionally reports to the Project Manager. He supports WESKEM Headquarters by

- ensuring that project-specific QA Plans and procedures are developed and implemented;
- ensuring that project activities are conducted in accordance with project-specific QA Plans;
- overseeing project activities by conducting internal assessments and reviewing procurement documents for inclusion of QA requirements;

- ensuring that a QA orientation program is developed and implemented for project personnel;
- ensuring implementation of all project QA implementation procedures;
- ensuring that QA/QC requirements are incorporated into project procedures and instructions;
- providing QA assistance for sampling activities and review of analytical data;
- coordinating QA surveillance of sampling activities;
- assisting with corrective actions, as necessary;
- reporting and tracking resolution of Price-Anderson Amendments Act noncompliances; and
- interfacing with the BJC Quality Manager and STR on all quality-related matters.

***Project Superintendent***

The Project Superintendent reports directly to the Project Manager and has overall responsibility for ensuring that all project personnel properly implement the requirements of the QAPP. The Project Superintendent is responsible for

- ensuring that technical and craft personnel under his/her supervision are qualified by experience and/or training to perform assigned work and that those personnel comply with the technical; ES&H; and QA requirements applicable to the work performed;
- ensuring that the QA requirements as outlined in this QAPP are adhered to;
- ensuring that sampling and decontamination procedures are effectively implemented;
- ensuring that appropriate QA/QC requirements and technical commitments as outlined in subcontractor contracts are met;
- ensuring that all applicable state and federal codes, standards, and regulations are appropriately specified and effectively implemented; and
- initiating stop-work actions when conditions or procedures adverse to quality warrant immediate action.

***Sampling and Analysis and Data Manager***

The Sampling and Analysis and Data Manager implements and provides coordination of the project to ensure that all the required information shall be obtained to meet requirements for disposition of the waste. The Sampling and Analysis and Data Manager also ensures that a SAP & DMP is developed to address the project's DQOs and that the analytical data are statistically evaluated, and he/she reports the findings and recommendations. In particular, the Sampling and Analysis and Data Manager is responsible for

- directing field sampling personnel and contractors to develop and implement a SAP & DMP in accordance with requirements and this QAPP;
- directing sampling personnel and contractors to develop a SAP & DMP to demonstrate compliance with WAC;

- directing sampling personnel and contractors in conducting field activities;

- overseeing and directing of the technical implementation of the SAP & DMP in the field to ensure compliance with the requirements of this QAPP;

- approving the SAP & DMP and ensuring that sampling personnel and contractors comply with requirements;

- reviewing and approving field change orders (FCOs) initiated for sampling and analysis efforts, including any changes or modifications to laboratory methodologies;

- coordinating data and records management activities related to sampling and analysis including, but not limited to, sample logs, COC documentation, hardcopy data deliverables, electronic data deliverables, and data reports;

- coordinating sampling and analysis data review, verification, validation, and reporting efforts;

- initiating stop-work actions when conditions or procedures adverse to safety or quality warrant immediate action; and

- overseeing data and records management activities related to sampling and analysis including, but not limited to, sample logs, COC documentation, hardcopy data deliverables, electronic data deliverables, and data reports to ensure compliance with the intent of this QAPP.

***Environmental Safety and Health Representative***

The ESHR is responsible for ensuring that quality objectives are achieved during properly implemented sampling and analytical efforts associated with project activities. Accordingly, the ESHR is responsible for

- reviewing, evaluating, and approving all sampling and analysis activities relative to safety, chemical, and radiation hazards;

- ensuring that all health, safety, radiation, and criticality concerns are addressed by the field activities;

- coordinating all health, safety, and radiation screening required to properly collect and ship samples for analysis;

- reviewing and approving of all FCOs initiated for sampling and analysis efforts, including any changes or modifications to laboratory methodologies; and

- initiating stop-work actions when conditions or procedures adverse to safety or quality warrant immediate action.

***DOT Manager***

The DOT Manager is responsible for developing the Transportation Plan, providing intermodals and rail cars, generating shipping papers, and ensuring the necessary paperwork and requirements are met for shipment to and receiving by disposal facilities.

### *Line Management*

WESKEM line management is committed to the QA program, which expects each person to understand his/her quality responsibilities and to implement the controls applicable to his/her work.

### *Personnel*

Project personnel are responsible for ensuring the quality of their work, and they have stop-work authority should concerns over safety or quality arise. The responsibilities of sampling team personnel specifically are

- ensuring the QA requirements for sampling operations and decontamination are adhered to;
- ensuring that appropriate QA/QC requirements and technical commitments, as outlined in the respective subcontractor contracts, are met;
- interfacing with the Sampling and Analysis and Data Manager on all quality-related matters; and
- initiating stop-work actions when conditions or procedures adverse to quality warrant immediate action.

### *Subcontract Analytical Laboratory Support*

All analytical laboratory support is provided through the BJC SMO. Review, approval, and selection of laboratory services are covered by BJC policies and procedures.

Figure A.3 of the Design Report (Chap. A) depicts the Paducah Scrap Metal Removal and Disposal project organization.

## E.2.2 Personnel Training and Qualifications

Personnel will receive the necessary indoctrination and performance-based training. Training sessions are documented as to objective, content of the session, attendees, and date of attendance. WESKEM will provide introductory and refresher training on quality management systems, as appropriate, for all employees. The objective is to bring the entire workforce together with management as a cohesive team. This is easily attainable from a team that is lead instead of driven by leaders equally concerned with productivity and human resource enhancements. The Project Manager, or designee, shall verify with the QA Manager, or designee, that training requirements are met for each individual working on the project prior to commencing work activities. Training requirements are performed in accordance with WSOP 107, *Training and Indoctrination,* as applicable.

All personnel performing work inside a radiological boundary area are required to have current training in the following areas as prescribed by the RWP and/or the safety and health work permit:

- HAZWOPER training in accordance with the OSHA (29 *CFR* 1910.120) and
- Radiological Worker II (PGDP-specific).

## E.3 QA OBJECTIVES FOR DATA MEASUREMENT

Objectives for data collection and analysis are developed as project goals. General goals for the analytical data are as follows:

- data generated will withstand scientific and technical scrutiny;
- data will be generated using appropriate procedures for analysis, COC, data documentation, and reporting; and
- data will be of known precision, accuracy, and sensitivity.

Goals for data precision, accuracy, and completeness are presented in Tables E.2 and E.3, while sensitivity goals are identified in Tables E.4 and E.5.

**Table E.2. Solids investigative project objective summary**

| Data use | Sample type | Analytical method | Precision field dups | RPD[a] laboratory dups | Accuracy laboratory (MS) | Completeness (%) |
|---|---|---|---|---|---|---|
| Screening ES&H | Discrete | FID/PID volatile organics | +/- comparison | NA | +/- 0.1ppm | 95 |
| | | PTSA-2006 radiological monitoring | +/- cpm | NA | NA | 95 |
| Determination of solids characteristics | Discrete | SW-8260B volatile organics | <50 RPD | <35 RPD | 50 to 150% recovery | 90 |
| | Discrete or composite | SW-8270C semivolatile organics | <50 RPD | <35 RPD | 30 to 140% recovery | 90 |
| | | SW-8082 PCBs | <50 RPD | <35 RPD | 35 to 135% recovery | 90 |
| | | SW-6010B/7000 or SW-6020 metals | <50 RPD | <35 RPD | 75 to 125% recovery | 90 |
| | | Radiochemical, various | <50 RPD | <35 RPD | 75 to 125% recovery | 90 |
| | | SW-1311 TCLP analytes | NA | <40 RPD | 75 to 125% recovery | 90 |
| | | Other waste characteristics | NA | <40 RPD | 50 to 150% recovery | 90 |
| | | Physical testing | NA | <40 RPD | NA | 90 |

[a] RPD Relative percent difference; at values within five times the reporting level, comparison is acceptable if values are plus or minus four times the reporting level.

ES&H environmental safety and health.
FID flame ionization detector.
MS matrix sample.
NA not applicable.
PCB polychlorinated biphenyl.
PID photoionization detector.
ppm parts per million.
TCLP Toxicity Characteristic Leaching Procedure.

## Table E.3. Waste water investigative project objectives summary

| Data use | Sample type | Analytical method | Precision field dups | RPD[a] laboratory dups | Accuracy laboratory (MS) | Completeness (%) |
|---|---|---|---|---|---|---|
| Screening ES&H | Discrete | FID/PID volatile organics | NA | NA | +/- 0.1 ppm | 95 |
| Determination of water characteristics | Discrete | EPA-120.1 conductivity | <10 RPD | NA | +/- 10 mhos/cm | 95 |
| | | EPA-150.1 pH | <10 RPD | NA | +/- 0.1 s.u. | 95 |
| | | EPA-170.1 temperature | <10 RPD | NA | NA | 95 |
| | Discrete | SW-8260B volatile organics | <30 RPD | <20 RPD | 50 to 100% recovery | 90 |
| | Discrete or composite | SW-8270C semivolatile organics | <30 RPD | <20 RPD | 35 to 140% recovery | 90 |
| | | SW-8082A PCBs | <30 RPD | <20 RPD | 35 to 135% recovery | 90 |
| | | SW-6010B/7000 or SW-6020 metals | <30 RPD | <20 RPD | 75 to 125% recovery | 90 |
| | | Anions various | <30 RPD | <20 RPD | 75 to 125% recovery | 90 |
| | | Radiochemical various | <30 RPD | <20 RPD | 75 to 125% recovery | 90 |

[a] RPD Relative percent difference; at values within five times the reporting level, comparison is acceptable if values are plus or minus four times the reporting level.

| | |
|---|---|
| EPA | U.S. Environmental Protection Agency. |
| ES&H | environmental Safety and Health. |
| FID | flame ionization detector. |
| MS | matrix sample. |
| NA | not applicable. |
| PCB | polychlorinated biphenyl. |
| PID | photoionization detector. |
| ppm | parts per million. |

**Table E.4. Analytical methods, parameters, and project quantitation limits**

| Parameters | Analytical methods | | Project quantitation limits [a] | |
|---|---|---|---|---|
| | Water | Solids | Water | Solids |
| Volatile organic compounds | SW 846-8260B | SW 846-8260B | (µg/L) | (µg/kg) |
| Chloromethane | | | 10 | 10 |
| Bromomethane | | | 10 | 10 |
| Vinyl chloride | | | 5 | 5 |
| Chloroethane | | | 10 | 10 |
| Methylene chloride | | | 5 | 5 |
| Acetone | | | 100 | 100 |
| Carbon disulfide | | | 5 | 5 |
| 1,1-Dichloroethene | | | 5 | 5 |
| 1,1-Dichloroethane | | | 5 | 5 |
| cis-1,2-Dichoroethene | | | 5 | 5 |
| trans-1,2-dichloroethene | | | 5 | 5 |
| Chloroform | | | 5 | 5 |
| 1,2-Dichloroethane | | | 5 | 5 |
| 2-Butanone | | | 100 | 100 |
| 1,1,1-Trichloroethane | | | 5 | 5 |
| Carbon tetrachloride | | | 5 | 5 |
| Bromodichloromethane | | | 5 | 5 |
| 1,2-Dichloropropane | | | 5 | 5 |
| cis-1,3-Dichloropropene | | | 5 | 5 |
| Trichloroethene | | | 5 | 5 |
| Dibromochloromethane | | | 5 | 5 |
| 1,1,2-Trichloroethane | | | 5 | 5 |
| Benzene | | | 5 | 5 |
| trans-1,3-Dichloropropene | | | 5 | 5 |
| Tribromomethane (bromoform) | | | 5 | 10 |
| 4-Methyl-2-pentanone | | | 50 | 50 |
| 2-Hexanone | | | 50 | 50 |
| Tetrachloroethene | | | 5 | 5 |
| Toluene | | | 2 | 2 |
| 1,1,2,2-Tetrachloroethane | | | 5 | 5 |
| Chlorobenzene | | | 5 | 5 |
| Ethylbenzene | | | 5 | 5 |
| Styrene | | | 5 | 5 |
| m,p-Xylene | | | 5 | 5 |
| 1,2-Dimethylbenzene | | | 5 | 5 |
| PCBs | SW 846 3520/8082A [b] | SW 846 3540/8082A [b] | | |
| PCBs, total | | | 100 | 100 |
| Arochlor-1016 | | | 100 | 100 |
| Arochlor-1221 | | | 100 | 100 |
| Arochlor-1232 | | | 100 | 100 |
| Arochlor-1242 | | | 100 | 100 |

**Table E.4. Analytical methods, parameters, and project quantitation limits (continued)**

| Parameters | Analytical methods | | Project quantitation limits [a] | |
|---|---|---|---|---|
| | Water | Solids | Water | Solids |
| Arochlor-1248 | | | 100 | 100 |
| Arochlor-1254 | | | 100 | 100 |
| Arochlor-1260 | | | 100 | 100 |
| Arochlor-1268 | | | 100 | 100 |
| Metals (Target analyte list) | SW 846 3010A/6010B, 6020A, or 7000 series [b] | SW 846-3050A/6010B, 6020A, or 7000 series [b] | | (mg/kg) [c] |
| Arsenic | | | 5 | 5 |
| Barium | | | 50 | 1 |
| Beryllium | | | 10 | 0.5 |
| Cadmium | | | 10 | 2 |
| Chromium | | | 50 | 2 |
| Lead | | | 200 | 20 |
| Mercury (CVAA) | SW 846-7470 | SW 846-7471 | 0.2 | 0.2 |
| Selenium | | | 5 | 1 |
| Silver | | | 50 | 5 |
| Anions | | | (mg/L) | |
| Bromide | EPA 9056 | — | 0.2 | — |
| Chloride | EPA 9056 | — | 1.0 | — |
| Fluoride | EPA 9056 | — | 0.1 | — |
| Sulfate | EPA 9056 | — | 5.0 | — |
| Phosphate | EPA 9056 | — | 0.1 | — |
| Nitrate/Nitrite | EPA 9056 | — | 0.2 | — |
| Alkalinity | EPA 310.1 [d] | — | NA | — |
| Radiochemical parameters | | | pCi/L | pCi/g |
| Gross alpha | Proportl. Ctr. [e] | Proportl. Ctr. [e] | 5 | 5 |
| Gross beta | Proportl. Ctr. [e] | Proportl. Ctr. [e] | 5 | 5 |
| Isotopic uranium ($^{234, 235, 238}U$) | Alpha spec. [e] | Alpha spec. [e] | 0.5 ea. | 0.5 ea. |
| Isotopic thorium ($^{228, 230, 232}Th$) | Alpha spec. [e] | Alpha spec. [e] | 0.5 ea. | 0.5 ea. |
| Isotopic plutonium ($^{238, 239/240}Pu$) | Alpha spec. [e] | Alpha spec. [e] | 0.5 ea. | 0.5 ea. |
| Neptunium 237 ($^{237}Np$) | Alpha spec. [e] | Alpha spec. [e] | 100 | 100 |
| Strontium 89/90 ($^{89/90}Sr$) | Proportl. Ctr. [e] | Proportl. ctr. [e] | 1 | 1 |
| Technetium 99 ($^{99}Tc$) | Liquid scint. [e] | Liquid scint. [e] | 10 | 10 |
| Antimony-124 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Antimony-125 | Gamma Spec. | Gamma Spec. | 0.2 | 0.2 |

**Table E.4. Analytical methods, parameters, and project quantitation limits (continued)**

| Parameters | Analytical methods | | Project quantitation limits [a] | |
|---|---|---|---|---|
| | Water | Solids | Water | Solids |
| Barium-133 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Barium-140 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Beryllium-7 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Bismuth-211 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Bismuth-212 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Bismuth-214 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cerium-139 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cerium-141 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cerium-144 | Gamma Spec. | Gamma Spec. | 0.5 | 0.5 |
| Cesium-134 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Cesium-136 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cesium-137 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Chromium-51 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cobalt-56 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cobalt-57 | Gamma Spec. | Gamma Spec. | 0.01 | 0.01 |
| Cobalt-58 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Cobalt-60 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Europium-152 | Gamma Spec. | Gamma Spec. | 0.5 | 0.5 |
| Europium-154 | Gamma Spec. | Gamma Spec. | 0.2 | 0.2 |
| Europium-155 | Gamma Spec. | Gamma Spec. | 0.2 | 0.2 |
| Iridium-192 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Iron-59 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Lead-210 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Lead-211 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Lead-212 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Lead-214 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Manganese-54 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Mercury-203 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Neodymium-147 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Neptunium-237 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Neptunium-239 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Niobium-94 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Niobium-95 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Potassium-40 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Promethium-144 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Promethium-146 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Protactinium-231 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Protactinium-233 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Radium-223 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Radium-228 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Radon-219 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Ruthenium-106 | Gamma Spec. | Gamma Spec. | 0.8 | 0.8 |
| Silver-110M | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Sodium-22 | Gamma Spec. | Gamma Spec. | 0.7 | 0.7 |

Table E.4. Analytical methods, parameters, and project quantitation limits (continued)

| Parameters | Analytical methods | | Project quantitation limits [a] | |
|---|---|---|---|---|
| | Water | Solids | Water | Solids |
| Thallium-208 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Thorium-227 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Thorium-229 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Thorium-234 | Gamma Spec. | Gamma Spec. | 5 | 5 |
| Tin-113 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Uranium | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Uranium-234 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Uranium-235 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Uranium-238 | Gamma Spec. | Gamma Spec. | 1 | 1 |
| Ytrium-88 | Gamma Spec. | Gamma Spec. | 0.1 | 0.1 |
| Zinc-65 | Gamma Spec. | Gamma Spec. | 0.2 | 0.2 |
| Zirconium-95 | Gamma Spec. | Gamma Spec. | 1 | 1 |

[a] These are expected quantitation limits based on reagent-grade water or a purified solid matrix. Actual quantitation limits may be higher depending on the nature of the sample matrix. The limit reported on final laboratory reports will take into account the actual sample volume or weight, percent solids (where applicable), and dilution factor, if any. The quantitation limits for additional analytes to this list may vary, depending on the results of laboratory studies. All solids will be reported on a dry weight basis, with the associated sample percent moisture reported separately. Requirements specified in the analytical Statement of Work will supercede the analytes, analytical methods, and project quantitation goals.

[b] *Test Methods for Evaluating Solid Waste*, U.S. Environmental Protection Agency (EPA), SW-846, Third Edition.

[c] Estimated detection limits for metals in soil are based on a 2-g sample diluted to 200 mL.

[d] Methods for Chemical Analysis of Water and Wastes, U.S. EPA-600/4-79-020.

[e] Laboratory specific procedures, which are consistent with U.S. Department of Energy Environmental Measurements Laboratory Procedure Manual (HASL-300), will be submitted for the project files.

PCB polychlorinated biphenyl.

CVAA cold vapor atomic absorption.

**Table E.5. Analytical methods, parameters, and project quantitation limits for waste characteristics**

| Parameters | Analytical methods<br>Solid waste | Project quantitation limits [a]<br>Leachate |
|---|---|---|
| Volatile organic compounds | SW 846-1311 (zero headspace ext.) | (µg/L) [c] |
| (TCLP analyte list) | SW 846-5030/8260B | |
| Vinyl chloride | | 20 [d] |
| 1,1-Dichloroethene | | 7 |
| Chloroform | | 60 |
| 1,2-Dichloroethane | | 5 |
| 2-Butanone | | 2000 |
| Carbon tetrachloride | | 5 |
| Trichloroethene | | 5 |
| Benzene | | 5 |
| Tetrachloroethene | | 7 |
| Chlorobenzene | | 1000 |
| Semivolatile organic compounds | SW 846-1311 (extraction) | Leachate |
| (TCLP analyte list) | SW 846-3520/8270C | (g/L) [c] |
| 1,4-Dichlorobenzene | | 75 |
| 2-Methylphenol (o-cresol) | | 2000 |
| 3-Methylphenol (m-cresol) | | 2000 |
| 4-Methylphenol (p-cresol) | | 2000 |
| Hexachloroethane | | 30 |
| Nitrobenzene | | 20 |
| Hexachlorobutadiene | | 50 [d] |
| 2,4,6-Trichlorophenol | | 20 |
| 2,4,5-Trichlorophenol | | 4000 |
| 2,4-Dinitrotoluene | | 13 [d] |
| Hexachlorobenzene | | 13 [d] |
| Pentachlorophenol | | 1000 |
| Pyridine | | 500 [d] |
| Metals | SW 846-1311 (extraction) | Leachate |
| (TCLP analyte list) | 3010A/6010B, 6020, or 7000 series [b] | (µg/L) |
| Aluminum | 200.7 R3.3 | |
| Antimony | | 10 |
| Arsenic | | 50 |
| Barium | | 100 |
| Beryllium | | 10 |
| Cadmium | | 10 |
| Calcium | 200.7 R3.3 | |
| Chromium | | 50 |
| Copper | | 50 |
| Iron | | 100 |
| Lead | | 30 |
| Magnesium | 200.7 R3.3 | |

Table E.5. Analytical methods, parameters, and project quantitation limits for waste characteristics (continued)

| Parameters | Analytical methods | Project quantitation limits [a] |
|---|---|---|
| | Solid waste | Leachate |
| Manganese | 200.7 R3.3 | |
| Mercury (CVAA) | SW 846-7470 [b] | 20 |
| Nickel | | 50 |
| Potassium | 200.7 R3.3 | |
| Selenium | | 10 |
| Silver | | 50 |
| Sodium | 200.7 R3.3 | |
| Thallium | | 10 |
| Vanadium | | 50 |
| PCB total | SW 846-8082A [b] | 0.5 mg/kg |
| PCBs total | | 100 |
| Arochlor-1016 | | 100 |
| Arochlor-1221 | | 100 |
| Arochlor-1232 | | 100 |
| Arochlor-1242 | | 100 |
| Arochlor-1248 | | 100 |
| Arochlor-1254 | | 100 |
| Arochlor-1260 | | 100 |
| Arochlor-1268 | | 100 |
| | | |
| Miscellaneous | | |
| pH | SW 846-9045 [b] | NA |
| Total organic carbon | SW 846-9060 [b] | 25 mg/kg |
| Oil and grease | EPA 413.1 | 10 mg/L |
| Chloride | EPA 300.0 | |
| Sulfate | EPA 300.0 | |
| | | |
| Physical testing | | |
| Specific conductance | EPA 120.1 | |
| Total dissolved solids | EPA 160.2 | |
| | | |
| Radiological | | |
| Uranium | IN7105 | 1.2 pCi/g |
| Neptunium-237 | RL-7103 | 3 pCi/g |
| Technetium-99 | RL-7116 | 5 pCi/g |
| Plutonium-238 | RL-7120 | 1 pCi/g |
| Plutonium-239/240 | RL-7120 | 1 pCi/g |
| Thorium-228 | RL-7120 | 3 pCi/g |
| Thorium-230 | RL-7120 | 3 pCi/g |
| Thorium-232 | RL-7120 | 3 pCi/g |
| % Uranium-235 | RL-7124 | NA |
| Americium-241 | RL-7124 | 20 pCi/g |
| Cesium-134 | RL-7124 | 20 pCi/g |

**Table E.5. Analytical methods, parameters, and project quantitation limits for waste characteristics (continued)**

| Parameters | Analytical methods<br>Solid waste | Project quantitation limits [a]<br>Leachate |
|---|---|---|
| Cesium-137 | RL-7124 | 20 pCi/g |
| Cobalt-60 | RL-7124 | 20 pCi/g |
| Neptunium-237 | RL-7124 | 20 pCi/g |
| Uranium | RL-7124 | 60 pCi/g |
| Uranium-234 | RL-7124 | 60 pCi/g |
| Uranium-235 | RL-7124 | 60 pCi/g |
| Uranium-235-Mass | RL-7124 | 60 pCi/g |
| Uranium-238 | RL-7124 | 60 pCi/g |

[a] These are expected quantitation limits based on reagent-grade water or a purified solid matrix. Actual quantitation limits may be higher depending on the nature of the sample matrix. The limit reported on final laboratory reports will take into account the actual sample volume or weight, percent solids (where applicable), and the dilution factor, if any. The quantitation limits for additional analytes to this list may vary, depending on the results of laboratory studies. Requirements specified in the analytical statement of work will supercede the analytes, analytical methods, and project quantitation goals.

[b] *Test Methods for Evaluating Solid Waste*, U.S. EPA, SW-846 Third Edition.

[c] Quantitation goals are set at 0.01× the regulatory action level.

[d] Quantitation goals are set at 0.1× the regulatory action level.

[e] American Society for Testing and Materials, ASTM Standards, Vol. 04.08, "Soil and Rock," 1995 and Vol. 11.04, "Water and Environmental Technology," 1993.

CVAA Cold Vapor Atomic Absorption.
EPA Environmental Protection Agency.
PCB polychlorinated biphenyl.
TCLP Toxicity Characteristic Leaching Procedure.

The QC criteria included here should be considered minimum requirements. The BJC Sample Manager will ensure that specific QC requirements are communicated to the analytical laboratory. Any necessary changes to these requirements will be documented and approved through the project FCO system. Requirements for analytical documentation by the laboratories for this project are expected to be similar to the documentation requirements outlined under the EPA Contract Laboratory Program protocol. These requirements are identified throughout this QAPP. Analyses will be scheduled and managed by the BJC Sample Manager.

The goals for all analytical data are to obtain reproducible, precise, and accurate measurements consistent with the intended use of the data and the limitations of the sampling and analytical procedures. The purpose of QC is (1) to screen out data of unacceptable precision, accuracy, or sensitivity and (2) to document the viability of the data used to accomplish the objectives of this project. All analyses for this project will require analytical QC to be implemented, documented, and reported as part of the data deliverable. Analytical data will be reported in accordance with a standard data deliverable as defined in this QAPP and with QC procedures consistent with the EPA Methods and the Data and Documents Management and Quality Assurance Plan (DOE 1998).

## E.4 ASSESSMENTS

### E.4.1 Audits

An assessment of readiness will be performed prior to the start of work activities in accordance with BJC procedure BJC-PQ - 1510 R0, *Readiness Evaluations*.

QA audits are performed to review and evaluate the adequacy of field performance and to ascertain whether the QAPP is being completely and uniformly implemented. A laboratory audit is outside the scope of this QAPP. A schedule for audits to be conducted during field operations/activities will be developed during the premobilization phase of this project. Additional audits may be implemented at the direction of the WESKEM Project Manager, BJC, or DOE. If so, such audits will be conducted in accordance with written procedures and checklists and performed by personnel who do not have direct responsibility for performing the activities being audited.

### E.4.2 Surveillances

Surveillance activities include monitoring and observing documents and work activities to provide an effective real-time means of evaluating the adequacy and effectiveness of methods for achieving quality, for compliance with H&S requirements, and for assessing the quality of final results. The Project QA Manager will conduct surveillances of project activities in accordance with the surveillance schedule. Surveillances will follow the procedures specified in the project's QAPP that will be developed during the premobilization phase of this project.

## E.5 PROCEDURES

The requirements for instructions, procedures, and drawings are applied to activities and services within the scope of this QAPP are in accordance with WSOP 105, *Standard Procedure Instructions;* WSOP 110, *Adopting Site Procedures;* WSOP 111, *Utilizing Procedures*, as applicable, and this section. All procedures will be accepted by the BJC STR and approved by the QA Manager and the Project Manager, or designee. Measures are in place to ensure that activities affecting quality are prescribed by documented procedures, drawings, and instructions, appropriate to the circumstances, and accomplished in accordance with these documents. These documents also include quantitative and qualitative acceptance criteria to ensure that important operations have been satisfactorily accomplished.

The Project Manager is responsible for the system of preparation, review, and approval and for the use of procedures and instructions in accordance with the requirements of this section of the QAPP.

### E.5.1 Sampling Collection Procedures

Chapter 3 describes sampling activities, locations, and populations. Sampling data generated during all phases of this investigation must be of acceptable quality and must be comparable to similar environmental data. To ensure the quality and consistency of data, specific approved sample collection and handling procedures will be followed as identified in this QAPP. The procedures to be followed during this investigation are identified in the SAP & DMP. Sample locations and analyses to be performed for each location are also identified in the SAP & DMP.

### E.5.2 Field Documentation and Records

An integral part of the QAPP for the field activities will be to maintain current, accurate, and complete field documentation and records including logbooks, COC forms, and appropriate field data forms. Field logbooks will be managed and used in accordance with WSOP 151, *Waste Logbooks*, and WSOP 169, *Development, Completion, and Control of Data Forms and Logbooks*. Field logbooks will be bound and of hard-cover construction. All information pertinent to field activities will be recorded. Each page must be signed and dated. Entries in the logbooks or on the data forms will be made in water-resistant black ink and will include the information specified in the applicable WSOP. Corrections must be marked out with a single line, dated, and initialed. All field records will be reviewed by a qualified field team member other than the person completing the record. No blank spaces should appear on completed forms. If information requested is not applicable, the space will be marked "N/A." All field sampling logbooks and field data forms will be handled and controlled in accordance with WSOP 169.

### E.5.3 Sample Containers and Holding Times

The selection criteria for appropriate sample containers, sample preservatives, and holding times will be in accordance with SW-846 requirements and the BJC SMO. Types of sample containers and sample preservation methods used will be documented in the sampling logbook. Field and laboratory records will indicate the sample holding time before analysis. Sample containers and holding times are summarized in the SAP & DMP.

### E.5.4 Sample Packaging and Preservation

Handling, shipping, and storage of samples and data resulting from field activities will adhere to COC procedures and will ensure that sample integrity for analytical purposes is maintained. Preservation, packaging, shipping, handling, and storage of containers of environmental samples will be based on EPA SW-846 methods and WSOP 150, *Sample Chain-of-Custody*; WSOP 152, *Sample Tracking, Laboratory Coordination, and Sample Handling Guidance*; WSOP 154, *Temperature Control for Sample Storage*; and WSOP 121, *Shipping Analytical Samples*. Upon receipt of sample coolers, the laboratory will check and record the temperature of the cooler. Field alpha and beta/gamma radiation screenings of individual samples and of coolers containing samples will be conducted to ensure compliance with DOT requirements and to ensure that Nuclear Regulatory Commission licensee limits of the laboratory(ies) are not exceeded.

### E.5.5 Decontamination of Equipment and Devices

Decontamination of sample containers and sampling devices will follow WSOP 630, *Decontamination of Sampling Containers and Sampling Devices*. Sampling equipment will be decontaminated before use and between sampling locations and intervals. Each decontamination activity will be recorded in the field logbook.

### E.5.6 Sample Identification and Traceability

Each environmental sample collected during this project will be assigned a unique sample identifier, which will be permanently affixed to the sample container and recorded in the field logbook and COC record. The identifiers used for samples will be established and maintained in accordance with WSOP 153, *Special Labeling Requirements for Samples*. Identification systems will ensure traceability of samples to the appropriate source as described in the SAP & DMP.

### E.5.7 List of Procedures

Procedures to be used to support the sampling program include the following, as applicable:

- WSOP 121, *Shipping Analytical Samples;*
- WSOP 150, *Sample Chain-of-Custody;*
- WSOP 151, *Waste Logbooks;*
- WSOP 152, *Sample Tracking, Laboratory Coordination, and Sample Handling Guidance;*
- WSOP 153, *Special Labeling Requirements for Samples;*
- WSOP 154, *Temperature Control for Sample Storage;*
- WSOP 156, *Collection of Field Quality Control Samples;*

- WSOP 159, *Composite Sample Preparation;*
- WSOP 160, *Sampling Containerized Waste;*
- WSOP 161, *Opening Sealed Waste Containers;*
- WSOP 162, *Identification and Safe handling of Pressurized Waste Containers;*
- WSOP 630, *Decontamination of Sampling Containers and Sampling Devices;*
- WSOP 640, *Bulk Sampling of Material Suspected of Containing Asbestos; and*
- WSOP 641, *Airborne Asbestos Sampling.*

### E.5.8 Field Variance System

Procedures cannot fully encompass all conditions encountered during a field investigation. Variances from the operating procedures, SAP & DMP, and/or project-specific H&S documentation will, therefore, likely occur and must be documented on an FCO form or a nonconformance report and be noted in the appropriate logbooks. The approach to controlling and documenting field changes will follow WSOP 151, *Waste Logbooks*. If a variance is anticipated (e.g., because of a change in field instrumentation), the applicable procedure should be modified and the change noted in the field logbooks.

As appropriate, regulatory agencies will be notified of any variances that significantly affect project scope or objectives, and approval from the agencies will be obtained as necessary. Variances from the ES&H Plan must be approved by the ESHR and the Safety Advocate. Copies of the FCO forms will be maintained by the Project Superintendent or designee until the fieldwork is complete and will then be forwarded to the Project Manager or designee for inclusion in the project file. The STR must also review and approve these forms.

### E.5.9 Data Management

The data management process and procedures used for data generated for this project are specified in Chap. C, which will be generated during pre-mobilization activities.

## E.6 SAMPLE CUSTODY

COC procedures require documentation of sample possession from the time of collection to time of disposal. These procedures allow the possession and handling of samples from the time of collection through analysis and final disposal to be traced. COC will be maintained in accordance with WSOP 150, *Sample Chain-of-Custody*. The COC record is generated by the PEMS database, which meets all the EPA requirements for COC records.

An original completed COC record will accompany samples. As the samples are transferred, the present custodian and the new custodian will complete the required sections of the record and will note any discrepancies. This COC record will be initiated at the time of sample collection and remain with the sample from the field, while being transported to , and into, the laboratory.

Sample shipments will be examined immediately upon receipt by the laboratory to determine damage, loss, or inconsistencies. A sample receiving report will be completed by the laboratory indicating sample condition, cooler temperature, documentation consistency, and any problems discovered. If samples are damaged or the shipment has been otherwise compromised, the laboratory will immediately notify the SMO by telephone. Samples will be logged into the laboratory and maintained at appropriate temperatures throughout the analytical process. After appropriate information and required signatures have been added to the COC and sample receiving report, the laboratory will return signed copies to the SMO contact within 2 days. The laboratory will include a copy of the sample receiving report and documentation of the analytical log-in (project sample number, laboratory sample number, analysis scheduled, etc.) in this sample receiving report.

After sample receipt and throughout analysis, the laboratory will maintain custody of all samples, aliquots, resultant extracts, and digestions. Tracking and internal COC will be recorded by the laboratory; however, this documentation will not be required as part of the analytical deliverable. Internal COC information will be verified during on-site audits by the Paducah SMO.

Work-related documents and sampling records will be maintained, filed, and kept current in accordance with the requirements of the Data and Documents Management and Quality Assurance Plan (DOE 1988), Chap. E, and WSOP 112, *Document Control and Records Management*, as applicable.

## E.7 CALIBRATION PROCEDURES AND FREQUENCY

All measuring and test equipment (M&TE) will be calibrated against certified equipment and/or standards having known valid traceability to nationally recognized standards. M&TE will be calibrated, adjusted, and maintained at prescribed intervals or before use. If no nationally recognized standards exist, the basis for calibration will be documented.

All standards used for equipment calibration will be traceable to EPA, the National Institute of Standards and Technology, or a commercially available certified standard. The source of the standard used must be documented in a calibration logbook.

### E.7.1 Field Instrument Calibration Procedures and Frequency

Field instrumentation will be calibrated according to the procedures specified in the manufacturer's operating manual or more frequently should the conditions dictate it for the particular instrument. Table E.6 lists the types of M&TE expected to be used, detection limits, and a schedule for calibration. Instrument logbooks or notebooks will be established and maintained by the cognizant field team members, the Project Superintendent, or ESHR, as appropriate.

All instruments will be maintained within factory calibration, in accordance with the applicable manufacturer's recommendations and specifications described in the manufacturer's operation manuals. Daily calibration will be recorded in the field M&TE logbook in a section dedicated to calibration and vital information about the instruments.

### E.7.2 Laboratory Instrument Calibration Procedures and Frequency

This section is addressed separately by the BJC SMO-selected analytical laboratory through implementation of their Analytical Services Master Specifications and project-specific laboratory SOW.

### E.7.3 Calibration Failures

Scheduled periodic calibration of equipment will not relieve personnel of the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, he/she should remove the device from service, initiate a nonconformance report, tag it so it is not inadvertently used, and notify project management. If equipment is found to be out of calibration, the appropriate project management personnel will evaluate and document (in the instrument logbook) the validity of the previous inspection or test results and the acceptability of similar equipment previously inspected or tested. The Field Manager will ensure that the devices that are out of calibration are (1) tagged or segregated from other equipment and (2) disposed of or not used until they are calibrated. Any equipment that is consistently found to be out of calibration will be repaired or replaced. Any such action should be recorded in the instrument logbook or notebook.

**Table E.6. Field instrument uses, detection limits, and calibration**

| Instrument | Uses | Detection limits | Calibration | Comments |
|---|---|---|---|---|
| Total organic vapor meters | Sample screening for VOCs | PID; 0.2 ppm benzene | 1 point - PID benzene daily | Action level must be stated in Health and Safety Plan |
| | Health and safety screening | FID; 1.0 ppm methane | 1 point - FID methane daily | Instrument cannot differentiate naturally occurring compounds from contaminants |
| | | | Verification check every 20 samples | PID cannot detect compounds with ionization potentials > 11 eV |
| Radiological monitoring | Monitoring of beta-gamma surface, gross gamma, alpha surface contamination levels | Daily calibration check varies by equipment | Daily source check per manufacturer | Validation labels include minimum and maximum acceptable levels |

FID flame ionization detector.
PID photoionization detector.
VOC volatile organic compound.

### E.7.4 Calibration Records

Calibration data will be recorded in the instrument logbook or notebook. The information will include the date, operator, signature, and standard that was used. Records will be prepared and maintained for each piece of calibrated equipment to indicate that established calibration procedures have been followed. Records will be kept that demonstrate traceability of all calibration standards used in full or daily calibrations to the certified source. The Project Superintendent or designee will ensure that records of calibration data are kept current. Records for field equipment used will be maintained by the Project Superintendent or designee and the ESHR and kept in the project files.

An appropriate, unique instrument identification number or name will be assigned to each individual piece of analytical equipment, and the due date of the next calibration will be attached to the equipment or documented in its equipment log. If this identification is not possible, records traceable to the equipment will be readily available for reference.

## E.8 ANALYTICAL PROCEDURES

### E.8.1 Field Analytical Methods

Screening of organic vapors and alpha and beta/gamma radiation will be conducted at the sample location or field sample handling area for H&S purposes as well as screening-level investigation data.

Organic vapor screening will follow the requirements set forth in the project H&S documentation. Screening for alpha and beta/gamma radiation will follow BJC RADCON procedures.

### E.8.2 Laboratory Analytical Methods

This section will be addressed separately by BJC and its analytical laboratory through implementation of their Analytical Services Master Specifications and project-specific laboratory SOW.

## E.9 DATA REDUCTION, VERIFICATION/VALIDATION, AND REPORTING

This information is discussed in more detail in the SAP & DMP (Chap. C).

### E.9.1 Field Data Reduction and Evaluation

If required, data collected during field activities will be evaluated by checking the procedures used. The Sampling and Analysis and Data Manager will be responsible for checking field QC sample results to ensure that field measurement and sampling protocols have been observed. These reviews will check date and time sampled, preservation, SOPs, calibration method and frequency, and COC documentation. Reviews will be conducted in accordance with PMSA-1001, *Quality Ensured Data*, or if approved by BJC, WSOP 171, *Quality Ensured Data*, which is essentially identical to PMSA-1001.

Reviewers are responsible for ensuring that data reduction calculations are documented and checked by qualified personnel. Written reports including reduced and summarized data may include the raw data in appendices. Specific calculations used for data reduction may also be included.

### E.9.2 Analytical Laboratory Data Reduction and Evaluation

Details are provided in the SAP & DMP data management section.

### E.9.3 Data Validation Approach

Details are provided in the SAP & DMP data management section.

### E.9.4 Project Data Quality Assessment

Details are provided in the SAP & DMP data management section.

## E.10 QC CHECKS

### E.10.1 Field QC Checks

QC samples will be collected in accordance with WSOP 156, *Collection of Field Quality Control Samples*, and at the frequencies identified in this QAPP to assess the quality of sampling. Field QC samples include blanks, rinsates, and duplicates.

#### E.10.1.1 Trip Blanks

A trip blank is a sample bottle filled with analyte-free reagent water that accompanies VOC samples during shipment to the laboratory. Trip blanks are used to detect contamination by VOCs during the time the samples are being handled and shipped. The number of trip blanks will equal the number of coolers containing VOC samples delivered to the laboratory. Trip blanks will be analyzed for VOCs only.

#### E.10.1.2 Field Blanks

Field blanks are samples of the field source waters used in the decontamination and cleaning of sampling equipment. Primary decontamination water and final decontamination rinse waters are both considered field source waters. Field blanks will consist of one ASTM final rinsate water per ASTM lot number used, plus a minimum of two samples from the potable water source employed during decontamination processes.

#### E.10.1.3 Equipment Rinsates

An equipment rinsate is a sample of the last rinse using ASTM water that has been pumped into or poured through the sampling equipment. The purpose of rinsates is to check for residual contamination as a measure of the effectiveness of decontamination. The equipment associated with the unique sample identifier should be identified in the field logbook. Equipment rinsates are analyzed for the same analytes as the samples collected.

#### E.10.1.4 Split Samples

Split samples are not presently planned to be collected by the sampling team for removal and characterization activities. However, it is possible that regulatory agencies may request the sampling team to collect split samples.

#### E.10.1.5 Field Duplicates

Field duplicates will be collected as specified in Chap. C.

### E.10.2 Laboratory QC Procedures

This section will be addressed separately by BJC and its analytical laboratory; through implementation of their Analytical Services Master Specifications and project-specific laboratory SOW.

## E.11 PREVENTIVE MAINTENANCE PROCEDURES/SCHEDULES

Any equipment (an inclusive term for tools, gauges, instruments, and other items that have specific preventive maintenance) will be serviced and documented as specified by the manufacturer's recommended schedule. All equipment service will be performed by qualified and trained individuals. The operators are responsible for seeing that the equipment is scheduled for service, serviced, and properly maintained. Properly maintained equipment helps reduce unnecessary downtime. A complete list of equipment will be developed by the operator, and the parts or replacement equipment will be immediately available (either from the supplier/manufacturer or on-site). Having replacement equipment or critical spare parts available minimizes downtime.

The implementation of a preventive maintenance program depends on the specific instruments and equipment used in the field. The Project Superintendent, or designee, will ensure a preventive maintenance program that includes

- a listing of the instruments and equipment in the program, including backup alternatives;

- the frequency of maintenance considering manufacturer's recommendations and/or previous experience with the equipment;
- external service contracts;
- checklists of items to be serviced and directions for maintenance or manufacturer's instrument manuals; and
- records of periodic and routine maintenance performed.

## E.12 CORRECTIVE ACTION

Corrective actions to address audit/surveillance findings and nonconformances will be documented and managed in accordance with WSOP 540, *Issues Management and Corrective Action.* Nonconformances will be documented and managed in accordance with WSOP 545, *Control of Nonconforming Items and Services*. The Project Manager and the QA Manager will be notified when a nonconformance is documented and furnished a copy of the report as soon as possible. Copies of nonconformance reports and their dispositions will be forwarded to the Site STR. Nonconformances will be evaluated for Price-Anderson Amendments Act applicability in accordance with WSOP 545, *Price-Anderson Amendments Act Noncompliance Determination and Reporting,* which is essentially identical to BJC-PQ-1610. In addition, nonconformances will be shared with others in accordance with WSOP 544, *Lessons Learned Program*.

## E.13 QA REPORTS TO MANAGEMENT

All QA records concerning the project (e.g., internal and external correspondence, sampling and analysis plan, QAPP, field logbooks and forms, COC forms, audit or surveillance reports, nonconformance reports, corrective action reports) will be forwarded to the Paducah Project Manager for placement in the Records Center in accordance with Data and Documents Management and QA Plan (DOE 1998); this Project's QAPP; and WSOP 112, *Document Control and Records Management*, as applicable.

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# F.0 REFERENCES

American Conference of Governmental Industrial Hygienists 1999. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

BJC (Bechtel Jacobs Company LLC) 1999. *Paducah Project Environmental Measurements System Configuration Management Plan and User Guide*, BJC/PAD-34, Rev. 1, March.

BJC (Bechtel Jacobs Company LLC) 2001. *Waste Acceptance Criteria for the Department of Energy Treatment, Storage, and Disposal Units at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, BJC/PAD-11, Rev. 3, April.

CDM (CDM Federal Services, Inc.) 2001. *Spill Prevention Control and Countermeasure Plan, Paducah Gaseous Diffusion Plant, Paducah, KY*, BJC/PAD-246, April 2001.

DOE (U.S. Department of Energy) 1998. *Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities*, DOE/OR/07-1595&D2

DOE (U.S. Department of Energy) 2001. *Engineering Evaluation/Cost Analysis for Scrap Metal Disposition at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1880&D2/R1, March.

NIOSH (National Institute for Occupational Safety and Health) 1994. NIOSH Pocket Guide to Chemical Hazards.

NIOSH (National Institute for Occupational Safety and Health) 1997. NIOSH Pocket Guide to Chemical Hazards.

Union Carbide 1980. *Disposal of the PGDP Scrap Metal*, KY/F-127, April 1980.

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## APPENDIX 1:
## ARARs FROM ENGINEERING EVALUATION/COST ANALYSIS FOR SCRAP METAL DISPOSITION

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## Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Location Specific | | | |
| Endangered Species Act of 1973 | Determine the presence of endangered or protected species under both Federal and State authorization, within the areas to be disturbed. Avoid, to the extent practicable, the disturbance of the areas within which the identified species reside. Take action to the extent practicable, to prevent unauthorized taking, possession, sale and transport of stated species. | Federal actions that involve potential impacts to endangered or protected species as defined by Federal or State regulations. – applicable | 50 *CFR* 17 |
| Migratory Bird Treaty Act of 1918 | Take action, to the extent practicable, to prevent any unauthorized hunting, killing, capturing, attempted capture, delivery, sale, shipment, transport or receipt of any migratory birds included in this regulation or any part, nest or egg of any such bird. | Federal actions that involve potential impacts to migratory birds and mammals. – applicable | 50 *CFR* 20 and 21 |
| Presence of wetlands as defined in 10 *CFR* 1022.4(v) | Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy and modification of wetlands. Measures to mitigate adverse effects of action, include, but are not limited to: minimum grading requirements, runoff controls, design and construction constraints, and protection of ecology-sensitive areas as provided in 10 *CFR* 1022.12(a)(3). | Federal actions that involve potential impacts to, or take place within, wetlands – applicable | 10 *CFR* 1022.3(a) |
| | Take action, to extent practicable, to minimize destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. | | 10 *CFR* 1022.3(b) |
| | Potential effects of any new construction in wetlands shall be evaluated. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands. | | 10 *CFR* 1022.3(c) and (d) |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| | The location of any waste site or facility in a wetland is prohibited. | Siting of a waste site or facility within the Commonwealth of Kentucky – applicable | 401 KAR 30:031 |
| Presence of floodplain as defined in 10 *CFR* 1022.4(i) | Avoid, to the extent possible, the long- and short-term adverse effects associated with occupancy and modification of floodplains. Measures to mitigate adverse effects of actions in a floodplain include, but are not limited to: minimum grading requirements, runoff controls, design and construction constraints, and protection of ecology-sensitive areas as provided in 10 *CFR* 1022.12(a)(3). | Federal actions that involve potential impacts to, or take place within, floodplains – applicable | 10 *CFR* 1022.(3)(a) |
| | Potential effects of any action taken in a floodplain shall be evaluated. Identify, evaluate, and implement alternative actions that may avoid or mitigate adverse impacts on floodplains. | | 10 *CFR* 1022.3(c) and (d) |
| | Design or modify selected alternatives to minimize harm to or within floodplains and restore and preserve floodplain values. | | 10 *CFR* 1022.5(b) |
| | Construction activities in and along streams in the Commonwealth are prohibited unless the substantive requirements of 401 KAR 4:060 are met. | Construction activities impacting streams or floodplains – applicable | 401 KAR 4:060 |
| Chemical Specific | | | |
| Radionuclide emissions | Emissions from DOE facilities must not cause members of the public to receive, in any year, an effective dose equivalent in excess of 10 mrem/year. | Radionuclide emissions from a DOE facility – applicable | 40 *CFR* 61.92 |
| Releases of radionuclides into the environment | Exposure to individual members of the public from radiation shall not exceed a total EDE of 0.1 rem/year (100 mrem/year), exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs. | Radionuclide releases at NRC – licensed facility – relevant and appropriate | 10 *CFR* 20.1301(a) |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Action Specific | | | |
| Management of PCB Items | Must dispose of in accordance with 40 *CFR* 761.60(b) or decontaminate in accordance with 40 *CFR* 761.79. | Removal from use of a PCB Item containing intact, nonleaking PCB Article – applicable | 40 *CFR* 761.50(b)(2) |
| | Must dispose of as bulk product waste in accordance with 40 *CFR* 761.62(a) or (c). | Removal from use of a PCB Item where PCB Article is no longer intact and nonleaking – applicable | 40 *CFR* 761.50(b)(2) |
| Management of PCB/radioactive waste | Any person storing such waste $\geq$50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in Section 761.65(a)(1), (b)(1)(ii), and (c)(6)(I). | Generation of PCB/radioactive waste for a disposal – applicable | 40 *CFR* 761.50(b)(7)(i) |
| | Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties. | | 40 *CFR* 761.50(b)(7)(ii) |
| Generation of PCB waste (e.g., contaminated PPE, equipment) | Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D. | Generation of waste containing PCBs at concentrations $\geq$ 50 ppm – applicable | 40 *CFR* 761.50(a) |
| Management of PCB waste | Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761/ Subpart D. | Generation of waste containing PCBs at concentrations 50 ppm – applicable | 40 *CFR* 5(a) |
| | Any person cleaning up and disposing of PCBs shall do so based on the concentration at which per compliance to regulation. | Generation of PCB remediation waste as defined in 40 *CFR* 761.3 – applicable | 40 *CFR* 761.61 |

## Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| | If after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility, permitted, licensed, or registered by a state as a municipal or nonmunicipal nonhazardous waste landfill, e.g., PCB bulk product waste under 40 *CFR* 761.62(b)(1), then the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone in accordance with applicable requirements. | | |
| Temporary storage of PCB waste (e.g., PPE, rags) in a container(s) | Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a). | Storage of PCBs and PCB Items at concentrations ≥ 50 ppm for disposal – applicable | 40 *CFR* 761.40(a)(1) |
| | Storage area must be properly marked as required by 40 *CFR* 761.40 (a) (10). | | 40 *CFR* 761.65(c)(3) |
| | Any leaking PCB Items and their contents shall be transferred immediately to a properly marked non-leaking container(s). | | 40 *CFR* 761.65(c)(5) |
| | Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180. | | 40 *CFR* 761.65(c)(6) |
| Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area | Does not have to meet storage unit requirements in 40 *CFR* 761.65(b)(1) provided unit:<br>• is permitted by EPA under RCRA §3004, or<br>• qualifies for interim status under RCRA §3005; or<br>• is permitted by an authorized state under RCRA §3006 and,<br>• PCB spills cleaned up in accordance with Subpart G of 40 *CFR* 761. | Storage of PCBs and PCB Items designated for disposal – applicable | 40 *CFR* 761.65(c)(6)<br>40 *CFR* 761.65(b)(2)(I)<br>40 *CFR* 761.65(b)(2)(ii)<br>40 *CFR* 761.65(b)(2)(iii)<br>40 *CFR* 761.65(c)(1)(iv) |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Storage of PCB/radioactive waste in containers | For liquid wastes, containers must be nonleaking. | Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards – applicable | 40 *CFR* 761.65(c)(6)(i)(A) |
| | For non-liquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 *CFR* 761.65(b)(1)(ii); and | | 40 *CFR* 761.65(c)(6)(i)(B) |
| | For both liquid and non-liquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety. | | 40 *CFR* 761.65(c)(6)(i)(C) |
| Decontamination of PCB non-porous surface (e.g., scrap metal) | For unrestricted use, meet standard of: • $\leq$10 μg/100 cm$^2$ as measured by a standard wipe test; (40 *CFR* 761.123) at locations selected in accordance with 40 *CFR* 761.300 et seq. | Non-porous surfaces previously in contact with liquid PCBs, where no free-flowing liquids are present – applicable | 40 *CFR* 761.79(b)(3)(i)(A) |
| | For disposal in a smelter operating in accordance with 40 *CFR* 761.72(b), meet standard of: • <100 μg/100 cm$^2$ as measured by a standard wipe test under 40 *CFR* 761.123) at locations selected in accordance with 40 *CFR* 761.300 et seq. | Non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are present – applicable | 40 *CFR* 761.79(b)(3)(ii)(A) |
| | • Clean to regulatory standards. Verify compliance by visually inspecting all cleaned areas. | Non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, e.g., paint or coating on metal – applicable | 40 *CFR* 761.79(b)(3)(i)(B) 40 *CFR* 761.79(b)(3)(ii)(B) |
| Clean closure of TSCA storage facility | A TSCA/RCRA storage facility closed under RCRA is exempt from the TSCA closure requirements of 40 *CFR* 761.65(e). | Closure of TSCA/RCRA storage facility – applicable | 40 *CFR* 761.65(e)(3) |

## Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Decontamination of PCB contaminated equipment | May decontaminate (in lieu of disposal) by:<br>Swabbing surfaces that have contacted PCBs with a solvent; or<br>A double wash/rinse as defined in 40 *CFR* 761.360-378, or<br>Another applicable decontamination procedure under 40 *CFR* 761.79 | Equipment contaminated by PCBs – applicable | 40 *CFR* 761.79(c)(2) |
| Disposal of PCB liquids or items | PCB liquids must be disposed of in one of the following manners:<br><br>In an incinerator operating in compliance with 40 *CFR* 761.70;<br>In a high-efficiency boiler (this method of disposal is available only for mineral oil dielectric fluid and other liquids containing PCBs > 500 ppm); or<br>In a chemical waste landfill operating in compliance with 40 *CFR* 761.75. | Disposal of PCB liquids containing PCBs ≥ 50 ppm – applicable | 40 *CFR* 761.60 |
| | PCB small capacitors may be disposed of in a municipal waste landfill. | PCB small capacitors – applicable | 40 *CFR* 761.60(b)(2)(iii) |
| Disposal of PCB cleanup wastes (PPE or cleaning materials contaminated with PCBs) | Shall dispose of the waste in a facility permitted, licensed, or registered by a state to manage municipal solid waste or non-municipal nonhazardous waste; a RCRA Subtitle C landfill permitted to accept PCB waste, or a PCB disposal facility approved under the TSCA regulations; or decontaminate in accordance with 40 *CFR* 761.79(b) or (c). | Generation of non-liquid PCBs at any concentration during and from the cleaning of PCB remediation waste – applicable | 40 *CFR* 761.61(a)(5)(v)(A) |
| Performance-based disposal of PCB bulk product waste | May dispose of by one of the following:<br>• in an incinerator approved under 40 *CFR* 761.70;<br>• in a chemical waste landfill approved under 40 *CFR* 761.75;<br>• in a hazardous waste landfill permitted by EPA under §3004 of RCRA or by authorized state under §3006 of RCRA; | Disposal of PCB bulk product waste as defined in 40 *CFR* 761.3 – applicable | 40 *CFR* 761.62(a)<br>40 *CFR* 761.62(a)(1)<br>40 *CFR* 761.62(a)(2)<br>40 *CFR* 761.62(a)(3) |

## Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| | • under alternate disposal approved under 40 *CFR* 761.60(e); | | 40 *CFR* 761.62(a)(4) |
| | • in accordance with decontamination provisions of 40 *CFR* 761.79; or | | 40 *CFR* 761.62(a)(5) |
| | • in accordance with thermal decontamination provisions of 40 *CFR* 761.79(c)(6) for metal surfaces in contact with PCBs. | | 40 *CFR* 761.62(a)(6) |
| Risk-based disposal of PCB bulk product waste | May dispose of in a manner other than prescribed in 40 *CFR* 761.62(a) or (b) if receive approval in writing from EPA and the method (based on technical, environmental or waste specific characteristics) will not pose an unreasonable risk of injury to human health or the environment. | Disposal of PCB bulk product waste – applicable | 40 *CFR* 761.62(c) |
| Transportation of PCBs offsite | Prepare, use, and maintain manifest and manifest records in accordance with 40 *CFR* 761.207-209. | Transportation of PCB-contaminated waste ≥ 50 ppm for commercial off-site storage or disposal – applicable | 40 *CFR* 761.207-209 |
| | The waste must meet packaging, labeling, marking, placarding, manifest and pretransport requirements. | | 49 *CFR* 172, 173, 175, 178 and 179 |
| | Carrier must be licensed and obtain the appropriate permits for the transportation of each radioactive or hazardous waste or materials. | | 902 KAR 100.070<br>10 *CFR* 71.5<br>DOE Order 460.1 (TBC) |
| Characterization of solid waste (e.g., contaminated PPE, equipment, wastewater) | Must determine if that waste is hazardous waste or if waste is excluded under 40 *CFR* 261.4; and | Generation of solid waste as defined in 40 *CFR* 261.2 – applicable | 40 *CFR* 262.11(a) |
| | Must determine if waste is listed under 40 *CFR* Part 261; or | | 40 *CFR* 262.11(b) |

## Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| | Must characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used. If waste is determined to be hazardous, it must be managed in accordance with 40 *CFR* 261-268. | | 40 *CFR* 262.11(c) and (d) |
| Release of scrap metal | Before being released, property shall be surveyed to determine whether both removable and total surface contamination (including contamination present on or under any coating) is greater than the levels given in Fig. IV-1 of the Order and that the contamination has been subjected to the ALARA process. | Residual radioactive material on equipment structures for unrestricted use – (TBC) | DOE Order 5400.5 (IV)(4)(d) |
| | Potentially surface-contaminated metals may be released to the public without restrictions on use if both removable and total surface contamination meet levels specified in Fig. IV of DOE Order 5400.5. | Radionuclide-contaminated scrap materials and equipment intended for recycle or reuse – (TBC) | DOE Order 5400.5(II)(5)(c) |
| | | Clearance of equipment and materials from nuclear facilities. – (TBC) | NUREG-1640, *Radiological Assessments of Clearance of Equipment and Materials From Nuclear Facilities* |
| | | Radionuclide-contaminated scrap materials and equipment intended for recycle or reuse – (TBC) | *U.S. Environmental Protection Agency, Office of Radiation and Indoor Air "Evaluation for Recycling of Scrap Metals From Nuclear Facilities*, March 1997. |
| | | Clearance of equipment and materials from nuclear facilities. – (TBC) | IAEA-TECDOC-855, *International Atomic Energy Agency, Clearance Levels for Radionuclides in Solid Materials*, , January 1996 |



104

Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Characterization of hazardous waste (e.g., contaminated PPE, equipment, wastewater, soil) | Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) which at a minimum contains all the information which must be known to treat, store, or dispose of the waste in accordance with 40 *CFR* 264 and 268. | Generation of RCRA hazardous waste for storage, treatment or disposal – applicable | 40 *CFR* 262.13(a)(1) |
| | Must determine if the waste is restricted from land disposal under 40 *CFR* 268 et seq. by testing in accordance with prescribed methods or use of generator knowledge of waste. | | 40 *CFR* 268.7 |
| Generation of hazardous waste | Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) which at a minimum contains all the information which must be known to treat, store, or dispose of the waste in accordance with 40 *CFR* 264 and 268. | Generation of RCRA hazardous waste for storage, treatment, or disposal – applicable | 40 *CFR* 264.13(a)(1)<br>KAR 32:030 |
| Accumulation of hazardous waste onsite | Hazardous waste may be stored onsite provided that it is stored in containers or tanks that are managed in accordance with the minimum standards specified in 40 *CFR* Part 265, such as labeling and marking (including "hazardous waste" label). | Accumulation of RCRA hazardous waste onsite – applicable | 40 *CFR* 262.34(a)<br>401 KAR 32:030 |
| Storage of hazardous waste in containers | Ensure that containers of hazardous waste are<br>Maintained in good condition;<br>Compatible with hazardous waste to be stored;<br>Closed during storage (except to add or remove waste);<br>Opened, handled, or stored in a manner that will not cause containers to rupture or leak. | Storage of RCRA hazardous waste (listed or characteristic) – applicable | 40 *CFR* 264.171<br>40 *CFR* 264.172<br>40 *CFR* 264.173(a) and (b)<br>401 KAR 34:180(2)<br>401 KAR 34:180(3)<br>401 KAR 34:180(4) |
| | Inspect container storage areas weekly for deterioration. | | 40 *CFR* 264.174<br>401 KAR 34:180(5) |

Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Management of RCRA hazardous waste in container storage area | Place containers on a sloped, crack-free base and protect from contact with accumulated liquid; provide containment system with a capacity of 10% of the volume of containers; remove spilled or leaked waste in a timely manner to prevent overflow to the containment system; prevent run-on into the containment system. | | 40 *CFR* 264.175(b)<br>401 KAR 34:180(6(2)) |
| | Storage area must be sloped to allow drainage of liquid resulting from precipitation; containers should be elevated or otherwise protected from accumulated liquid. | Containers of hazardous waste that do not contain free liquids – applicable | 40 *CFR* 264.175(c)<br>401 KAR 34:180(6(3)) |
| | Containers of ignitable or reactive waste must be stored at least 15.24 m (50 ft) from the facility's property line. | Storage of ignitable or reactive wastes hazardous waste – applicable | 40 *CFR* 264.176<br>401 KAR 34:180(7) |
| | Separate incompatible materials by a dike or other barrier. | Storage of incompatible hazardous waste – applicable | 40 *CFR* 264.177<br>401 KAR 34:180(8) |
| Solid waste disposal | Debris that is no longer contaminated with hazardous waste is no longer subject to Subtitle C regulation. *Note:* May be land disposed in a Subtitle D facility without further treatment. | Hazardous waste debris – applicable | 40 *CFR* 261.3(f)(2) |
| Disposal of nonhazardous solid waste | May be disposed in a permitted landfill if it meets the permit requirements and their waste acceptance criteria; a "special waste approval" may be necessary. | Nonhazardous solid waste – applicable | 40 *CFR* 258<br>401 KAR 47 |
| Land disposal of restricted RCRA waste | | Placement of RCRA-restricted hazardous waste – applicable | 40 *CFR* 268.40(a)<br>40 *CFR* 268.40<br>401 KAR 37:010<br>401 KAR 37:030 |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Treatment of debris contaminated with RCRA hazardous waste | Must be treated before land disposal using extraction, destruction, or immobilization technologies or treated to meet the waste-specific treatment standard for the wastes contaminating the debris. | Contaminated with RCRA listed or characteristic waste – applicable | 40 *CFR* 268.45 (a)(d) |
| | Residues from the treatment of hazardous debris must be separated from the debris. Such residues are subject to the waste-specific treatment standards for the waste contaminating the debris. | | 40 *CFR* 268.45 (d) |
| Disposal of treated debris | Debris treated by one of the specified extraction or destruction technologies meets the requirements for a clean debris surface, no longer exhibits a characteristic, meets the LDR treatment standards, and is no longer subject to the LDR. Such debris may be disposed of at a sanitary landfill, recycled, or reused. | Potentially clean debris that has been treated – applicable | 40 *CFR* 268.45(c) |
| | Debris treated by immobilization must be disposed of in a Subtitle C facility. | | |
| Disposal of nonhazardous solid waste | May be disposed in a permitted landfill if it meets the permit requirements and their waste acceptance criteria; a "special waste approval" may be necessary. | Nonhazardous solid waste – applicable | 40 *CFR* 258<br>401 KAR 47 |
| Transportation of hazardous waste | Waste must be packaged, labeled, and transported in accordance with DOT hazardous materials regulations under 49 *CFR* Parts 170-179. Waste must be manifested as specified. | Off-site transportation of RCRA hazardous waste – applicable | 40 *CFR* 262.10(h)<br>401 KAR 32 |
| Off-site shipment of non-radioactive waste | Hazardous or toxic waste originating from the PGDP that is determined to be non-radioactive by virtue of process knowledge and surface smear surveys may be shipped offsite. | Off-site shipments of a non-radioactive hazardous or toxic waste other than bulk materials. | DOE, 1995<br>(TBC) |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Characterization of low-level waste | Low-level waste must be characterized with sufficient accuracy to permit proper segregation, treatment, storage, and disposal. | Generation of radioactive waste – (TBC) | DOE Order 435.1 |
| | Waste characterization data must be recorded on a waste manifest and must include the following:<br>Physical and chemical characteristics of the waste;<br>Volume of the waste;<br>Weight of the waste;<br>Major radionuclides and their concentrations; and<br>Packaging data, package weight, and external volume. | Generation of radioactive waste – (TBC) | DOE Order 435.1 |
| Radioactive waste minimization | The generation, treatment, storage, transportation, and/or disposal of radioactive wastes will be accomplished in a manner that minimizes the generation of such wastes. | Generation and management of radioactive waste – (TBC) | DOE Order 435.1 |
| LLW storage | Ensure that radioactive releases to surface wastes, groundwater, soil, plants, and animals, do not exceed an EDE of 25 mrem/year to any member of the public. Reasonable efforts shall be made to maintain releases of radioactivity in effluents to the general environment ALARA. | Management of LLW at a DOE facility – (TBC) | DOE Order 435.1 |
| LLW disposal | Must meet waste acceptance criteria for the receiving facility. | Disposal of LLW – (TBC) | DOE Order 435.1 |
| | Site-specific ALARA analysis of bulk materials with volume radiological contamination required to ensure that waste acceptance criteria for the receiving disposal facility are met. | (TBC) | DOE Order 5400.5 |
| | LLW must be disposed of on the site where it is generated, if possible. If not possible, disposal must occur at another DOE facility. | (TBC) | DOE Order 435.1 |

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Off-site transportation of LLW | Off-site disposal of LLW to a commercial facility requires an exemption from the on-site disposal requirements of DOE Order 435.1; requests for exemption must be approved by DOE-ORO. | (TBC) | DOE Order 435.1 |
| | Radioactively contaminated waste must not be shipped to a commercial treatment or disposal facility that is not licensed by the NRC or an agreement state. | Any off-site shipment of a potentially radioactive-contaminated waste that is also a hazardous or toxic waste – (TBC) | DOE, 1997<br>DOE Order 5400.5 |
| Transportation of LLW or mixed waste to a licensed off-site disposal facility | The waste must meet packaging, labeling, marking, placarding, manifest and pretransport requirements. | Transportation of radioactive waste offsite – applicable | 49 *CFR* 172, 173, 175, 178 and 179<br>902 KAR 100.070 |
| | Carrier must be licensed and obtain the appropriate permits for the transportation of each radioactive or hazardous waste or materials. | Transportation of radioactive waste offsite –relevant and appropriate | 10 *CFR* 71.5 |
| | Packaging requirements based on the maximum activity of radioactive material in a package. | | 49 *CFR* 173.431; 49 *CFR* 173.433; 49 *CFR* 173.435; 49 *CFR* 173.411<br>DOE Order 460.1(TBC) |
| Asbestos air emissions from demolition operations | Must not discharge visible emissions to the outside air. | Collection, processing (including incineration), packaging, or transporting of asbestos-containing waste materials – applicable | 40 *CFR* 61.150(a)(b)<br>40 *CFR* 61.145 |
| | Rather than meet the no visible emission requirement, must adequately wet asbestos-containing waste material, process asbestos-containing waste material into nonfriable forms, or employ an alternative emission control and waste treatment method that has received EPA approval. | | |
| Disposal of asbestos-containing waste material | All asbestos-containing waste material shall be deposited as soon as practicable at an approved waste disposal site; does not apply to Category 1 nonfriable asbestos-containing material that is not RCRA. | Waste material containing asbestos – applicable | 40 *CFR* 61.150(b) |

109

**Appendix 1. ARARs from the Engineering Evaluation/Cost Analysis for Scrap Metal Disposition (DOE/OR/07-1880&D2/R1) (continued)**

| Location/Chemical/Action | Requirement | Prerequisite | Citation |
|---|---|---|---|
| Transportation of asbestos to a licensed off-site disposal facility | The waste must meet packaging, labeling, marking, placarding, manifest and pretransport requirements. | Transportation of asbestos off-site – applicable | 49 *CFR* 172, 173, 175, 178 and 179<br>902 KAR 100.070<br>10 *CFR* 71.5<br>DOE Order 460.1 (TBC) |
| Fugitive air emissions | Reasonable precaution must be taken to prevent particulate matter from becoming airborne and ensure that no visible dust is emitted beyond the property boundary line. Such precautions may include the following:<br>Use of water or chemicals to control dust from construction activities;<br>Placement of asphalt, oil, water, or suitable chemicals on roads and material stockpiles to control dust;<br>Ensure that all open-bodied trucks are covered if any materials could become airborne;<br>Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials, or the use of water sprays or other measures to suppress the dust emissions during handling;<br>Employ adequate containment methods during sandblasting or other similar operations; and<br>Prompt removal of earth or other material from a paved street when earth or other material has been deposited by trucks, earth-moving equipment, or erosion by water. | Handling, processing, construction, road-grading, land-clearing activities, and any other activity that could produce fugitive dust emissions – applicable | 401 KAR 63:010(3)<br>401 KAR 63:010(4(1)) |
| Storm-water discharge | Best management practices (BMPs) and sediment and erosion controls must be used to minimize storm-water discharges. | Applicability related to < 5 acres of construction site – relevant and appropriate | 40 *CFR* Part 122<br>401 KAR 5:080 (1(2)(d)) |

## APPENDIX 2:
## ESTIMATED QUANTITY AND TYPE OF SCRAP

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## Appendix 2. Estimated Quantity and Type of Scrap as Presented in Sect. A.5.1 of DOE/OR/07-1880&D2

| Location | Scrap Description | Mat'l | Pkg | No. Units | Unit Weight (Tons) | Amount (Tons) | Comments |
|---|---|---|---|---|---|---|---|
| | | | | *C-746-C, Contaminated Excess Metal Yards* | | | |
| C-746-C | Piles, drums, pipe, and mix | Al | N | | | 1.5 | pile 1 just south of drums |
| C-746-C | Piles, drums, pipe and mix | Al | N | | | 46 | large pile¾Al portion 1% |
| C-746-C | Piles, drums, pipe, and mix | Cu | N | | | 2 | pile 1 south of drums |
| C-746-C | Piles, drums, pipe, and mix | Fe | Y | 1212 | 0.05 | 60.6 | 55-gal drums |
| C-746-C | Piles, drums, pipe, and mix | Fe | Y | 1212 | 0.05 | 60.6 | 55-gal drums |
| C-746-C | Piles, drums, pipe, and mix | Fe | N | | | 16.5 | pile 1 south of drums |
| C-746-C | Piles, drums, pipe, and mix | Fe | N | | | 27.25 | pile 2 south of pile 1 |
| C-746-C | Piles, drums, pipe, and mix | Fe | N | | | 4,521 | large pile¾20% nickel-plated steel |
| C-746-C | Piles, drums, pipe, and mix | SS | N | | | 2 | stainless steel pipe |
| *C-746-C* | *Scrap wood estimate* | *Wood* | *N* | | | *122* | *Split w/C746-C, C-746-C1, C-746-E, C-746-E1, C-747-B* |
| TOTAL | **C-746-C Scrap Yard** | | | | | **4,859.45** | |
| | | | | *C-746-C1 Contaminated Excess Metal Yards* | | | |
| C-746-C1 | Piles, fins, compressor shells, ingots | Al | Y | 1620 | 0.65 | 0 | Al ingots *[1,053 tons to C-746-D]* |
| C-746-C1 | Air handlers, piles, equipment, ingots | Al | N | 150 | 0.05 | 7.5 | bomb casings |
| C-746-C1 | Piles, fins, compressor shells, ingots | Al | N | | | 11 | cast ingots (different) |
| C-746-C1 | Piles, fins, compressor shells, ingots | Al | N | | | 187 | compressor shells |
| C-746-C1 | Piles, fins, compressor shells, ingots | Al | N | | | 204 | Al fins |
| C-746-C1 | Piles, fins, compressor shells, ingots | Al | N | | | 260 | Al lids [260 tons to C-746-D] |
| C-746-C1 | Air handlers, piles, equipment , ingots | Cu | N | 8 | 1.2 | 9.6 | Fairbank¾Morse Pump Motors |
| C-746-C1 | Air handlers, piles equipment, ingots | Cu | N | 24 | 0.5 | 12 | Cu tubing from air handlers |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | | | 0.5 | tub¾50% stainless steel |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | 1 | 1.5 | 1.5 | marvel saw |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | | | 2 | iron mix |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | | | 8.5 | iron pipe |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | 8 | 4.8 | 38.4 | Fairbanks¾Morse Pump Motors |
| C-746-C1 | Air handlers, piles, equipment, ingots | Fe | N | 24 | 2 | 48 | iron sheet¾air handlers |
| C-746-C1 | Piles, fins, compressor shells, ingots | Fe | N | | | 1.5 | grating and equipment |
| C-746-C1 | Piles, fins, compressor shells, ingots | Fe | N | | | 2 | iron tanks |
| C-746-C1 | Piles, fins, compressor shells, ingots | Fe | N | | | 651 | nickel-plated/pipe |
| C-746-C1 | Piles, fins, compressor shells, ingots | Fe | N | | | 879.9 | pile¾mixed |
| C-746-C1 | Air handlers, piles, equipment, ingots | SS | N | | | 0.5 | plating acid tank |
| C-746-C1 | Air handlers, piles, equipment, ingots | SS | N | | | 0.5 | tub 50% iron |
| C-746-C1 | Air handlers, piles, equipment, ingots | SS | N | | | 14 | stainless steel tanks and equipment |

Appendix 2. Estimated Quantity and Type of Scrap as Presented in Sect. A.5.1 of DOE/OR/07-1880&D2 (continued)

| Location | Scrap Description | Mat'l | Pkg | No. Units | Unit Weight (Tons) | Amount (Tons) | Comments |
|---|---|---|---|---|---|---|---|
| C-746-C1 | Piles, fins, compressor shells, ingots | SS | N | | | 1.5 | stainless steel pipe |
| *C-746-C1* | *Scrap wood estimate* | *Wood* | *N* | | | *122* | *Split w/C746-C, C-746-C1, C-746-E, C-746-E1, C-747-B* |
| TOTAL | **C-746-C1 Scrap Yard** | | | | | 2,462.9 | |
| | | | *C-746-E, Contaminated Excess Metal Yards* | | | | |
| C-746-E | Pipe, mix and rings | Al | Y | 192 | 0.02 | 3.8 | Al shavings in 55-gal drums |
| C-746-E | Pipe, mix, and rings | Al | N | | | 0.25 | 500 # Al |
| C-746-E | Pipe, mix, and rings | Fe | N | 192 | 0.2 | 38.5 | iron shavings in 55-gal drums |
| C-746-E | Pipes and plate | Fe | N | 7 | 2.5 | 17.5 | end pieces |
| C-746-E | Pipes and plate | Fe | N | 5 | 4.3 | 21.5 | converter shells |
| C-746-E | Pipes and plate | Fe | N | | | 60.3 | all nickel plated¾small pile |
| C-746-E | Pipes and plate | Fe | N | | | 11,900 | 50% nickel plated¾large pile |
| C-746-E | Pipes, mix and rings | Fe | N | 73 | 0.04 | 3 | small rings |
| C-746-E | Pipes, mix and rings | Fe | N | 86 | 0.05 | 4.3 | large rings |
| C-746-E | Pipes, mix and rings | Fe | N | 10 | 0.5 | 5 | iron nickel plate |
| C-746-E | Pipes, mix and rings | Fe | N | | | 7.5 | iron mix |
| C-746-E | Pipes, mix and rings | Fe | N | | | 39 | iron mix |
| C-746-E | Pipe, mix and rings | Fe | N | | | 71 | misc. iron pipe |
| C-746-E | Pipe, mix and rings | Fe | N | 36 | 2.6 | 93.6 | large diameter 1" thick rings |
| C-746-E | Pipe, mix and rings | SS | N | | | 4 | stainless steel pipe |
| *C-746-E* | *Scrap wood estimate* | *Wood* | *N* | | | *122* | *Split w/C746-C, C-746-C1, C-746-E, C-746-E1, C-747-B* |
| TOTAL | **C-746-E Scrap Yard** | | | | | 12,391.25 | |
| | | | *C-746-E1, Contaminated Excess Metal Yards* | | | | |
| C-746-E1 | Covers, blades, and pipe | Al | N | | | 21.5 | Al covers and heat exchangers |
| C-746-E1 | Covers, blades, and pipe | Al | N | | | 34.5 | Al covers |
| C-746-E1 | Covers, blades, and pipe | Al | N | | | 41.6 | Al blades |
| C-746-E1 | Covers, blades, and pipe | Al | N | | | 42 | Al covers |
| C-746-E1 | Piles, converter, shells, nickel plated | Al | N | | | 108 | Al mix |
| C-746-E1 | Piles, converter, shells, nickel plated | Al | N | | | 115 | Al lids and compressors |
| C-746-E1 | Piles, converter, shells, nickel plated | Al | N | | | 208 | Al converter shells and blades |
| C-746-E1 | Piles, converter, shells, nickel plated | Al | N | | | 741 | Al mix, fins, shells |
| C-746-E1 | Covers, blades and pipe | Fe | N | | | 31 | iron¾10" diameter pipe |
| C-746-E1 | Piles, converter, shells, nickel plated | Fe | N | | | 10 | iron¾10" pipe |
| C-746-E1 | Piles, converter, shells, nickel plated | Fe | N | 30 | 0.65 | 19.5 | railroad rail |

## Appendix 2. Estimated Quantity and Type of Scrap as Presented in Sect. A.5.1 of DOE/OR/07-1880&D2 (continued)

| Location | Scrap Description | Mat'l | Pkg | No. Units | Unit Weight (Tons) | Amount (Tons) | Comments |
|---|---|---|---|---|---|---|---|
| C-746-E1 | Piles, converter, shells, nickel plated | Fe | N | 68 | 1.57 | 106.76 | iron nickel-plated pipe shells |
| C-746-E1 | Piles, converter, shells, nickel plated | Fe | N | | | 2,499 | large pile |
| C-746-E1 | Scrap wood estimate | Wood | N | | | 122 | Split w/C746-C, C-746-C1, C-746-E, C-746-E1, C-747-B |
| TOTAL | **C-746-E1 Scrap Yard** | | | | | 4,099.86 | |
| | | | *C-746-H4, Nickel Ingot* | | | | |
| C-746-H4 | Nickel yard | Al | Y | 186 | 0.65 | 121 | Al ingots¾1300 lb. each |
| C-746-H4 | Nickel yard | Al | Y | 1773 | 0.65 | 1,153 | Al ingots¾1300 lb. each |
| C-746-H4 | Nickel yard | Al | N | | | 4.2 | Al |
| C-746-H4 | Nickel yard | Al | N | | | 48.7 | Al ingots |
| C-746-H4 | Nickel yard | Ni | Y | | | 9,700 | pure nickel ingots |
| TOTAL | **C-746-H4 Scrap Yard** | | | | | 11,026.90 | |
| | | | *C-746-P East, Regulated Yard* | | | | |
| C-746-P E | Mixed, misc. | Al | N | | | 153.6 | big pile 10% Al mixed |
| C-746-P E | Wire, pipe, drums, and sheet | Al | N | | | 0.5 | Al pipe |
| C-746-P E | Wire, pipe, drums, and sheet | Al | N | | | 0.5 | Al pipe |
| C-746-P E | Mixed, misc. | Cu | N | | | 2 | Cu pipe |
| C-746-P E | Mixed, misc. | Cu | N | | | 2 | transformers |
| C-746-P E | Wire, pipe, drums, and sheet | Cu | N | | | 1 | Cu wire |
| C-746-P E | Mixed, misc. | Fe | N | | | 2 | cabinets and lockers |
| C-746-P E | Mixed, misc. | Fe | N | | | 3.5 | misc. iron mix |
| C-746-P E | Mixed, misc. | Fe | N | 8 | 0.68 | 5.5 | railroad rails |
| C-746-P E | Mixed, misc. | Fe | N | | | 6 | light structural and pipe |
| C-746-P E | Mixed, misc. | Fe | N | | | 8 | transformers |
| C-746-P E | Mixed, misc. | Fe | N | 58 | 0.5 | 29 | steel in insulators¾no ceramic |
| C-746-P E | Mixed, misc. | Fe | N | 1 | 37 | 37 | 1 package mobile boiler |
| C-746-P E | Mixed, misc. | Fe | N | | | 1,382.40 | big pile 90% iron mix |
| C-746-P E | Wire, pipe, drums, and sheet | Fe | N | | | 6 | iron mix and drums |
| C-746-P E | Wire, pipe, drums, and sheet | Fe | N | | | 10 | mix |
| C-746-P E | Wire, pipe, drums, and sheet | Fe | N | | | 12 | galvanized pipe and sheet |
| C-746-P E | Mixed, misc. | SS | N | 2 | 6 | 12 | pressure vessels |
| C-746-P E | Mixed, misc. | Fe | N | | | 362 | 50/50 split w/C-746-P1 of additional Fe when comparing App C and Table D.1 of EE/CA |
| TOTAL | **C-746-P East Scrap Yard** | | | | | 2035 | |



115

Appendix 2. Estimated Quantity and Type of Scrap as Presented in Sect. A.5.1 of DOE/OR/07-1880&D2 (continued)

| Location | Scrap Description | Mat'l | Pkg | No. Units | Unit Weight (Tons) | Amount (Tons) | Comments |
|---|---|---|---|---|---|---|---|
| *C-746-P1, Clean Excess Metal Yard* | | | | | | | |
| C-746-P1 | Misc., mesh, drums, pipe | Al | N | | | 0.5 | |
| C-746-P1 | Rail, pipe, motors, fan blades | Al | N | | | 0.25 | Al conduit |
| C-746-P1 | Rail, pipe, motors, fan blades | Al | N | | | 3 | Al blades |
| C-746-P1 | Rail, pipe, motors, fans | Al | N | | | 3.5 | pile 2 |
| C-746-P1 | Misc., mesh, drums, pipe | Cu | N | | | 1.5 | Cu pipe sprinklers |
| C-746-P1 | Misc., mesh, drums, pipe | Cu | N | | | 2 | copper |
| C-746-P1 | Rail, pipe, motors, fan blades | Cu | N | 9 | 0.1 | 0.9 | motors |
| C-746-P1 | Rail, pipe, motors, fan blades | Cu | N | | | 10 | Cu heat exchanger tubing |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | 2* | 0.125* | 0.5 | refrigerators |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | | | 1 | iron pipe |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | 200 | 0.0175 | 3.5 | Drums |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | | | 5.5 | iron rail |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | | | 9 | railroad rail |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | | | 14 | Carrier |
| C-746-P1 | Misc., mesh, drums, pipe | Fe | N | | | 383 | pile 1-20% light |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | | | 2 | pipe |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | 9 | 0.4 | 3.6 | motors |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | 2 | 3.5 | 7 | tanks |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | | | 10 | structural |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | | | 12.8 | pipe |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | | | 15.5 | iron pipe 19" diameter |
| C-746-P1 | Rail, pipe, motors, fan blades | Fe | N | | | 327 | railroad rail |
| C-746-P1 | Rail, pipe, motors, fans | Fe | N | | | 1 | misc. iron |
| C-746-P1 | Rail, pipe, motors, fans | Fe | N | | | 11 | cooling tower standoff pipe |
| C-746-P1 | Rail, pipe, motors, fans | Fe | N | 59 | 0.65 | 38.35 | railroad rail |
| C-746-P1 | Rail, pipe, motors, fans, | Fe | N | | | 41.5 | pipe |
| C-746-P1 | Rail, pipe, motors, fan | Fe | N | | | 31.5 | pile 2 mixed, sheeting |
| C-746-P1 | Misc., mesh, drums, pipe | SS | N | | | 2 | stainless steel mesh |
| C-746-P1 | Rail, pipe, motors, fan blades | SS | N | | | 4.5 | stainless steel pipe |
| C-746-P1 | Mixed, misc. | Fe | N | | | 362 | 50/50 split w/C-746-P East of additional Fe when comparing App C and Table D.1 of EE/CA |
| TOTAL | **C-746-P1 Scrap Yard** | | | | | 1307.9 | |

116

## Appendix 2. Estimated Quantity and Type of Scrap as Presented in Sect. A.5.1 of DOE/OR/07-1880&D2 (continued)

| Location | Scrap Description | Mat'l | Pkg | No. Units | Unit Weight (Tons) | Amount (Tons) | Comments |
|---|---|---|---|---|---|---|---|
| | | | | *C-747-A $UF_4$ Drum Yard* | | | |
| C-747-A $UF_4$ Drum Yard | Drums and tanks | Fe | N | 18* | 2.5* | 40.5 | tanks |
| TOTAL | **C-747-A Scrap Yard** | | | | | **40.5** | |
| | | | | *C-747-B Scrap Yard*** | | | |
| C-747-B | Mixed | Al | N | | | 1.25 | Al compressor sections |
| C-747-B | Mixed | Al | N | | | 4.5 | Al |
| C-747-B | Pipe, gating, equipment | Fe | N | | | 1 | grating |
| C-747-B | Pipe, gating, equipment | Fe | N | 3 | 0.5 | 1.5 | mobile units |
| C-747-B | Pipe, gating, equipment | Fe | N | | | 2 | scrap |
| C-747-B | Pipe, gating, equipment | Fe | N | 1 | 4 | 4 | mobile crane |
| C-747-B | Pipe, gating, equipment | Fe | N | | | 5 | pipe |
| C-747-B | Pipe, gating, equipment | Fe | N | 2 | 3 | 6 | trucks |
| C-747-B | Pipe, gating, equipment | Fe | N | | | 11 | mobile units |
| C-747-B | Pipe, gating, equipment | Fe | N | 1 | 50 | 50 | railroad flat car |
| C-747-B | Pipe, gating, equipment | Fe | N | 54 | 1.5 | 81 | fork lifts |
| C-747-B | Rail, tanks | Fe | N | 1 | 4 | 4 | tanks |
| C-747-B | Rail, tanks | Fe | N | 2 | 2 | 4 | tanks |
| C-747-B | Rail, tanks | Fe | N | 134* | 0.88* | 81 | rail |
| C-747-B | Mixed | Fe | N | 1 | 4 | 4 | car |
| C-747-B | Mixed | Fe | N | 2 | 2.25 | 5 | transfer cars |
| C-747-B | Mixed | Fe | N | 1 | 6 | 6 | pump |
| C-747-B | Mixed | Fe | N | | | 7.5 | douys, misc. iron |
| C-747-B | Mixed | Fe | N | | | 61.3 | mixed iron |
| *C-747-B* | *Scrap wood estimate* | *Wood* | *N* | | | *54* | *Split w/C746-C, C-746-C1, C-746-E, C-746-E1, C-747-B* |
| TOTAL | **C-747-B Scrap Yard** | | | | | **394.05** | |
| TOTAL | **All Non-Classified Scrap Yards** | | | | | **38,618** | |
| TOTAL | **C-746-D Scrap Yard** | **Fe** | N | | | **14,560** | |
| TOTAL | **All Scrap Yards** | | | | | **53,178** | |

Italicized information is EE/CA data manipulated by WESKEM using assumptions in Section D.1.1.2 of the EE/CA to clarify discrepancies between Appendix C and Table 1 of Sect. A.5.1 of the EE/CA.
The inventory does not include DMSA (3) East.
*From inventory, although amount is not consistent with these numbers.
**This includes DMSA (1) South/West.

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# APPENDIX 3:
# EXPOSURE HAZARDS

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## Appendix 3. Exposure Hazards Table

| Chemical | TLV, PEL, STEL, IDLH, or DAC[a] | Health effects/ potential hazards[b] | Chemical and physical properties[b] | Exposure route(s)[b] |
|---|---|---|---|---|
| Asbestos | PEL/TWA: 0.1 f/cc | Pulmonary damage: asbestosis, lung cancer, mesothelioma | Solid nonflammable fibrous material; VP: 0 mm; FP: NA | Inhalation<br>Ingestion |
| Gasoline and diesel (fuel) | TLV/TWA: 300 ppm<br>IDLH: NA | Dizziness, eye irritation, dermatitis; flammable liquid | Liquid with aromatic odor; FP: -45°F | Inhalation<br>Ingestion<br>Contact |
| Chlorodiphenyls | TLV/TWA: 0.5mg/m$^3$<br>IDLH: Ca (5 mg/m$^3$) | Carcinogen, eye irritation, liver damage, reproductive effects | Nonflammable liquid; FP: NA; VP: 0.00006 mm | Inhalation<br>Absorption<br>Ingestion<br>Contact |
| Uranium isotopes | PEL/TWA: 0.05 mg/m$^3$<br>TLV/TWA: 0.2 mg/m$^3$<br>BJC administrative exposure limits<br>DAC: 3E-7 | Kidney toxicity, cancer | Variable by compound but probably solid; VP: NA; FP: NA | Inhalation<br>Ingestion<br>Contact |

[a]From Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (American Conference of Governmental Industrial Hygienists 1999) and NIOSH Pocket Guide to Chemical Hazards (NIOSH 1997).
[b]From NIOSH Pocket Guide to Chemical Hazards (NIOSH 1994).
BJC = Bechtel Jacobs Company LLC
DAC = derived air concentration
FP = flash point
IDLH = immediately dangerous to life or health
NA = not applicable
NIOSH = National Institute of Occupational Safety and Health
PEL = permissible exposure limit
TLV = threshold limit value
TWA = time-weighted average
VP = vapor pressure

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**APPENDIX 4:**
**HOSPITAL ROUTE MAP**

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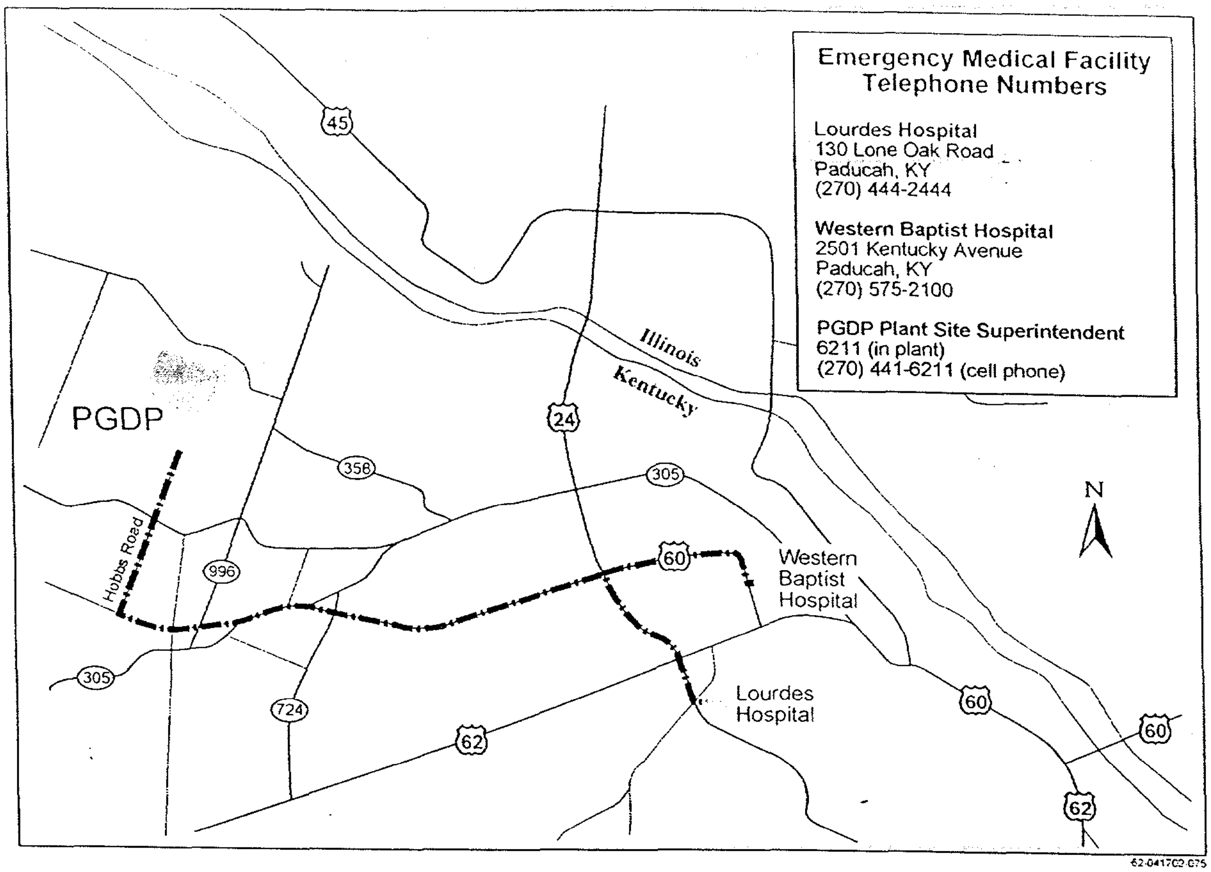
## Appendix 4. Hospital Route Map



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