

**FLUOR FERNALD, INC.  
SILOS PROJECT**

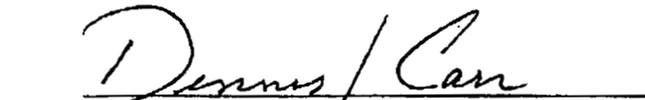
**URANIUM ASSAY ADJUSTMENT PROJECT WORK PLAN**

*Prepared by Fernald Closure Project  
November 2004*

*40600-PL-0001  
Revision 01*

*Prepared for  
U. S. Department of Energy  
Contract DE-AC24-01 OH20115*

### Work Plan for the Uranium Assay Adjustment Project

  
Dennis Carr  
Silos Project, Director

11/24/04  
Date

  
Bob Schulten  
Silos Project Shipping & Receiving, Manager

11-24-04  
Date

For   
John Samples  
Silos Project Operations

11-24-04  
Date

  
Kevin Crosson  
Silos Waste Engineer

11/24/04  
Date



# Work Plan for the Uranium Assay Adjustment Project

## TABLE OF CONTENTS

Section	Page
<b>TABLE OF CONTENTS</b> .....	<b>3</b>
<b>LIST OF ACRONYMS</b> .....	<b>5</b>
<b>1. INTRODUCTION</b> .....	<b>6</b>
1.1. <i>Objectives</i> .....	<i>6</i>
1.2. <i>Organization of the Work Plan</i> .....	<i>6</i>
<b>2. DESCRIPTION OF THE WASTE</b> .....	<b>7</b>
<b>Container Number W207183 and W207184</b> .....	<b>7</b>
<i>Figure 2.1 - W207183 Contents</i> .....	<i>7</i>
<i>Figure 2.2 - W207184 Contents</i> .....	<i>7</i>
<b>Container Number W207823</b> .....	<b>8</b>
<i>Figure 2.3 - W207823 Contents</i> .....	<i>9</i>
<b>Container Numbers W233544 and 234484</b> .....	<b>10</b>
<i>Figure 2.4 - W233544 Contents</i> .....	<i>10</i>
<i>Figure 2.5 - W234484 Contents</i> .....	<i>10</i>
<b>Container Number W514065</b> .....	<b>11</b>
<i>Figure 2.6 - W514065 Contents</i> .....	<i>11</i>
<b>Container Number W234711, W234852, and W234882</b> .....	<b>12</b>
<i>Figure 2.7 - 234711 Contents</i> .....	<i>13</i>
<i>Figure 2.8 - W234852 Contents</i> .....	<i>13</i>
<i>Figure 2.9 - W234882 Contents</i> .....	<i>13</i>
<b>Table 2-1 - Inventory Summary</b> .....	<b>15</b>
<b>3. PROJECT PLANS AND MANAGEMENT</b> .....	<b>16</b>
3.1. <i>Project Work Plan</i> .....	<i>16</i>
3.2. <i>Project Management</i> .....	<i>16</i>
3.2.1. <i>Organization</i> .....	<i>16</i>

- Figure 3-1 – Project Organization ..... 16
  - 3.2.2. Project Schedule..... 18
  - 3.2.3. Stop Work Action ..... 18
  - 3.2.4. Project Documentation and Data ..... 18
  - 3.2.5. Sampling and Analysis..... 18
- 3.3. Health and Safety..... 18
- 3.4. Quality Assurance ..... 18
- 3.5. Radiological Protection..... 19
- 3.6. Project Work Instructions ..... 19
- 3.7. Procurement..... 19
- 4. Processing and Handling Facility ..... 19**
  - 4.1. Design ..... 19
  - 4.2. Preparation..... 19
  - 4.3. Checkout and Startup..... 19
  - 4.4. Operations and Maintenance..... 20
- 5. Management of Materials and Waste ..... 20**
  - 5.1. Primary and Secondary Waste..... 20
  - 5.2. Primary Waste Processing..... 24
    - 5.2.1. Waste Categorization ..... 24
    - 5.2.2. Waste Processing Objective and Methodology..... 24
  - 5.3. Materials Management ..... 26
    - 5.3.1. Waste Minimization by Prevention of Contamination..... 26
    - 5.3.2. Prevention of Environmental Media Pollution ..... 26
    - 5.3.3. Management of Facility Waste Containers..... 26
    - 5.3.4. Facility and Container Inspections..... 26
    - 5.3.5. Spill Response..... 27
    - 5.3.6. Management of Contaminated Water ..... 27
    - 5.3.7. Management of Secondary Waste..... 27
  - 5.4. Materials Management ..... 27
- 6. Waste Treatment..... 27**
  - 6.1. Commercial Treatment ..... 27
  - 6.2. Certificate of Treatment..... 27
- 7. Waste Disposal..... 28**
  - 7.1. Commercial Disposal..... 28
  - 7.2. Certificate of Disposal ..... 28

## Work Plan for the Uranium Assay Adjustment Project

### LIST OF ACRONYMS

ACA	Amendment Consent Agreement
AEDO	Assistant Emergency Duty Officer
AWWT	Advance Waste Water Treatment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	Department of Energy
EPA	Environmental Protection Agency
FCP	Fernald Closure Project
FEMP	Fernald Environmental Management Project
HEPA	High-Efficiency Particulate Air (filter)
HVAC	Heating Ventilation and Air Conditioning
HWMU	Hazardous Waste Management Unit
IDLH	Immediate Dangerous to life and Health
LLW	Low-Level Waste
MDC	Major Diagnostic Category
MEF	Material Evaluation Form
MC&A	Material Control and accountability
CFR	Code of Federal Regulations
MLLW	Mixed Low-Level Radioactive and Hazardous Waste
OAC	Ohio Administrative Code
PBS	Performance Baseline Summary
PCB	Polychlorinated Biphenyl (s)
PPE	Personal Protective Equipment
PPM	Parts Per Million
PWID	Project Waste Identification and Disposition
RACM	Reasonably Available Control Measures
RCRA	Resource Conservation and Recovery Act.
RMI	Reactive Metals Incorporated
SAP	Sampling and Analysis Plan
TC	Target Concentration
TCA	1,1,1, Trichloroethane
TSCA	Toxic Substance Control Act
TSDF	Treatment Storage and Disposal Facility (RCRA)
WBS	Work Breakdown Structure

## 1. INTRODUCTION

This work plan describes the objectives and scope of work for the Fluor Fernald, Inc. (Fluor Fernald) Uranium Assay Adjustment Project to be conducted at the U. S. Department of Energy (DOE) Fernald Site. The Fernald site also known as the Fernald Closure Project (FCP), is a government owned, former uranium processing facility located near Cincinnati, Ohio. The site was placed on the National Priorities List in 1989 and is currently undergoing remediation under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) in accordance with the 1991 *Amended Consent Agreement (ACA)* between the DOE and the U. S. Environmental Protection Agency (EPA).

The waste to be processed and disposed of in the Uranium Assay Adjustment project is currently stored in nine containers. The waste is comprised of Dust Collector Residues, Chloride Salt Sludges, Scrap Salts High Fluoride, U3O8 (Black Oxide) High Fluoride, Scrap U3O8 (Black Oxide) and Oily Sludges/Grease. The waste has a multitude of chemical and physical forms and may require a diverse array of processing methods to achieve the desired uranium concentration adjustment.

### 1.1. Objectives

Provide for the one time processing of slightly enriched mixed low-level waste (MLLW) so that Fluor Fernald can ship it to an approved off-site Treatment Storage and Disposal Facility (TSDF) for further treatment of the RCRA constituents to meet land disposal restrictions (LDR) requirements in accordance with applicable Federal, State and local regulations. The waste contains a combined uranium mass of 507.199 kilograms having enrichment range between 0.71 73 and 0.99 percent U-235. The MLLW are currently stored in nine containers and in its present form the waste does not meet applicable radiological waste acceptance criteria at any of our approved TSDF's. The project will develop an acceptable method for mixing / blending the MLLW with non-radioactive material having similar physical characteristics to adjust the enrichment level of the MLLW to meet the radiological waste acceptance criteria at an approved TSDF.

An on-site processing facility will be set up in Building 93A for processing this waste and preparing it for shipment to an approved treatment and disposal provider under contract with Fluor Fernald, Incorporated. Accomplishing the project will require participation from Project Support Departments, Project Management, and Operations.

### 1.2. Organization of the Work Plan

This project work plan has been organized to match the Work Breakdown Structure of the Project. The plan identifies the parties responsible for each activity including its management and control. Section 2.0 of the Work Plan provides a description of the waste to be processed and dispositioned in terms of the Material Evaluation Form (MEF) characterization process. Section 3.0 describes the planning that is required for the job and defines how the planning is documented herein. Section 4.0 describes the packaging and handling facility and the activities that must be accomplished to prepare the facility for use by the project. Section 5.0 describes the management of materials and waste that is to be performed for each of the unique waste streams. Sections 6.0 describes project activity to overview and provide direction and control of the treatment activities of the subcontractor. Section 7.0 describes project activity to overview and provide direction and control of the disposal activities of the disposal site.

**2. DESCRIPTION OF THE WASTE**

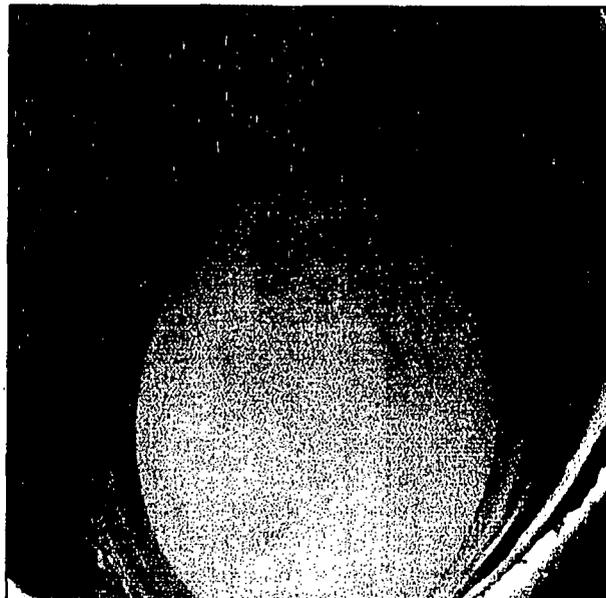
There are nine containers of waste to be processed in this project. The following is a description of each container:

**Container Number W207183 and W207184**

The material in these drums is described as Dust Collector Residues and is characterized under MEF 2987.



**Figure 2.1 - W207183 Contents**



**Figure 2.2 - W207184 Contents**

**Determination**

RCRA Hazardous, Low-Level Radioactive Waste: F002, D008

**Descriptive Name**

Dust, dust collector bags, and dust collector residue from the Trane incinerator.

**Process Generating the Waste**

This waste was generated during Safe Shutdown activities when the Trane incinerator ancillary equipment was cleaned out. The Trane incinerator was part of HWMU #28, and was characterized as F002 and D008. The HWMU has not been clean closed, there are no available records indicating the dust collectors had been cleaned previously, and there are no analytical results available for this material to indicate that no F002 or D008 waste was a part of this waste stream. Therefore, this dust collector material is obliged to be characterized the same as the HWMU. Thus, this waste is characterized as F002 and D008 RCRA hazardous low-level radioactive waste. According to the verification forms, the residue was scraped and vacuumed from the baghouse, the hopper, and the plenum of the G2-95 dust collector. The bags, of course, originate from the baghouse.

**Radiological/Chemical Composition**

Analytical data collected in July 2004, shows a uranium concentration of 113000 ug/g or 11.3% and a U235 concentration of 0.942% for container number W207183, and a uranium concentration of 302000 ug/g or 30.2% and a U235 concentration of 0.986% for container number W207184.

**Hazardous Waste Listings and Characteristics**

**Listings** – The waste comes from the Trane incinerator, which was part of HWMU #28 and which has an F002 listing for 1,1,1-TCA. This listing will also apply to the waste managed under this MEF. This waste does not meet the listing descriptions for K, P, or U-listed wastes per 40 CFR 261.32 and 261.33.

**Characteristics** – This material is not a liquid or a gas and thus is not ignitable or corrosive as defined in 40 CFR 261.21 and 261.22. The material is also not expected to be unstable or reactive as defined in 261.23.

The waste comes from the Trane incinerator, which was part of HWMU #28 and which carries the D008 toxicity characteristic for lead. Unless sampling is performed to refute exceeding the regulatory level for lead, the D008 characteristic will remain associated with this waste.

**TSCA Regulated PCB or Asbestos Waste, and OAC Infectious Waste**

This waste stream is not expected to have PCBs, asbestos, or infectious wastes associated with it.

**Pyrophoricity, Combustibility, Reactivity, Gas Evolution**

MDCs 029, 033, and 062 are not identified in SA-9601916 or RM-0005 as being pyrophoric or gas generating. They are also not expected to be combustible or reactive. See form FS-F-5716: *Determination of Pyrophoricity, Gas Evolution, Combustibility, and Reactivity of Containerized Wastes and Nuclear Materials* for further information.

**Container Number W207823**

The material in this drum is described as Sludges, Salt, Soft, chloride and is characterized under MEF 20139.

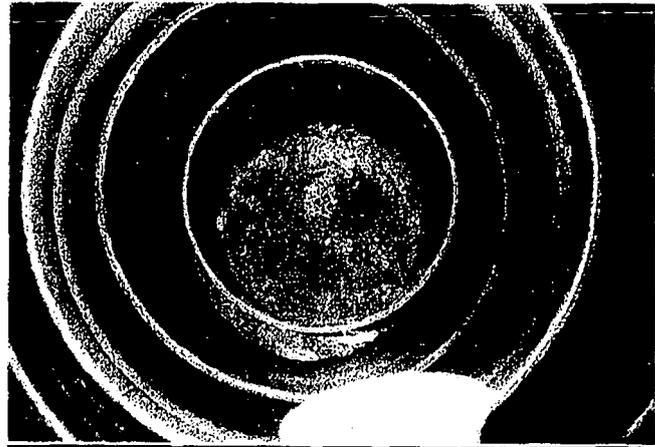


Figure 2.3 - W207823 Contents

**Determination**

RCRA hazardous, low-level radioactive waste: D005 (barium)

**Descriptive Name**

This material is various wastes and samples from RMI operations that are hazardous for barium.

**Process Generating the Waste**

The RMI facility, located in Ashtabula, Ohio, was where uranium metal shapes were extruded. The uranium metal was processed in a molten salt bath (usually barium chloride) to facilitate the extrusion process. The salt baths were heated to approximately 1100 °F and were used to make the uranium malleable enough to extrude. The baths were emptied occasionally in order to replace the salt and refurbish the worn out bricks within the salt bath. As a result of this process, wastes with concentrations of barium that exceed the regulatory limit were generated.

This MEF manages various wastes and samples of waste that are RCRA hazardous for barium and that were generated from RMI processes. Examples of waste include, but are not limited to:

- Furnace bricks that lined the salt bath
- Pieces of graphite from the extrusion press
- Rock, dirt, floor sweepings, trash, and concrete from RMI
- Bottoms from the salt bath

**Radiological/Chemical Composition**

**Radiological:** According to MC&A data the total uranium concentration is less than 20% and the uranium-235 isotopic concentration is less than 1.25 wt.%. Sampling has been schedule to verify the assigned assay.

**Chemical:** Volatile organics were not used in the process of uranium extrusion at RMI and are not constituents of concern for this waste stream. Barium is the primary concern for these wastes. Other metals that have been detected in these wastes as well include cadmium, chromium, and lead.

**Hazardous Waste Listings and Characteristics**

**Listings:** Process knowledge does not indicate that these wastes contain or came into contact with any listed wastes.

**Characteristics:** Based on the matrix of the material and process knowledge of the generation of the waste, it is not expected to be ignitable, corrosive, or reactive. Barium is the only constituent found in these wastes that exceeds its respective TC regulatory level. These wastes are characterized by the waste code D005 for barium.

**TSCA Regulated PCB or Asbestos Waste, and OAC Infectious Waste**

This waste is not regulated PCB, asbestos, or OAC infectious waste.

**Pyrophoricity, Combustibility, Reactivity, Gas Evolution**

This waste is not expected to be pyrophoric, combustible, reactive, or hydrogen generating.

There is a potential for some of this waste to generate methane. See FS-F-5716 for further detail.

**Container Numbers W233544 and 234484**

The material in these drums is described as Scrap Salts, High Fluoride, Including Floor Sweepings and is characterized under MEF 20146.



**Figure 2.4 – W233544 Contents**



**Figure 2.5 – W234484 Contents**

**Determination**

RCRA-hazardous, low-level radioactive, mixed D006, D007, and D008

**Description**

Sampler's logs describe the waste as "dirt" and "powder."

**Process Generating the Waste**

Plant 4 was the green salt plant where  $UO_3$  was converted to  $UF_4$  (green salt). The green salt would then be packaged and sent to Plant 5 and used as the feed material to form uranium metal. Based on visual inspections, this material consists of particulate waste possibly generated by a vacuum cleaner or a dust collector. The actual activity generating this waste and the specific area where this waste was generated is unknown.

**Radiological/Chemical Composition**

Sampling and analysis was conducted on this material under sample plan 2003-1677, and indicates total uranium from 271000 to 387000 ug/g or 27.1% to 38.7% and U235 at 0.802% to 0.82%.

Sampling and analysis was conducted on this material under FEMP SAP 97-1397. The results indicate that the waste exhibits the characteristic of toxicity for cadmium, chromium, and lead. The waste is regulated as a hazardous waste under RCRA and is assigned D006, D007, and D008 hazardous waste codes.

**Pyrophoricity, Combustibility, Reactivity, Gas Evolution**

This waste is not expected to be pyrophoric, combustible, reactive, or hydrogen generating. There is a potential for some of this waste to generate methane. See FS-F-5716 for further detail.

**Container Number W514065**

The material in this drum is described as  $U_3O_8$  (Black Oxide) +8 Mesh Low Fluoride and is characterized under MEF 50364.



Figure 2.6 – W514065 Contents

**Determination**

RCRA hazardous waste, only hazardous for chromium; D007 (chromium), F001/F002

**Description Name**

This material is coded as  $U_3O_8$  +8 mesh - low fluoride from the Plant 8 Box Furnace.

**Process Generating the Waste**

Recycle materials containing impurities were roasted in the Plant 8 Box Furnace to oxidize the impurities. Recycle material included uranium metals, black oxide ( $U_3O_8$ ), furnace salts, dust collector materials, floor sweepings, and miscellaneous burnables.

The Visual Inspection Report describes this material as: black material, powder, some 1/4" to 1/8" chunks and some light green color on the surface and some white material mixed in. This description is consistent with the 122 Material type code description of +8 mesh size uranium oxide, which would have been or contained coarse material. A lot code assignment of 824SRC/122 MTC and the Visual Inspection description are consistent with a product of the Box Furnace.

Materials sent to the Box Furnace were recycle material including uranium metals, black oxide ( $U_3O_8$ ), furnace salts, dust collector materials, floor sweepings, and miscellaneous burnables. The Box Furnace has been determined to be a Hazardous Waste Management Unit (HWMU) based on evidence that rags containing spent solvents and degreasing solvents were processed through the furnace. Based on the mixture rule, this waste stream will receive the spent solvent designation F001/F002 for the spent solvent 1,1,1-trichloroethane.

**Radiological/Chemical Composition**

Radiological analysis conducted in January 2004 indicated a total U concentration of 68 69.17. 6% and the weight percent of  $U^{235}$  is 0.905 943 wt%.

Chromium, was the only TC metal detected and was reported at a concentration greater than the regulatory limit. The detection of chromium may be attributable to uranium interference, but this is not confirmed. This waste will be considered hazardous for chromium based on the existing information.

The waste is therefore, characterized as D007 (chromium), F001/F002 RCRA hazardous low-level mixed radioactive waste.

**Pyrophoricity, Combustibility, Reactivity, Gas Evolution**

This waste is not expected to be pyrophoric, combustible, reactive, or hydrogen generating. There is a potential for some of this waste to generate methane. See FS-F-5716 for further detail.

**Container Number W234711, W234852, and W234882**

The material in these drums is described as Oily Sludge's and Grease and is characterized under MEF 10027.



**Figure 2.7 – 234711 Contents**



**Figure 2.8 – W234852 Contents**



**Figure 2.9 – W234882 Contents**

**Determination**

RCRA hazardous (F001, D039, D040), low level waste.

**Descriptive Name**

This material is described by the lot code marking as contaminated insoluble oil and sludges generated at Plant 6. Visual inspection indicates the material is mostly oil/sludge and water.

**Process Generating the Waste**

According to the Plant 6 manager, this waste oil was mainly collected from the routine draining of gear oil from gear housings. Some of the oil may have been generated during repairs and other routine

maintenance on machinery in Plant 6. The most likely source of the water in this waste is coolant water leaking into the gears and contaminating the oil.

1, 1, 1 Trichloroethane (TCA) was not used to clean the gear housings, as it would ruin the bearings. The TCA found in this waste stream is the result of Plant 6 personnel dumping TCA that had been used to clean parts and tools into the waste oil drums.

#### **Radiological/Chemical Composition**

According to the laboratory report generated in September 2004, the analysis for W234852 indicates 163000 ug/g uranium or 16.3% and 0.726% U235. The analysis for W234882 indicates 288000 ug/g uranium or 28.8% and 0.775% U235. And the analysis for W234711 indicates 9290 mg/L uranium or 21.6% and 0.801765% U235 respectively.

This waste consists primarily of water and oil/sludge. Additional constituents include the following: 1,1,1 trichloroethane [1.3 to 38,000 ppm], acetone [0.40 to <62 ppm], toluene [<.05 to <31], methylene chloride [<.05 to <31 ppm], trichloroethene [<.05 to <31 ppm], tetrachloroethylene [<.05 to <31 ppm], barium [<.2 to .389 ppm].

Samples were taken from the individual oil and water layers in the same drum. The data were percent averaged based upon the layering volumes given in the sampling log to yield one "sample". This provided a significantly greater statistical accuracy for determining constituent concentrations.

#### **Hazardous Waste Listings and Characteristics**

TCA used for its solvent properties is RCRA listed F001 waste, therefore, the waste oil will also be considered F001 listed waste. The Plant 6 manager could not explain how any of the other solvent constituents that exist in this waste stream got there, therefore, no other RCRA listings will apply.

#### **TSCA Regulated PCB, Asbestos Waste, and OAC Infectious Waste**

Based on process knowledge this waste is not expected to be TSCA regulated or contain asbestos or infectious waste.

#### **Pyrophoricity, Combustibility, Reactivity, Gas Evolution**

This waste has been evaluated for pyrophoricity, combustibility, reactivity, and gas evolution. The results of the evaluation indicate the waste does not exhibit pyrophoric, or reactive characteristics. However, this waste stream does exhibit the potential to be combustible in the presence of an external ignition source, and to produce methane gas. See FS-F-5716 for more specific information.

**Table 2-1 – Inventory Summary**

Item Number	Container Number	Volume (L)	Weight (kg)	Volume (L)	Volume (L)	Weight (kg)	Weight (kg)	Weight (kg)	Description
2987	W207183	110	228	390	S093-240-O-062-0260	0.93	26.72	104.21	Dust Collector Residues, High Fluoride
2987	W207184	110	221	180	S093-240-O-062-0260	0.93	26.72	48.10	Dust Collector Residues, High Fluoride
20139	W207823	085	174	178	X888-FTA-O-044-S303	1.1	15.08	26.84	Sludge's Salt Soft, chloride
20146	W233544	030	36	5	R100-400-V-065-0499	1.0	70.00	3.50	Scrap Salts, High Fluoride
20146	W234484	055	73	178	R100-400-V-065-0305	1.0	60.00	106.80	Scrap Salts, High Fluoride
10027	W234711	085	148	464	R078-600-V-039-0447	0.78	22.20	103.01	Sludge's, Oily
10027	W234852	085	133	380	R078-600-V-039-0447	0.78	22.20	84.36	Sludge's, Oily
10027	W234882	085	133	286	R078-600-V-039-0447	0.78	22.20	63.49	Sludge's, Oily
50364	W514065	085	137	833	R094-824-0-112-4127	0.943	69.17	184.93	U308 + Mesh. Low Fluoride

**3. PROJECT PLANS AND MANAGEMENT**

**3.1. Project Work Plan**

This Project Work Plan has been prepared to describe the scope of work and activities to accomplish the work that is required to disposition the inventory of waste specified in Section 2. The planning and execution of this work is the Uranium Assay Adjustment Project.

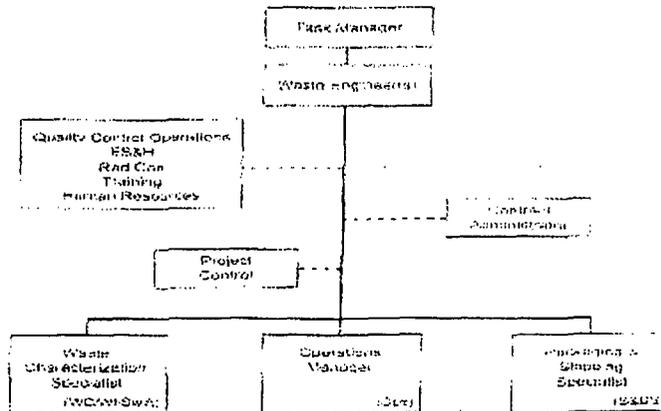
The Uranium Assay Adjustment Project is a sub activity of the larger Waste Disposition activity located in the Fluor Fernald Work Breakdown Structure (WBS) under WBS element 1.1.1.H.E. within the Silos Project. The Silos Project is located in Project Baseline Summary (PBS) 7. Waste Disposition scope includes the disposition of all Old Generation Wastes remaining on-site after the close of the Waste Management Project with was located in PBS 10 and PBS 11 respectively.

**3.2. Project Management**

**3.2.1. Organization**

The Project Team has been organized under the Operations support section of the Waste Shipping and Receiving Department within the Silos Project. Figure 3-1 shows how the Project Team has been organized. The Project Team has been assembled with participation from the Project Technical Support Area, the Project Management area, and the Operations area.

**Figure 3-1 – Project Organization**



**Task Manager**

The Task Manager has oversight in managing all activities of the Project. These include:

- Directing project activities in accordance with customer and corporate requirements including applicable laws, regulations, standards, and specification to achieve the required results.
- Communicate formally and informally with DOE, Corporate and upper level project management.

**Waste Engineer(s)**

The Waste Engineer(s) is (are) responsible for leading and directing all activities of the Project. These include:

- Being the focal point of project activities and ensuring all technical, quality, cost, and schedule requirements are being met.
- Directing the preparation and maintenance of all project plans and procedures.
- Directing the acquisition or otherwise securing of materials, equipment, and services necessary to prepare the facility for process operations.
- Plan, schedule, review, coordinate, and integrate the work of the project team to produce deliverables that accomplish project milestones and objectives.
- Preparing work packages and coordinating their review and approval.
- Tracking project progress and preparing and providing project progress and status reports.
- Tracking and expediting the resolution of problems that could threaten project success.
- Planning, administering and overseeing personnel selection, training, and qualification.
- Providing field support to Operations during processing and packaging operations.

**Operations Manager**

The team's Operations Manager will assist the Task Manager as needed in handling the waste through characterization and preparation for shipment. These include:

- Ensuring operational readiness of equipment and personnel and taking any action necessary to achieve and maintain readiness.
- Planning and supervising processing activities and staging of waste for shipping.
- Planning and supervising the handling of waste and the collection of samples and their identification, tracking and control.
- Planning and supervision of housekeeping and maintenance activities of the facility and its equipment.

**Packaging and Shipping Specialist**

The Team's Packaging and Shipping Specialist is responsible for assisting the Task Manager in ensuring the waste is properly classified, packaged and shipped to the treatment facility and ultimately to the disposal facility. This includes:

- Ensuring that all containers are properly packaged, marked, and labeled in accordance with 49 Code of Federal Regulations (CFR).
- Reviewing the characterization data to properly classify the waste.
- Preparing the shipping manifest(s).
- Preparing other associated documents required to make up the acceptance data package required for disposal.

#### Environmental Safety and Health

The project's Environmental Safety and Health program is the responsibility of the Task Manager and will be implemented by the Project Team with assistance from the staff assigned to the project.

#### Quality Assurance

The project's Quality Assurance program is the responsibility of the Task Manager and will be implemented by the Project Team with assistance from the staff assigned to the project.

#### Project Control

The project's project control activities are the responsibility of the Task Manager and will be implemented by the Project Team with assistance from the staff assigned to the project.

#### Contract Administration

The project's acquisition of equipment, supplies, and services is the responsibility for the Task Manager and will be performed with assistance from the Contract Administrator assigned to the Project.

#### 3.2.2. Project Schedule

The project schedule is maintained by Project Control, which maintains the schedule and coordinates with the Waste Engineer(s).

#### 3.2.3. Stop Work Action

All project team personnel have the authority to stop work for any condition adverse to safety or quality without fear of retaliation.

#### 3.2.4. Project Documentation and Data

Project documentation will be maintained in accordance with site document control procedures. The documentation will include contractual records, official correspondence, operations logs, waste logs, sampling and analysis logs, self-assessments, audits, and records of treatment and disposal.

#### 3.2.5. Sampling and Analysis

Sampling and analysis, if required, will be performed according to PL-3078, *FCP Waste Characterization Program Plan*, and specific sampling plans provided by the Project Team in accordance with PL-3048, *Prototype Sampling and Analysis Plan for Waste at the FCP*.

### 3.3. **Health and Safety**

The Project Team will implement the Integrated Safety Management System and all applicable Fluor Fernald Health and Safety programs and/or procedures.

### 3.4. **Quality Assurance**

The Project Team will implement the Integrated Safety Management System and all applicable Fluor Fernald Quality Assurance programs and/or procedures.

**3.5. Radiological Protection**

The Project Team will implement the Integrated Safety Management System and all applicable Fluor Fernald Radiological Protection programs and/or procedures.

**3.6. Project Work Instructions**

The Project Team will develop and approve work instruction and procedures in accordance with EW-1016, Waste Management Project Work Authorization Program.

**3.7. Procurement**

The projects required acquisition of equipment, materials, and services will be performed in accordance with all applicable Fluor Fernald procurement programs and/or procedures.

**4. Processing and Handling Facility**

This section describes the design of the Processing Facility to be established in Building 93A. The Waste Disposition Project has been given authorization to establish a waste processing and packaging enclosure in the east bay of Building 93A that currently houses the Garage and Laundry.

**4.1. Design**

The Processing and Handling Facility will be a temporary enclosure installed in the east bay of Building 93A. The east bay of the building measures 30 feet wide by 55 feet long. The Enclosure will occupy approximately 294 square feet and be located in the northwest corner of the work area inside of the east bay. It will be constructed out of steel 8" metal studs placed approximately twenty four inches on center running from floor to ceiling and then covered with a heavy duty plastic sheeting commonly used in asbestos abatement work. The plastic sheeting will be firmly attached to the enclosure frame so that it forms a barrier sufficient to control the release of radioactive contamination from within. Access to the work area inside the enclosure will be gained through an opening equipped with Freezer Strips hanging vertically and overlapped approximately 2" from top to bottom.

A Satellite Clothing Area (SCA) will be established adjacent to the enclosure and will be stocked with appropriate levels of Personal Protective Equipment (PPE) as needed to support the safe and efficient completion of required work within the enclosure. Personnel working in the enclosure will don and doff PPE in this area.

**4.2. Preparation**

The Processing and Handling Facility will be a temporary enclosure installed in the east bay of existing Building 93A. Equipment available for use in the facility on-site will be identified and staged for installation. Equipment that is not available on-site will be purchased and installed as required.

**4.3. Checkout and Startup**

When the facility installation is complete, a management assessment will be conducted to determine its readiness to start operations. A self-assessment checklist will be developed for the assessment. A team will be formed to conduct the assessment and determine readiness to start operations.

#### **4.4. Operations and Maintenance**

Like wastes will be processed in campaigns. Any secondary waste generated during the campaign will be packaged and staged for dispositioning to like waste streams for newly generated waste on-site.

Facility operations will be conducted according to governing procedures/work packages/work tickets/technical specifications. Maintenance will be performed according to procedures on equipment as needed to facilitate process operations. Routine maintenance such as lubrication and cleaning will be performed regularly in accordance with manufacturer instructions.

Supplies such as PPE, absorbent materials, housekeeping supplies, containers for overpacking and repacking will be kept on-site. Spare parts such as high efficiency particulate air (HEPA) filter elements, heating, ventilation, and air-conditioning (HVAC) parts, lights, air monitoring equipment, and radiation monitoring equipment will be available as needed.

### **5. Management of Materials and Waste**

#### **5.1. Primary and Secondary Waste**

During the project, two main types of waste will be managed: primary waste and secondary waste. Primary waste includes all waste containers described in Section 2. Secondary waste include byproduct streams derived from processing the primary wastes.

To the greatest extent possible and consistent with the treatment subcontractors waste acceptance criteria, secondary waste will be accumulated, characterized, and dispositioned based on the attributes of the primary waste with which they are associated. Efforts will be made to prevent contamination of solid waste materials with mixed waste constituents. Uncontaminated solid wastes are managed separately and properly disposed by FCP site personnel.

Table 5.1  
 Blend Factors for No Disposal Path Containers  
 11/12/04  
 Table 5.1  
 Blend Factors for No Disposal Path Containers  
 11/12/2004

W	Y	RCRA	DESCRIPTION	110	228	390	STATUS	CODE	240	0	062	0260	000002	0.94	11.3	2294.35
W207183	2987	RCRA	DUST COLLECTOR RESIDUES - HIGH FLUORIDE	110	228	390	ACTIVE	S093	240	0	062	0260	000002	0.94	11.3	2294.35
W207184	2987	RCRA	DUST COLLECTOR RESIDUES - HIGH FLUORIDE	110	221	180	ACTIVE	S093	240	0	062	0260	000003	0.99	30.2	6457.97
W207823	20139	RCRA	SLUDGES, SALT, SOFT, CHLORIDE (FOR PLANT 8 RECOVERY)	085	174	178	ACTIVE	X888	FTA	0	044	5303	000001	1.1	15.08	3583.01
W233544	20146	RCRA	SCRAP SALTS, HIGH FLUORIDE, INCLUDING FLOOR SWEEPINGS	030	36	5	ACTIVE	R100	400	V	065	0499	000001	0.82	38.7	6854.54
W234484	20146	RCRA	SCRAP SALTS, HIGH FLUORIDE, INCLUDING FLOOR SWEEPINGS	055	73	178	ACTIVE	R100	400	V	065	0305	000004	0.802	27.1	4694.59
W514065	50364	RCRA	U308, +8 MESH - LOW FLUORIDE	085	137	833	ACTIVE	R094	824	0	122	4127	000001	0.943	69.17	14089.10
W234711	10027	RCRA	SLUDGES, OILY	085	148	464	ACTIVE	R078	600	V	039	0447	000008	0.78	22.2	3740.26
W234852	10027	RCRA	SLUDGES, OILY	085	133	380	ACTIVE	R078	600	V	039	0447	000006	0.73	16.3	2570.18

W234882 10027 RCRA SLUDGES, OILY 085 133 286 ACTIVE R078 600 V 039 0447 000007 0.78 28.8 4852.22

\*Recommended blend ratio using 25% safety factor

W207183	2987	RCRA	DUST COLLECTOR RESIDUES - HIGH FLUORIDE	110	228	390	ACTIVE	S093	240	0	062	0260	000002	0.94	11.3	2294.35	1.21	1.50	0.50	1530
W207184	2987	RCRA	DUST COLLECTOR RESIDUES - HIGH FLUORIDE	110	221	180	ACTIVE	S093	240	0	062	0260	000003	0.99	30.2	6457.97	3.40	4.25	3.25	1520
W207823	20139	RCRA	SLUDGES, SALT, SOFT, CHLORIDE (FOR PLANT 8 RECOVERY)	085	174	178	ACTIVE	X888	FTA	0	044	S303	000001	1.1	15.08	3583.01	to be sampled	to be sampled	to be sampled	to be sampled
W233544	20146	RCRA	SCRAP SALTS, HIGH FLUORIDE, INCLUDING FLOOR SWEEPINGS	030	36	5	ACTIVE	R100	400	V	065	0499	000001	0.82	38.7	6854.54	3.61	4.50	3.50	1523
W234484	20146	RCRA	SCRAP SALTS, HIGH FLUORIDE, INCLUDING FLOOR SWEEPINGS	055	73	178	ACTIVE	R100	400	V	065	0305	000004	0.802	27.1	4694.59	2.47	3.00	2.00	1565
W514065	50364	RCRA	U308, +8 MESH - LOW FLUORIDE	085	137	833	ACTIVE	R094	824	0	122	4127	000001	0.943	69.17	14089.10	7.42	9.25	8.25	1523
W234711	10027	RCRA	SLUDGES, OILY	085	148	464	ACTIVE	R078	600	V	039	0447	000008	0.78	22.2	3740.26	1.97	2.50	1.50	1496

5775

W234852	10027	RCRA	SLUDGES, OILY	085	133	380	ACTIVE	R078	600	V	039	0447	000006	0.73	16.3	2570.18	1.35	1.75	0.75	1469
W234882	10027	RCRA	SLUDGES, OILY	085	133	286	ACTIVE	R078	600	V	039	0447	000007	0.78	28.8	4852.22	2.55	3.25	2.25	1493
*Recommended blend ratio using 25% safety factor																				

## 5.2. Primary Waste Processing

### 5.2.1. Waste Categorization

Primary wastes described in Section 2 will be campaigned into three groupings:

- Group 1 - Solid monolithic wastes that cannot be freely removed from their current waste storage container without cutting the container away from the waste or without using a demolition/jack hammer to break the waste into fragments so that it can be removed from its storage container. Group 1 waste will require mechanical shredding and/or granulation to prepare them for blending. Another possible option is, after the waste has been removed from its storage container(s), place the waste in a mixing tank and mix it with a solvent to create a solution. This may be possible because the Group 1 wastes are made up of furnace salts, which could be soluble in hot water.
- Group 2 - Granular wastes containing little or no liquid/moisture that can be freely removed from their current waste storage container by pouring or dumping aided by the use of hand tools. Group 2 wastes require little or no preparation before blending/mixing and may be added to a mechanical mixer and blended with inert material, such as clean sand.
- Group 3 - Liquid/sludge waste containing organic constituents. These wastes are multiphase wastes that contain a solid phase, and an organic/aqueous liquid phase or both. This type of waste can be freely removed from their current waste storage container by pouring or dumping aided by the use of hand tools. Group 3 wastes require little or no preparation before blending/mixing and may be added to a mechanical mixer and blended with inert material, such as clean sand or absorbent material and a super absorbent such as Quick Solid 50<sup>TM</sup>.

### 5.2.2. Waste Processing Objective and Methodology

The objective of the project is to blend/mix the waste described in Section 2 with chemically compatible, non-radioactive material with similar physical properties to reduce the overall Uranium 235 concentration. The Uranium 235 concentration must be equal to or less than 1900 pico curies per gram (1900pCi/g U-235). 1900 pCi/g is the concentration-based limit for waste containing fissile material at Envirocare of Utah disposal facility. To ensure the final waste is  $\leq 1900$  pCi/g, a 25 % safety factor is included in the blend ratio (see attached Table 5.1 with blend info), which will result in a final waste with U-235 at 1600 pCi/g. Blending/mixing will require the final waste form to be as homogeneous as possible so that the original waste material cannot be mechanically separated from the blending material. The final waste form must be blended/mixed so that, if sampled, the final waste will demonstrate uranium 235 concentration of  $\leq 1900$  pCi/g. has been achieved This demonstrates  $\leq 1900$  pCi/g on a mass balance basis, which requires no sampling. (See Table 5.1 for Blending Ratio)

The methodology used to achieve an overall concentration of uranium 235 in the waste of 1900pCi/g U-235 will be based on the physical characteristics of the waste. Some of the waste streams will require size reduction and/or granulation before being blended/mixed. Others will require little preparation before blending/mixing. This is why the project has

determined to campaign the waste as discussed above. By whatever means the project determines is needed to prepare the waste for blending/mixing, once the waste has been prepared for blending/mixing the blending material will be added.

Determining the amount of blending material to add to the waste will be accomplished using the net weight of the waste in each container, the percent Uranium and the percent Uranium 235 in the waste. With this information we can find the corresponding percent U-235 in the center column on the table below, then find the percent Uranium in the left hand column on the table below which corresponds to the maximum concentration of Uranium allowed in the waste in order to stay within the 1900pCi/g maximum concentration of U-235. Once the maximum Uranium concentration allowed in the waste has been determined, we will calculate the amount of blending material to be added to the waste to bring the concentration of Uranium in the waste down to the desired percentage in the table.

**Table 5-1, U-235 Enrichments Below Limit of 1900 pCi/g**

1	9	1900
2	4.5	1900
3	3	1900
4	2.2	1900
5	1.8	1900
6	1.5	1900
7	1.25	1900
8	1.07	1900
9	0.95	1900
10	0.85	1900
11	0.77	1900
12	No enrichment	>1900

**Example:**

Drum number W207184 has a net weight of 180 pounds, a uranium concentration of 30.2 percent, and a U-235 concentration of 0.986 percent.

Using Table 5-1 we see there is no reference for 0.986 percent U-235, so we round up to 1.07 percent U-235. The maximum Uranium concentration for the 1.07 percent U-235 waste is 8.0 percent at 1900 pCi/g U-235.

To find out how much blending material to add to this drum to reduce the Uranium concentration to 8.0 percent, we perform the following calculations:

$(180 \text{ lbs. net weight} * 30.2 \% \text{ Uranium concentration}) = 54.36 \text{ net lbs. Uranium in the waste.}$

To find the multiplier that will give you the new net weight at 8.0% Uranium, you do the following:

$(100\% / 8\%) = 12.5$  is the multiplier to find the new net weight.

**5.3. Materials Management**

**5.3.1. Waste Minimization by Prevention of Contamination**

Special precautions will be taken to prevent contamination (e.g. Radiological, Chemical) and in areas where spills or leaks of liquid or liquid waste on the buildings floor are anticipated, Herculite™ or equivalent floor covering will be used to provide a local contamination barrier. Otherwise the floors in the building will not be covered.

Also, to minimize potential waste materials brought into the packaging and handling facility exclusion zone, unwrapping, decontainerizing, or unpackaging of equipment (including tools and materials) will be done prior to entry into the packaging and handling facility. This will keep as much packing material as possible from becoming contaminated.

**5.3.2. Prevention of Environmental Media Pollution**

Potential discharges of pollutants to soil, surface water, ground water, and the atmosphere will be minimized by the following measures. For soil and ground water pollution prevention, project activities will be performed inside of Building 93A. Bulk liquid storage areas inside the exclusion zone of the enclosure will be provided with temporary secondary containment. Care will be exercised at all times to prevent spills from occurring inside or outside of the exclusion zone. When spills do occur, prompt response action by the Project Team will be taken to contain and clean up the spill, with all recovered materials being properly managed as recyclable materials or as waste.

For water pollution, every effort will be made to collect any liquids extracted from waste containers and repackage that liquid for subsequent processing.

**5.3.3. Management of Facility Waste Containers**

Primary waste in this project are described in Section 2. Secondary wastes will include used PPE which has exceeded its useful life, contaminated isolation materials, decontamination waters, HEPA filters, and uncontaminated solid wastes. The Project Team will manage all waste materials in cooperation with other FCP personnel, to minimize hazards to project personnel, other personnel at the FCP site, the public, and the environment.

**5.3.4. Facility and Container Inspections**

Inspections of waste in holding containers and equipment in the packaging and handling facility exclusion zone will be conducted. In accordance with regulatory requirements, container storage, staging, areas will be inspected when in use. Inspections in container storage or staging areas will include, but not be limited to, inspection of containers for leaks, damage, indications of overpressure, loose or illegible labels, aisle spacing, and waste compatibility. The presence and accessibility of adequate quantities of emergency response equipment will be verified.

Process equipment will be inspected for any mechanical or electrical conditions which could cause an accident or emergency or render the equipment inoperable if not corrected. If such a condition is found, the equipment will immediately be tagged out of service, and maintenance or repairs will be initiated.

### 5.3.5. Spill Response

Any time a leaking container or an accumulation of dry or liquid mixed wastes in process equipment or on the floor, immediate action will be taken to contain, clean-up, and package the materials in question. Project Team personnel will perform any spill response and housekeeping within the exclusion zone in accordance with applicable site procedures. In the event of a large spill or a spill that causes a condition immediately dangerous to life and health (IDLH), Project and other site personnel will evacuate the exclusion zone, notify the Fluor Fernald Assistant Emergency Duty Officer (AEDO) and stay outside the exclusion zone until allowed to return by the AEDO.

### 5.3.6. Management of Contaminated Water

Wash water will be collected in a contaminated water holding container. If wash water is produced it will be evaluated for discharge through the Advanced Waste Water Treatment (AWWT) Facility.

### 5.3.7. Management of Secondary Waste

Secondary waste will be segregated into separate containers by category so that they may be managed as efficiently as possible. The most significant secondary waste stream will be PPE. At each break, personnel in the exclusion zone will pass through a dress out area where PPE will be doffed. Separate plastic lined collection drums for protective clothing, used respirators, outer booties, and disposable items (e.g., gloves, tape, filter cartridges, etc..) will be provided at the egress station. Project personnel will manage these accumulated secondary wastes. Project personnel will also manage the segregation and handling of PPE.

## 5.4. **Materials Management**

Non-waste materials such as equipment, spare parts, and consumable supplies will be managed to prevent emergency situations from spills or releases, and to prevent project delays due to shortage of Critical supplies. Supplies will be received, handled, processed, and stored in accordance with applicable site procedures. Regular periodic inspections of both the storage area and the inventories will be made.

## 6. Waste Treatment

### 6.1. **Commercial Treatment**

The waste in this project will be treated to meet Land Disposal Restriction (LDR) treatment standards found in 40 Code of Federal Regulations (CFR) Part 268, by Envirocare of Utah, under the Vacuum Thermal Desorption Contract (Contract Number 02FF1064). Envirocare of Utah has within its LLMW treatment facilities a robust treatment train that is designed to handle LLMW with waste codes assigned to the waste herein. Envirocare of Utah will perform all waste treatment activities under their commercial permits and licenses and in accordance with Federal, State and local laws and regulations.

### 6.2. **Certificate of Treatment**

The required certificate of treatment will be acquired from Envirocare of Utah and will be determined to meet the needs of the project. It will become part of the project record file.

7. **Waste Disposal**

7.1. **Commercial Disposal**

The waste in this project will be disposed of by Envirocare of Utah, under the Vacuum Thermal Desorption Contract (Contract Number 02FF1064). Envirocare of Utah has a LLMW disposal facility. Envirocare of Utah will perform all waste disposal activities under their commercial permits and licenses and in accordance with Federal, State and local laws and regulations.

7.2. **Certificate of Disposal**

The required certificate of disposal will be acquired from Envirocare of Utah and will be determined to meet the needs of the project. It will become part of the project record file.