7085 G-000-102.140

ISSUANCE OF REVISION 2.1 OF THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT'S RESOURCE CONSERVATION AND RECOVERY ACT PART B PERMIT APPLICATION

07/31/95

DOE-1267-95
DOE-FN USEPA
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REPORT

7085

Department of Energy
Fernald Environmental Management Project
P. O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 648-3155

JUL 3 1 1995

DOE-1267-95

Mr. Valdus Adamkus
U.S. Environmental Protection Agency
Region 5 - HRE-8J
77 West Jackson Blvd.
Chicago, Illinois 60604-3590

Dear Mr. Adamkus:

ISSUANCE OF REVISION 2.1 OF THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT'S RESOURCE CONSERVATION AND RECOVERY ACT PART B PERMIT APPLICATION

Enclosed is Revision 2.1 of the Fernald Environmental Management Project (FEMP) Resource Conservation and Recovery Act (RCRA) Part B Permit Application involving the changes to the RCRA Contingency Plan (Section G), Part A Permit Application (Section A) and Waste Characteristics (Section C). Changes are marked by shading and strikeouts. Revision 2.0 incorporated all review comments from Ohio Environmental Protection Agency (OEPA) and was submitted to your office in September 1994. Revision 2.1 is an updated version of Revision 2.0 providing the following alterations:

Section A	EPA Form 8700-23 Table A-1
Section C	Pages 12, 13 Addition of Attachment C-7
Section G	Pages 2, 3, 8 Attachment G-1, pages 2, 3, 9, 16, 18, 19, 20, 21, 22, 24, 45(A,B), 51, 52, 57, 59, 65, 66(A,B), 67(A,B), 68, 70(A,B), 74 and 75.

Reasons for the alterations are described in the enclosure. Please replace the appropriate pages (including removal of the corresponding diagrams to pages 9, 16, 18, 19, 24, 59 and 74, Section G, Attachment G-1) with their revisions.

If you have any questions, please contact Ed Skintik of my staff at (513) 648-3151.

Sincerely,

for Jack R. Craig
Director

FN:Skintik

Enclosures: As Stated

000001

cc w/enc:

K. A. Chaney, EM-423, QO
P. Pardi, OEPA-Dayton
RCRA Operating Record, FERMCO
Administrative Record, FERMCO

cc w/o enc:

J. Saric, USEPA-5
T. A. Schneider, OEPA-Dayton
T. Crepeau, OEPA-Columbus
T. D. Hagen, FERMCO/65-2
L. B. Ko, FERMCO/16-3
A. B. Saha, FERMCO/16-3

ENCLOSURE

The Prototype Sampling and Analysis Plan for Containerized Wastes at the FEMP (SAP) in Section C, Attachment C-7 was added in response to OEPA's comments made in the June 19, 1995 meeting on the FEMP RCRA Part B Permit Application. The changes on pages 12 and 13 of Section C reflect the inclusion of the Prototype Sampling and Analysis Plan.

The following alterations are due to changes in fire, safety and emergency equipment:

HWMU No. 10 -NAR System Components	Change in emergency equipment	Section G, Attachment G-1, pages 21 and 22
HWMU No. 28 - Trane Thermal Liquid Incinerator	Addition of a fire extinguisher and relocation of a portable eyewash/safety shower	Section G, Attachment G-1, pages 45(A,B)
HWMU Number 38 - HF Tank Car	Installation of new spill clean-up equipment	Section G, Attachment G-1, page 57
HWMU No. 46 - Uranyl Nitrate Tanks (NFS Storage Area)	Change in emergency equipment	Section G, Attachment G-1, page 65
HWMU No. 47 - Uranyl Nitrate Tanks (North of Plant 2)	Change in emergency equipment	Section G, Attachment G-1, pages 66(A,B)
HWMU No. 48 - Uranyl Nitrate Tanks (Southeast of Plant 2)	Change in emergency equipment	Section G, Attachment G-1, pages 67(A,B)
HWMU No. 49 - Uranyl Nitrate Tanks (Digestion Area)	Change in emergency equipment	Section G, Attachment G-1, page 68
HWMU No. 50 - Uranyl Nitrate Tanks (Raffinate Building)	Change in emergency equipment	Section G, Attachment G-1, pages 70(A,B)
HWMU No. 54 - Tank for Bulk Storage of Thorium Nitrate Solution, T-2	Two new portable eyewash units inside the Sump House (Building 13C) for to replace the damaged units.	Section G, Attachment G-1, page 75

The following alterations are due to new telephone system being installed at the FEMP in the month of May 1995:

Section A EPA Form 8700-23
Section G Pages 2, 3 and 8

The following alterations are due to relocation of storage areas from Building 64 to Bay 3 of the KC-2 Warehouse (Building 63) and changes in safety and emergency equipment:

HWMU No. 34 - KC-2 Warehouse (Bldg. 63)	Relocation of 90 Day and Controlled Holding Storage Areas from building 64 to building 63. Also, installation of safety shower and spill cleanup equipment	Section G, Attachment G-1, pages 9, 51 and 52

The following alterations are due to the units being closed:

HWMU NO.6- Drummed HF Residue/Associated Storage Area North West of Plant 4	OEPA Correspondence dated April 28, 1995	Section A, Table A-1 Section G, Attachment G-1, pages 2 and 16
HWMU No. 8 - Drummed HF Residue/Associated Storage Area South of Cooling Tower	OEPA Correspondence dated April 13, 1995	Section A, Table A-1 Section G, Attachment G-1, pages 3 and 18
HWMU NO. 9-Nitric Acid Rail Car and Area	OEPA Correspondence dated April 25, 1995	Section A, Table A-1 Section G, Attachment G-1, pages 2, 19 and 20
HWMU NO. 53- Safe Geometry Digestion Sump (Plant 1)	OEPA Meeting on March 2, 1995	Section A, Table A-1 Section G, Attachment G-1, pages 3 and 74

The following alterations are due to the reclassifications from Hazardous Waste Management Units to Solid Waste Management Units:

HWMU No. 12 - Wheelabrator	OEPA Correspondence dated March 27, 1995	Section A, table A-1 Section G, Attachment G-1, pages 2 and 24
HWMU No. 40 -Bio-Surge Lagoon	OEPA Correspondence dated February 14, 1995	Section A, table A-1 Section G, Attachment G-1, pages 3 and 59

SECTION A

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only.

Form approved. OMB No. 2050-0034; Expires 9-30-88

0085

EPA I.D. Number (enter from page 1): OH6890008976

Secondary ID Number (enter from page 1):

VII. Operator Information (see instructions)

Name of Operator: U S DEPARTMENT OF ENERGY

Street or P.O. Box: PO BOX 538705

City or Town: CINCINNATI

State: OH

ZIP Code: 45253-8705

Phone Number (area code and number): 513-648-3000

B. Operator Type: F

C. Change of Operator Indicator: Yes [ ] No [X]

Date Changed: Month Day Year

VIII. Facility Owner (see instructions)

A. Name of Facility's Legal Owner: U S DEPARTMENT OF ENERGY

Street or P.O. Box: PO BOX 538705

City or Town: CINCINNATI

State: OH

ZIP Code: 45253-8705

Phone Number (area code and number): 513-648-3000

B. Owner Type: F

C. Change of Owner Indicator: Yes [ ] No [X]

Date Changed: Month Day Year

IX. SIC Codes (4-digit, in order of significance)

Primary	Secondary
4953 (description) HAZARDOUS WASTE	(description)
Secondary	Secondary
(description)	(description)

X. Other Environmental Permits (see instructions)

A. Permit Type (enter code)	B. Permit Number	C. Description
N	110000004*DD	
E	OTHER	SEE ATTACHMENT #1

EPA Form 8700-23 (01-87)

ITEM VII: OPERATOR INFORMATION (Continued)

NAME OF CO-OPERATOR

Fernald Environmental Restoration Management Corporation (FERMCO)

STREET OR P.O. BOX

P.O. Box 538704

CITY OR TOWN	STATE	ZIP CODE
Cincinnati	Ohio	45253-8704

TELEPHONE NUMBER

(513) 648-3000

UNIT NO.	FEMP HAZARDOUS WASTE MANAGEMENT UNITS	Type of Unit (1)	Process Code (2)	Status (3)	Dimensions (4)
1A	Fire Training Facility*		D80		84'8" X 68'
1B	Fire Training Facility*	D	D80	4	105' x 134'
2	~~Parts Cleaner in Welding Shop (Bldg. 12)~~ (Removed in accordance with OEPA letter of November 1, 1993)	~~S~~	~~S01~~	~~2~~	~~33" x 71" x 5/9"~~
3	Waste Oil Storage in Garage	S	S01	2	10' x 10'
4	Drum Storage Area Near Loading Dock (Lab Bldg)	S	S01	2	40' x 76'
5	Drum Storage Area South of W-26 (Lab Bldg)	S	S01	2	31'8" x 41'
6	~~Drummed HF Residue/Associated Storage Areas Inside Plant 4~~ (Closed in accordance with OEPA letter of April 28, 1995)	~~S~~	~~S01~~	~~2~~	~~4' x 17'~~
7	Drummed HF Residue/Associated Storage Areas NW of Plant 4	S	S01	2	25' x 30'
8	~~Drummed HF Residue/Associated Storage Areas S. of Cooling Towers~~ (Closed under "Generator Closure" protocol in accordance with OEPA letter of April 13, 1995)	~~S~~	~~S01~~	~~2~~	~~14' x 40' x 15'~~
9	~~Nitric Acid Rail Car and Area~~ (Closed in accordance with OEPA letter of April 25, 1995)	~~S~~	~~S01~~	~~2~~	~~10' x 40' x 15'~~
10	NAR System Components	S	S02	4	13,262 sq. ft.
11	Tank Farm Sump	T	T02	3	165' x 135'
12	~~Wheelabrator (Bldg. 66)~~ (Removed in accordance with OEPA letter of March 27, 1995)	~~S~~	~~S01~~	~~4~~	~~24' x 20'~~
13	Wheelabrator Dust Collector (Bldg. 66)	S	S01	2	30' x 17'
14	Box Furnace	T	T03	4	14' x 18'
15	Oxidation Furnace #1	T	T03	4	85 sq. ft.
16	Primary Calciner	T	T03	4	13.5 ft diam x 40' high
17	Plant 8 East Drum Storage Pad	S	S01	4	18,330 sq. ft.

1) T=Treatment S=Storage D=Disposal.
2) Process Codes provided in item XII of Hazardous Waste Permit Application Part A.
3) 1=HWMU to be permitted, 2=HWMU to be closed, 3=HWMU to be operated, not permitted, Closure to be integrated with remedial actions, 4=HWMU not to be operated, Closure to be integrated with remedial actions, 5=HWMU closed.
4) Dimensions: width x length x height - unless otherwise indicated.
5) Waste pit No. 4 is irregularly shaped; dimensions provided are for each side.

* Unit 1 remains one unit, but is split into two areas (A & B) because a road divides the unit.

UNIT NO.	FEMP HAZARDOUS WASTE MANAGEMENT UNITS	Type of Unit (1)	Process Code (2)	Status (3)	Dimensions (4)
18	Plant 8 West Drum Storage Pad	S	S01	4	~~12,304 sq. ft.~~
19	CP Storage Warehouse - Bldg. 56 (Butler Bldg.)	S	S01	1	50′ x 180′
20	Plant 1 Pad	S	S01	1	480,000 sq. ft.
21	Hilco Oil Recovery	S	S01	2	272 sq. ft.
22	Abandoned Sump West of Pilot Plant	S	S01	4	2′ diam. x 14′ deep
23	~~Well Drilling Storage Area~~ (Removed in accordance with OEPA letter of November 1, 1993)	~~S~~	~~S01~~	~~2~~	~~29′ x 56′~~
24	~~Equipment Storage Area~~ (Removed in accordance with OEPA letter of June 2, 1992)	~~S~~	~~S01~~	~~2~~	~~45′ x 145′~~
25	Plant 1 Storage Bldg. (Bldg. 67)	S	S01	4	165′ x 190′
26	Detrex Still	S	S02	2	32" x 76" x 7′6"
27	Waste Pit No. 4	D	D80	4	170′ x 320′ x 400′ x 320′
28	Trane Thermal Liquid Incinerator	T	T03	4	50′ x 52′
29	Plant 8 Warehouse (Bldg. 80)	S	S01	1	60′ x 170′
30	Barium Chloride Salt Treatment Facility (Closed)	T	T04	5	50′ x 75′
31	Tank for Bulk Storage of Solvents, T-5	S	S02	2	10′ diameter
32	Tank for Bulk Storage of Solvents, T-6	S	S02	2	10′ diameter
33	Pilot Plant Warehouse (Bldg. 68)	S	S01	1	69′ x 7′
34	KC-2 Warehouse (Bldg. 63)	S	S01	1	346′2-3/8" x 82′
35	Plant 9 Warehouse (Bldg. 81)	S	S01	1	80′ x 100′
36	Storage Pad North of Plant 6	S	S01	2	8′ x 40′
37	Plant 6 Warehouse (Bldg. 79)	S	S01	1	100′ x 170′
38	HF Tank Car	S	S01	2	10′ x 36′ x 15′
39	Clearwell (Removed in accordance with OEPA letter of June 7, 1993)	T	T02	3	30,600 sq. ft.

1) T=Treatment S=Storage D=Disposal.
2) Process Codes provided in item XII of Hazardous Waste Permit Application Part A.
3) 1=HWMU to be permitted, 2=HWMU to be closed, 3=HWMU to be operated, not permitted, Closure to be integrated with remedial actions, 4=HWMU not to be operated, Closure to be integrated with remedial actions, 5=HWMU closed.
4) Dimensions: width x length x height - unless otherwise indicated.
5) Waste pit No. 4 is irregularly shaped; dimensions provided are for each side.
* Unit 1 remains one unit, but is split into two areas (A & B) because a road divides the unit.

UNIT NO.	FEMP HAZARDOUS WASTE MANAGEMENT UNITS	Type of Unit (1)	Process Code (2)	Status (3)	Dimensions (4)
40	~~Bio-Surge Lagoon~~ (Removed in accordance with OEPA letter of February 14, 1995)	~~T~~	~~T02~~	~~3~~	~~160,000 sq. ft.~~
41	Sludge Drying Beds	T	T02	4	79' x 92'
42	Waste Pit No. 5	T	T02	4	184,000 sq. ft.
43	Lime Sludge Ponds (Removed in accordance with OEPA letter of June 7, 1993)	S	S04	3	40,000 sq. ft.
44	Coal Pile Runoff Basin (Removed in accordance with OEPA letter of June 7, 1993)	S	S04	3	5,778 sq. ft.
45	UST No. 5 (Removed in accordance with OEPA letter of November 1, 1993)	S	S02	2	2'6" diameter
46	Uranyl Nitrate Tanks (NFS Storage Area)	S	S02	4	61'7" x 53'9"
47	Uranyl Nitrate Tanks (North of Plant 2)	S	S02	4	63'6" x 40'6"
48	Uranyl Nitrate Tanks (Southeast of Plant 2)	S	S02	4	54'7" x 45'4"
49	Uranyl Nitrate Tanks (Digestion Area [2 locations])	S	S02	4	127 x 20' (each loc.)
50	Uranyl Nitrate Tanks (Raffinate Building [2 locations])	S	S02	4	14' x 50' : 15' x 30'
51	Experimental Treatment Facility (ETF)	T	T04	4	20' x 48'
52	North and South Solvent Tanks (Pilot Plant)	S	S02	2	6'6" diameter each
53	~~Safe Geometry Digestion Sump (Plant 1)~~ (Closed in accordance with meeting with OEPA on March 2, 1995)	~~S~~	~~S02~~	~~2~~	~~8" diameter x 12" deep~~
54	Tank for Bulk Storage of Thorium Nitrate Solution, T-2	S	S02	4	10' diameter

1) T=Treatment S=Storage D=Disposal.
2) Process Codes provided in item XII of Hazardous Waste Permit Application Part A.
3) 1=HWMU to be permitted, 2=HWMU to be closed, 3=HWMU to be operated, not permitted, Closure to be integrated with remedial actions, 4=HWMU not to be operated, Closure to be integrated with remedial actions, 5=HWMU closed.
4) Dimensions: width x length x height - unless otherwise indicated.
5) Waste pit No. 4 is irregularly shaped; dimensions provided are for each side.
* Unit 1 remains one unit, but is split into two areas (A & B) because a road divides the unit.

SECTION C

Sampling Methods

The FEMP has prepared a prototype containerized waste sampling and analysis plan (Attachment C-7) for sampling waste materials for characterization which are stored in cans, pails, drums, white metal boxes, and Sea/Land or top load containers. The plan is updated on a regular basis to resolve reoccurring sampling problems, regulatory changes, and changes in the supporting documents. The prototype plan incorporates the sampling methods in the SCQ, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I, Soils and Solid Media (EPA/230-02-89-042), Characterizing Heterogeneous Wastes: Methods and Recommendations (EPA/600/R-92/033), and Test Methods for Evaluating Solid Wastes, Volume II, Field Manual, Physical/Chemical Methods (SW-846). All work will be conducted in accordance with the FEMP SCQ which is designed to meet the data quality objectives associated with FEMP activities. Data generated under the SCQ is intended to fulfill defined needs of DOE, EPA, the Ohio Environmental Protection Agency, and the public.

Due to the fact that wastes generated at the FEMP vary in types of matrices, the sampling methods and equipment used by the facility depend on the individual waste stream matrix. The types of equipment used to sample specific waste types are summarized in Table C-7.

Representativeness, or the collection of samples that are unbiased and exhibit average properties of the population sampled, is achieved by segregating the containerized wastes into sub-waste streams. A sub-waste stream is comprised of a sample groups of similar material matrix and physical properties.

Sampling accuracy, or the closeness of a sample value to its true value, is achieved through randomized sampling of the waste containers within a given sub-waste stream. Randomized sampling minimizes bias in the sample selection process by giving each container an equal probability of being sampled.

Sampling precision, or the closeness of repeated sample values, is achieved by increasing the number of samples to be collected, increasing the actual volume of the samples, or dividing a population into appropriate strata prior to sampling. Additional samples may be collected when the uniformity of the waste is not known and when sample collection is difficult. The volume of sample material collected at the FEMP usually exceeds the minimum amount

needed for analytical sample preparation and analysis to facilitate additional analyses for documentation of precision. Lastly, when a sub-waste stream is suspected or known to contain separate physical phases (i.e., solids and liquids), the number of samples required is calculated for each waste phase. During sample collection activities, a sample is collected from each waste phase from the randomly selected waste containers.

The sampling approach for containerized wastes at the FEMP is dependent on the characteristics of the sub-waste stream as determined by process knowledge, previous analytical data, and/or visual inspection reviews. Simple random sampling methods are used for sub-waste streams which contain a single-phased (i.e., either solid or liquid) and relatively homogenous waste material. Stratified random sampling methods are used for sub-waste streams that have been segregated into multiple container groups (lots) based upon differences in: the physical characteristics (i.e., phase and degree of homogeneity) of the waste materials, the origin (time and location) of waste materials and their generation process, or the distribution and concentration of contaminants.

Methods of determining simple random sample locations include using a random number generator or random number lists. Computer generation of random numbers is preferred, since it eliminates the potential for error in reading a random number list and reduces bias in the selection of the origin point for a random number list. Stratified random sample locations will be determined by selecting random sample locations as previously described for each container group or lot.

All samples will be placed in containers and labeled with the following information: generator name, manifest number (if applicable), waste stream/sample number and date sample was taken.

Number of Samples

Sampling procedures used for waste characterization at the FEMP are designed to ensure representative and random sampling. Sampling plans at the FEMP are prepared following the Prototype Sampling and Analysis Plan for Containerized Wastes at the FEMP (SAP), (Attachment C-7). The plan is updated on a regular basis to resolve reoccurring sampling problems, regulatory changes, and changes in the supporting documents. The primary objective of the SAP is to generate data of sufficient quality to identify the regulatory status of, and safely manage, containerized waste materials. To satisfy SCQ completeness

SMS-93-290
Revision 2

Prototype Sampling and Analysis Plan for Containerized Wastes at the FEMP

June 1994

Prepared for:

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

Executive Summary

The Fernald Environmental Management Project (FEMP) has prepared a prototype containerized waste sampling and analysis plan (SAP) for characterization of waste materials stored in cans or pails, drums, white metal boxes, and Sea/Land® or Top Load containers. This SAP replaces waste characterization protocol described in FMPC-2185, "Sampling Plan for Drummed Waste at the FMPC," October 1989. Project-specific sampling and analysis plans (PSAPs) will be developed based on requirements in this SAP. The PSAPs will be implemented in accordance with standard operating procedures (SOPs) which govern aspects of sampling and analysis (S&A), such as sample collection, chain-of-custody, decontamination of equipment, sample management, etc.

The primary objective of this SAP is to generate data of sufficient quality to identify the regulatory status of, and safely manage, containerized waste materials. Secondary objectives are to develop information to determine the appropriate waste disposition option, including treatment and/or disposal. This SAP has been developed to meet the requirements for waste management and disposal within the DOE complex and at commercial facilities. It is consistent with EPA guidance contained in SW-846, Test Methods for Evaluating Solid Waste, and meets the DOE/NV requirements of NVO-325 (Rev. 1), Nevada Test Site (NTS) Defense Waste Acceptance Criteria, Certification, and Transfer Requirements.

In general, the sampling approach for containerized wastes at the FEMP is dependent on the characteristics of the sub-waste stream as determined by process knowledge (PK), previous analytical data reviews and visual inspections. Sub-waste streams which contain heterogenous materials and lack sufficent PK data will be subjected to "comprehensive" sampling and analysis. Sub-waste streams which contain homogenous materials and/or have preliminary determinations based

on PK/previous analytical/visual inspection reviews will be subj ed to "confirmatory" sampling and analyses.

Simple-, systematic-, or stratified-random sampling techniques may b mployed based upon the material characteristics, process history, and projec -specific data needs. Systematic or stratified random sampling methods will be used for sub-waste streams that have been segregated into multiple container groups (lots) based upon differences in: physical characteristics (i.e., phase and degree of homogeneity) of the waste materials, origin (time and location) of waste materials and their generation processes, or distribution and concentration of contaminants.

The primary method for determining the number of samples required for "comprehensive" analyses (based on a 90% level of confidence) consists of a combination of sampling 10% of the containers (for sub-waste streams of 100 containers or less) and the cube root method (for sub-waste streams of > 100 containers). For "confirmatory" analyses, the primary method for determining the number of required samples is equal to the $\log_{10}$ of the number of containers plus one additional sample. EPA SW-846 Equation 8 may be used in lieu of the previously metioned sample frequencies for sub-waste streams which contain sufficient PK/analytical data to approximate a sample mean and standard deviation. EPA SW-846 Equation 8 may also be used as a secondary method for "comprehensive" or "confirmatory" analyses, in situations where the upper limit of a 90% confidence level approximates or exceeds the regulatory threshold value for a given analyte, to determine if additional sample collection and analysis is warranted.

Factors to be considered in the determination of the number of samples required are: 1) the availability of process knowledge, previous analytical data, or visual inspection results; 2) the volume and nature of the sub-waste stream; and 3) the feasibility and cost-effectiveness of sample collection and analysis.

Executive Summary

All work will be conducted in accordance with the FEMP Sitewide CERCLA Quality Assurance Project Plan (SCQ). The SCQ is designed to ensure that work performed at the FEMP is of sufficient quality to fulfill project-specific Data Quality Objectives (DQOs) and to satisfy Department of Energy (DOE), United States Environmental Protection Agency (EPA), Ohio Environmental Protection Agency (OEPA), and public data needs. The SCQ meets current FEMP site needs and retains the flexibility to incorporate changes in the FEMP mission, analytical methods, operating procedures, field techniques, etc. EPA guidance documents, FEMP SOPs, DOE Orders, and a variety of other documents may be used to support the SCQ.

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List of Acronyms

ALARA	As Low As Reasonably Achievable
ASL(s)	Analytical Support Level(s)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COLIWASA	Composite Liquid Waste Sampler
CRU	CERCLA/RCRA Unit
DEs	Drum Equivalents
DL	Detection Limit
DOE	United States Department of Energy
DOE/NV	Department of Energy/Nevada Field Office
DOT	United States Department of Transportation
DQO(s)	Data Quality Objective(s)
DVD	Data Validation Department
EPA	United States Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FMPC	Feed Materials Production Center
GMR	Great Miami River
LAB/ACS	Analytical Laboratory/Analytical Customer Support
LAB/DR&A	Analytical Laboratory/Data Review and Assembly
LLW	Low Level (radioactive) Wastes
MEF	Material Evaluation Form
nCi/g	nano-Curies per gram
NTS	Nevada Test Site
NVO-325	Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer requirements, Revision 1, June 1992
NVO-325LRD	NVO-325 Laboratory Reference Document

List of Acronyms

OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
P&CC	Project and Configuration Control
PCB(s)	Poly-Chlorinated Biphenyl(s)
pCi/g	pico-Curies per gram
PK	process knowledge
PPE	Personal Protective Equipment
ppm	parts per million
PSAP(s)	Project-specific Sampling and Analysis Plan(s)
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFA/OSCTR	Request for Analyses/Off-site Custody Transfer Record
RSA	Request for Sampling and Analysis
RSO	Remedial Support Operations
S&A	Sampling and Analysis
SAA	Satellite Accumulation Area
SAP	Sampling and Analysis Plan
SAR/CR	Sitewide Analysis Request/Custody Record
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SEG	Scientific Ecology Group, Inc.
SMS	Site Media Sampling
SOP(s)	Standard Operating Procedure(s)
SW-846	Test Methods for Evaluating Solid Wastes
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
VR	Variance Request
WC	Waste Characterization

1.0 Project Description

The Fernald Environmental Management Project (FEMP) has prepared a prototype containerized waste sampling and analysis plan (SAP) for characterization of waste materials stored in drums, white metal boxes, and Sea/Land® or Top Load containers. This SAP replaces waste characterization protocol described in FMPC-2185, "Sampling Plan for Drummed Waste at the FMPC," October 1989. Project-specific sampling and analysis plans (PSAPs) will be developed based on requirements in this SAP. The PSAPs will be implemented in accordance with standard operating procedures (SOPs) which govern aspects of sampling and analysis (S&A), such as sample collection, chain-of-custody, decontamination of equipment, sample management, etc.

This SAP applies to waste materials stored within cans or pails, drums, white metal boxes, and Sea/Land® or Top Load boxes. Ultimately, all solid waste materials at the FEMP requiring shipment to a treatment or disposal facility will be contained within drums, white metal boxes, or Sea/Land® or Top Load boxes. However, the FEMP is developing additional prototype SAPs to characterize these wastes in-situ prior to their containerization, if necessary. Types of wastes addressed by these additional SAPs include:

- Soil/Waste Stockpile Materials
- In-Situ Soils/Landfill Materials
- Tank/Sump Materials
- Surface Impoundment Materials

In addition, this SAP shall also be applicable to and followed by FEMP-specific subcontractors for sampling, analysis, and characterization of waste materials generated during recycling or treatment of FEMP materials. Specifically, this

SAP will be used by Scientific Ecology Group, Inc. (SEG) for sampling, analysis, and characterization of wastes generated as the result of metal melting or compaction of FEMP-specific materials.

1.1 General Site Description

This subsection provides site-specific information for the FEMP and Scientific Ecology Group (SEG) facilities.

1.1.1 FEMP-Specific Description

The FEMP, formerly called the Feed Materials Production Center (FMPC), is a United States Department Of Energy (DOE) facility located on approximately 1,050 acres of land in a rural area 27 kilometers (16 miles) northwest of downtown Cincinnati, Ohio. The FMPC operated from 1951 to 1989, by processing uranium ore and feed materials for the production of low-enriched uranium metal products. Subsequent to 1989, the site name and mission changed towards implementation of environmental restoration initiatives to address environmental impacts associated with FMPC operational and FEMP remediation activities.

In general, the FEMP site is divided into the following Operable Units (OUs) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/ Resource Conservation and Recovery Act (RCRA) Units (CRUs):

- OU/CRU 1 - the Waste Pit Area
- OU/CRU 2 - Other Waste Units
- OU/CRU 3 - the Former Production Area
- OU/CRU 4 - Silos 1 - 4
- OU/CRU 5 - Environmental Media

OU/CRU 1, the Waste Pit Area, consists of a total of eight impoundments used to store a variety of solid and liquid wastes generated by uranium metal production processes.

OU/CRU 2, Other Waste Units, consists of a solid waste landfill, two lime sludge settling ponds, an inactive and an active flyash disposal area, and a former construction rubble disposal area.

OU/CRU 3, the Former Production Area, consists of process/production plants (Plants 1 - 9), container storage pads, RCRA storage facilities, process-support/maintenance buildings, an impoundment used to separate suspended solids from stormwater prior to discharge, a sewage treatment plant, and a solid-material incinerator.

OU/CRU 4, Silos 1 - 4, consists of two silos (K-65) which contain residues from pitchblende processing operations, a silo which contains dry metal oxide materials, and an empty silo.

OU/CRU 5, Environmental Media, consists of surface water and sediments, soils, flora and fauna, ambient air, and groundwater for the entire FEMP facility and adjacent affected areas.

More detailed information concerning site characteristics can be obtained from the Amended Consent Agreement between the DOE and the United States Environmental Protection Agency (EPA), annual site environmental reports, and other records/documents submitted for public inspection.

1.1.2 SEG-Specific Description

The SEG Metal Processing facility is located at 1560 Bear Creek Road, Oak Ridge, Tennessee. This facility is designed to handle and process approximately 25,000 tons of scrap metal per year. Metal processes performed at this facility include size-reduction, decontamination, and/or recycling (i.e., high-temperature melting) to support a variety of DOE programs and commercial nuclear industries. Detailed site-descriptive information has not been provided; however, this information may be obtained from SEG, if warranted.

1.2 Description of Wastes and Generating Processes

A variety of the FEMP's restoration activities, as well as facility support and maintenance functions, are currently generating and will continue to generate waste materials. In addition, when the FMPC ceased production in 1989, a large, but finite inventory of materials associated with the uranium metal production processes were retained. Lastly, as part of the FEMP's waste management and minimization programs, a portion of FEMP materials are shipped to the SEG facility for volume reduction or recycling (metal melting). These wastes/materials require characterization to ensure safe, compliant, and appropriate management to support environmental restoration and waste management goals at the FEMP and supporting programs and facilities.

1.2.1 Overview of Waste Types

This subsection provides a generalized description of the types of waste materials generated at the the FEMP and SEG facilities.

1.2.1.1 FEMP-Specific Waste Types

The types of wastes generated at the FEMP can be grouped into three broad categories: low-level wastes (LLW), hazardous or mixed wastes, and conventional industrial wastes.

Low-level wastes are materials that exhibit radionuclide concentrations which are not economically feasible to recover. Common FEMP low-level wastes that may be characterized by sampling and analysis include:

- Process residues
- Construction rubble
- Thorium materials
- Surface impoundment sediments
- Lime sludge residues

- FEMP or offsite laboratory generated contact wastes, such as gloves, personal protective equipment (PPE), rags, wipes, filters, unused sample materials, sample extracts, etc.

In general, low-level wastes are sent to a viable low-level waste disposal facility (e.g., NTS) for proper disposition. However, soil materials exhibiting total uranium activities of less than 100 pico-Curies per gram (pCi/g) may be retained at the FEMP for unrestricted use as backfill materials.

Hazardous wastes are waste materials that exhibit properties of listed- or characteristic wastes defined in the Ohio Administrative Code (OAC), Chapter 3745-51 (in lieu of 40 CFR Part 261). Mixed wastes are waste materials which contain both radioactive and hazardous components. Common FEMP hazardous or mixed wastes that may be characterized by sampling and analysis include:

- Solvent still-bottoms and sludges
- Barium chloride salts
- Polychlorinated biphenyl (PCB)-containing materials
- Spent solvents
- Sand blasting residues
- FEMP or offsite laboratory generated contact wastes, such as gloves, personal protective equipment (PPE), rags, wipes, filters, unused sample materials, sample extracts, etc.

In general, hazardous and mixed wastes are stored at the FEMP site at approved RCRA storage facilities until the appropriate treatment or disposal option can be identified. Hazardous or mixed waste are only shipped to EPA approved and permitted hazardous/mixed waste facilities.

Conventional industrial wastes are materials that do not exhibit properties of low-level or hazardous wastes. Common conventional industrial wastes include:

- Trash from the Administrative Areas (not within Production Area)
- Boiler plant flyash

- Construction rubble (non-contaminated)

In general, conventional industrial wastes are shipped to an approved solid waste landfill for disposal.

1.2.1.2 SEG-Specific Waste Types

In general, recycling (metal melting) and compaction of FEMP-specific materials at the SEG facility should not generate any hazardous or mixed wastes. FEMP-specific materials shipped to SEG for recycling and compaction are low-level radiologically-contaminated stockpiled scrap metals and other debris generated during construction or remediation projects. These materials are as follows:

- Scrap metal
- Tanks
- Equipment/Machinery
- Structural steel
- Scrap vehicles
- Heat exchangers
- Pipe metal
- Tools

At SEG, low level scrap metal is segregated from loose oxides and other stockpile debris (i.e., paper, cardboard, plastic, gloves, glass, soil, etc.) included with the scrap metal shipments. Subsequent to segregation, scrap metal materials are recycled (i.e., melted) to produce rectangular metal boxes for radioactive material storage or burial.

Typical wastes generated by segregation and recycling of FEMP scrap metals and associated debris include:

- Iron oxides (rust scale)
- Segregated trash/debris

- Refractory brick
- Non-recyclable metal scrap
- Metal slag

These wastes will be placed in overpack containers for shipment to NTS. If warranted or feasible, these materials may be compacted to reduce waste volumes. Detailed information on these wastes are provided in ONL0000000009, Meatl Melt Wastes, as part of the FEMP's Waste Generator Application to NTS.

1.2.2 Overview of Waste Generation Processes

A brief, thorough description of the waste generation process is provided by the waste generator on the Material Evaluation Form (MEF). This brief description is incorporated into Section A.9 of the PSAP (Appendix A). Detailed information pertaining to the waste generation process is provided as an attachment to the PSAP and in the waste characterization file.

1.2.2.1 FEMP-Specific Waste Generation Processes

A majority of the wastes generated at the FEMP are either a direct or indirect result of the former uranium metal production processes at the FMPC. A summary of these processes is provided, to orient SAP users with historical production operations, as follows:

> The initial step in the uranium metal production process was to obtain uranium-containing materials from other DOE facilities and FMPC scrap metals recycling operations. These materials were then subjected to refining or reduction processes to produce Uranium tetrafluoride (UF4) or green salt. The green salt material was then blended with magnesium granules for reduction (in furnaces) to produce uranium metal forms called derbies. The derbies were then melted in vacuum induction furnaces and cast in graphite molds to produce ingots (flat or cylindrical). Flat ingots were subjected to heat treatment and final machining prior to shipment to other DOE sites. Cylindrical ingots were center-drilled to produce a billet. Billets were shipped offsite for extrusion then returned to the FMPC for heat treatment and final machining.

The uranium metal production processes were conducted at the following facilities at the FEMP site:

- Plant 1, the Sampling Plant
- Plant 2/3, the Refinery Plant
- Plant 4, the Green Salt Plant
- Building 13, the Pilot Plant
- Plant 5, the Metals Production Plant
- Plant 9, the Special Products Plant
- Plant 6, the Metals Fabrication Plant
- Plant 8, the Scrap Recovery Plant

Plant 1, the Sampling Plant, was responsible for the following functions:

- shipping, receiving, sampling and storing depleted, normal, and enriched uranium-containing materials
- drying, crushing, milling, grinding, and classifying uranium - containing materials
- reconditioning or baling of steel drums
- digesting enriched feed materials (up to 5% U^{235}) in geometrically safe equipment

Plant 2/3, the Refinery Plant, was responsible for the following functions:

- digesting recycled materials in nitric acid to produce an uranyl nitrate (UNH) solution for solvent extraction purification
- converting purified UNH to Uranium trioxide (UO_3) or orange oxide by thermal denitration processes
- recovering nitric acid from nitrogen oxide (NO_x) discharges from digestion and denitration operations

Plant 4, the Green Salt Plant, was responsible for the following functions:

- converting Uranium trioxide (UO_3) or orange oxide to Uranium dioxide (UO_2), or brown oxide by hydrogen reduction

- converting UO_2 to Uranium tetrafluoride (UF_4) by hydrofluorination processes (using anhydrous hydrogen fluoride - AHF)
- blending and packaging depleted green salt for the Metals Production Plant (Plant 5)

Building 13, the Pilot Plant, was responsible for the following functions:

- reducing Uranium hexafluoride (UF_6) to Uranium tetrafluoride (UF_4) by autoclaving processes
- coating crucibles used in uranium metal casting processes by plasma spray equipment

Plant 5, the Metals Production Plant, was responsible for the following functions:

- reducing Uranium tetrafluoride (UF_4) to high-purity depleted, normal, and enriched uranium derby metal
- remelting derby and recycled metals in vacuum induction furnaces for casting into ingots
- cutting ingots and milling Magnesium fluoride (MgF_2) slag byproduct for reuse in lining reduction pots

Plant 9, the Special Products Plant, was responsible for the following functions:

- machining ingots for extrusion
- casting derbies and high-grade recycled metals into large diameter ingots
- chemically decladding unirradiated fuel elements

Plant 6, the Metals Fabrication Plant, was responsible for the following functions:

- heat-treating products in neutral salt and salt-oil baths
- performing final machining of target element cores
- cropping, surface milling, and inspecting products for shipment

- performing metal pickling and chip briquetting operations

Plant 8, the Scrap Recovery Plant, was responsible for the following functions:

- screening recycled materials
- drying wastes for offsite disposal
- drum washing
- filtering contaminated water for recovery and waste operation

Figure 1.1 illustrates the FEMP uranium metal production processes. A more complete summary of these processes is provided by A Closer Look at Uranium Metal Production, A Technical Overview, prepared by the FMPC in March 1988. Detailed information on specific processes may be found in FMPC production SOPs, manufacturing specifications, and technical reports.

1.2.2.2 SEG-Specific Waste Generation Processes

In general, SEG-specific wastes result from scrap metal and debris segregation and treatment operations. A brief summary of the typical waste generation process is as follows:

> FERMCO scrap metal and appropriate waste manifest documentation are received at the SEG facility. These wastes are visually inspected for lead or lead-bearing materials and other non-desirable debris not amenable to the metal-melt process. When present, lead or lead-bearing metal scrap and other debris are physically segregated from the waste stockpile and transported to appropriately labeled storage bins for disposition. The resulting waste stockpile materials are subjected to size-reduction and/or surface decontamination (high pressure rinse or steel/glass bead shot blasting), if warranted. These materials are then melted in a 20-ton, 7200 kilowatt, high-energy induction furnace and deslagged. Metal slag material is removed , cooled, sampled, and placed in overpack containers with non-lead debris segregated prior to the metal-melt process. If warranted, these materials are subjected to volume-reduction operations prior to shipment to NTS.

Figure 1.2 illustrates typical SEG metal-melt processes. Detailed information on specific processes may be found in SEG-specific SOPs, specifications, and technical reports.

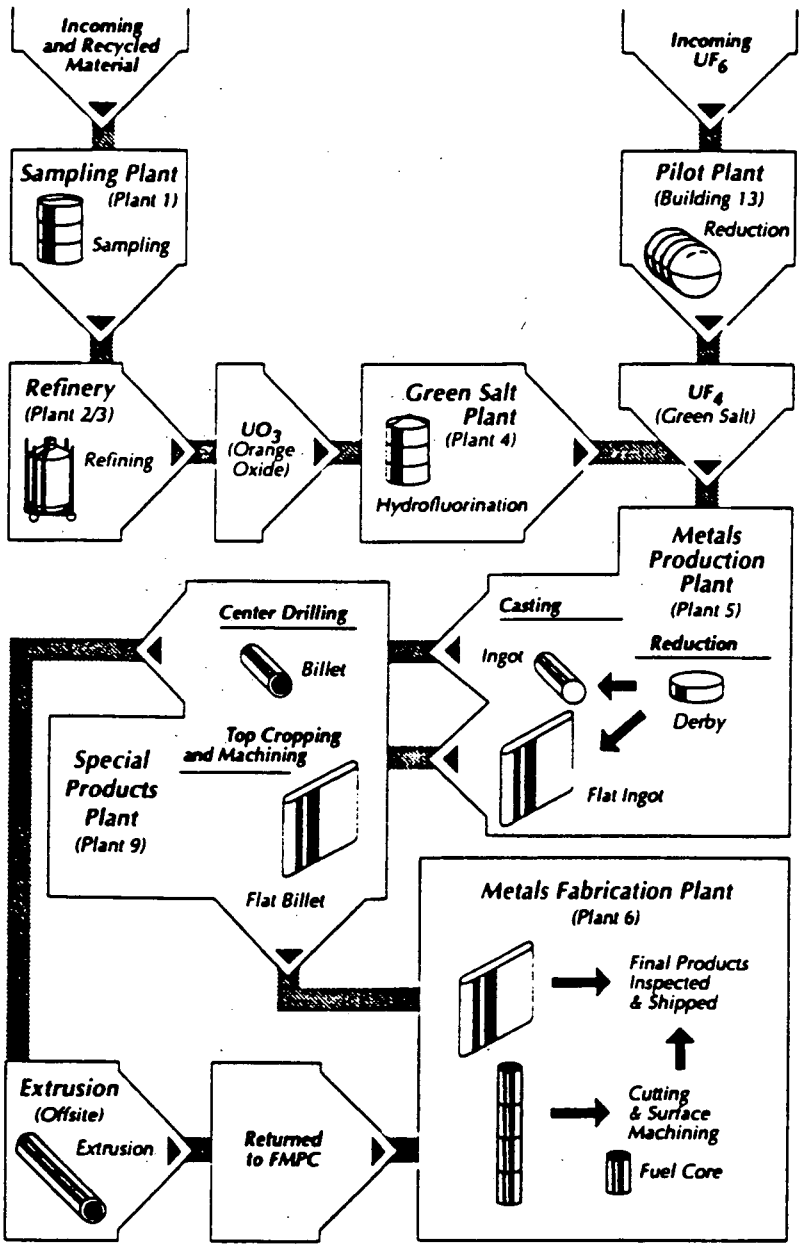


Figure 1.1 FMPC Uranium Metal Production Process

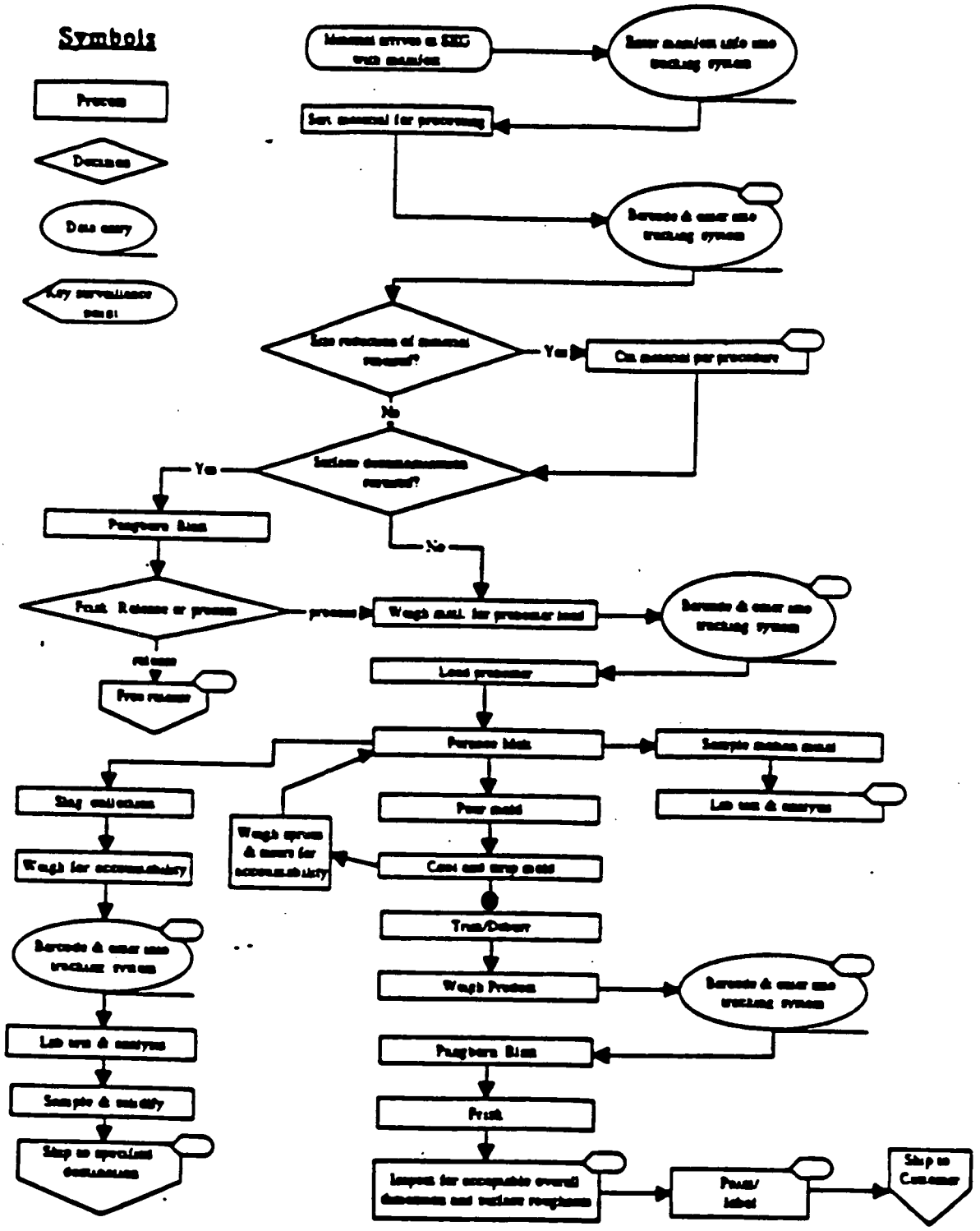


Figure 1.2 SEG Metal-Melt Process

1.3 Description of Containerized Waste Sampling Locations

Containerized waste may be sampled at one of following general locations:

- the container storage area,
- a container staging area established for sampling activities, or
- an established container sampling line

The sample plan writer determines the appropriate container sampling location based on the environmental setting, the contaminants of concern, the logistics and feasibility of transporting containers from their staging/storage area to a different site location. The selected container sampling location shall be identified in Section A.8 of the PSAP. If the container sampling location identified in Section A.8 of the PSAP must be changed, the sampling crew shall contact the sample plan writer to obtain verbal approval of the venue change. This variance will be documented on the PSAP and the associated field logbook page(s).

1.4 SAP Objectives

The primary objective of this SAP is to generate data of sufficient quality to identify the regulatory status of, and safely manage containerized waste materials. Secondary objectives are to develop information required to determine appropriate waste disposition options, including disposal and/or treatment. This SAP has been developed to meet the requirements for waste management and disposal within the DOE complex and at commercial facilities. Specifically, it meets the requirements of NVO-325 (Rev. 1), Nevada Test Site (NTS) Defense Waste Acceptance Criteria, Certification, and Transfer Requirements.

Specific objectives of this SAP are as follows:

1) Determine the presence and concentrations of RCRA hazardous constituents and radiological activities to support waste characterization,

2) Provide sufficient information to ensure that the sub-waste stream is managed safely,

3) Support identification of the appropriate disposal or treatment option (e.g., determine if the sub-waste stream meets NVO-325 Rev. 1 waste acceptance criteria), and

4) Identify potential hazards or risks to public health or the environment associated with storage of the sub-waste stream, if disposal or treatment is not feasible or practical.

1.5 Use of Process Knowledge/Existing Analytical Data/Visual Inspections

In general, the use of process knowledge (PK) alone (without confirmatory sampling and analyses) shall be appropriate for waste characterization when one or more of the following conditions exist:

1) The sub-waste stream is difficult to sample because of physical form. This primarily applies to solid matrix waste such as metal, glass, or wood, rather than as a residue that could be removed for testing or in a decontamination process.

2) Sampling and analysis of sub-waste stream would result in unacceptable risk of radiation exposure, (i.e., violate the As Low As Reasonably Achievable, ALARA, precept of the DOE)

3) Sub-waste stream is too heterogenous in composition (e.g., compactible trash containing clothing, booties, plastic, paper, experiment-driven, and decontamination and decommissioning waste).

In general, PK is used to provide information related to the waste materials and their generation process(es). This information may be used for waste material segregation to ensure that representative samples are collected for sub-waste stream characterization. In addition, PK may be used to support "non-RCRA" (not RCRA hazardous) or "RCRA" (RCRA hazardous) determinations for appropriate waste materials. The use of PK to support a "non-RCRA" determination generally requires a greater amount of supporting documentation, which must reasonably support a case that the material could not exhibit a characteristic or meet a threshold criteria for regulation.

Previous analytical data may be used for waste material segregation to ensure that representative samples are collected for sub-waste stream characterization. In addition, these data may be used to determine the number of samples required to characterize the waste materials (using the SW-846 equation, or parametric method), determine the appropriate analyses required for waste characterization, and determine the appropriate level of personal protective equipment (PPE) required during sampling activities.

Visual inspections are typically used to verify that the container's contents match the description provided on the MEF and document the physical characteristics of the waste materials. In addition, visual inspections may be used for waste material segregation to ensure that representative samples are collected for sub-waste stream characterization.

PK, previous analytical data, and visual inspection review documentation is prepared by Waste Characterization (WC) and transmitted to Site Media Sampling (SMS). A brief, thorough summary of this document is incorporated into Section A.9 of the PSAP. The entire PK/previous analytical data/visual inspection review document is provided as an attachment to the PSAP and in the waste characterization file.

1.6 Use of Results/Statistical Treatment of Data

Data obtained from the sampling and analyses of the waste materials will be used to:

- support waste identification,
- determine waste handling and storage requirements, and
- identify treatment or disposal options

Laboratory reviewed and validated analytical data are submitted to SMS for statistical analyses and reporting to assist WC in the RCRA determination process. For decisions that require comparison with a regulatory threshold, a 90% confidence limit (based on a one-sided Student "t" Test) is formed. An

example of the SMS Statistical Analysis Report is provided in Appendix B. A summary of the statistical analysis methodology, in accordance with the FEMP Waste Characterization Plan, is provided in the following subsections.

1.6.1 Evaluation of Sample Distributions

The inferential calculations used to form the 90% confidence limit are based on the assumption that the population is approximately normally distributed. Two primary criteria for determining whether a population is normally distributed based on review of a sample set are:

1) Visual inspection of the data (i.e., a graph or plot of the data) and/or

2) Mathematical comparison of the values for the sample mean ($\bar{x}$) and the sample standard deviation ($s\bar{x}$)

When the coefficient of variance is less than 1.25 (i.e., $s\bar{x}/\bar{x} < 1.25$), the data may be assumed to be approximately normally distributed. If this test indicates that the data are not normally distributed, then the following steps are taken in accordance with established guidance at the FEMP:

1) PK and the S&A effort are revisited to determine if the apparent distribution may be an artifact of S&A. Resampling may be necessary if this is deemed to be the case.

2) If the data correlate to an apparent stratification of the sub-waste stream and this correlation is substantiated by PK, then the waste may be evaluated as a stratified sub-waste stream.

3) If the data are determined to meet an alternate distribution profile, a data transformation and subsequent statistical evaluation may be performed (e.g., log-normal transformation followed by anti-log transformation of the 90% confidence limit).

4) If the transformation does not normalize the data, non-parametric approaches may be utilized to form the required 90% confidence limit.

5) Alternatively, additional samples may be collected to expand the number of data points representing the waste. This additional data provides a broader base with which to evaluate assumptions of normality.

1.6.2 Treatment of "Less Than" Values

In cases where the constituent concentration is expressed as "less than" the detection limit (DL), a value of 1/2 the DL is used as an input for statistical treatment. For data to be considered valid, however, the reported DL must be below the regulatory limit with which data are to be compared. This approach minimizes error in decision making (as opposed to using a value of zero or the actual DL in the decision making). If the reported DL exceeds its respective regulatory threshold level, the actual DL value will be input to minimize false negative errors in the waste determination decision-making process.

1.6.3 Treatment of Duplicate Analyses

Sample duplicate analyses are an integral part of SW-846 quality assurance protocol and are used to measure sampling performance in terms of precision (reproducability). A sample and its duplicate are designed to be equivalent (i.e., sampled and analyzed in precisely the same manner), therefore any distinction between a sample and its duplicate is arbitrary. For purposes of statistical treatment of data, the average value of the duplicate analyses for each constituent for a given sample is used for calculating statistics.

1.6.4 Forming the 90% Confidence Interval

Statistical treatment of data is performed by Site Media Sampling. A minimum of two sample points is required to form the 90% confidence limit in accordance with SW-846's Equation No. 6. A summary of sample results and sample statistics, including the 90% confidence interval, is prepared by SMS and sent to WC for evaluation.

1.7 Sampling and Analysis Schedule

To manage the large amount of sampling and analyses conducted by the FEMP, schedules for individual projects are controlled by an independent support organization within Project and Configuration Control (P&CC). Start and end dates associated with the following specific milestones are generally tracked:

- Request Sampling and Analysis
- Prepare PSAP
- Collect Samples
- Analyze Samples
- Conduct Data Review and Validation
- Prepare Statistical Analysis Report
- Document Waste Characterization

2.0 Organizations and Responsibilities

Figure 2.1 illustrates the process flow chart from waste generation to waste characterization. Key technical and quality assurance personnel implementing these activities are identified in the documentation generated for each sampling and analysis event.

In general, WC receives a MEF from the waste generator. WC conducts a PK/previous analytical data/visual inspection review, prepares appropriate documentation, and submits a Request for Sampling and Analysis (RSA) form to SMS. SMS prepares a PSAP, based on information supplied on the RSA, and obtains the required concurrences and approvals prior to initiating sampling activities. Remedial Support Operations (RSO) or SMS collects and delivers the waste samples to Analytical Laboratory/Analytical Customer Support (LAB/ACS) for analyses or shipment to FEMP-approved laboratories. Subsequent to waste sample analyses, Analytical Laboratory/Data Review and Assembly (LAB/DR&A) reviews the data package and forwards these data to SMS for statistical analyses. SMS conducts the statistical analyses, generates a statistical report, and submits all information to WC for waste characterization. WC maintains supporting documentation traceable to the sub-waste stream and characterization file.

Examples of a MEF and a RSA are provided in Appendix D.

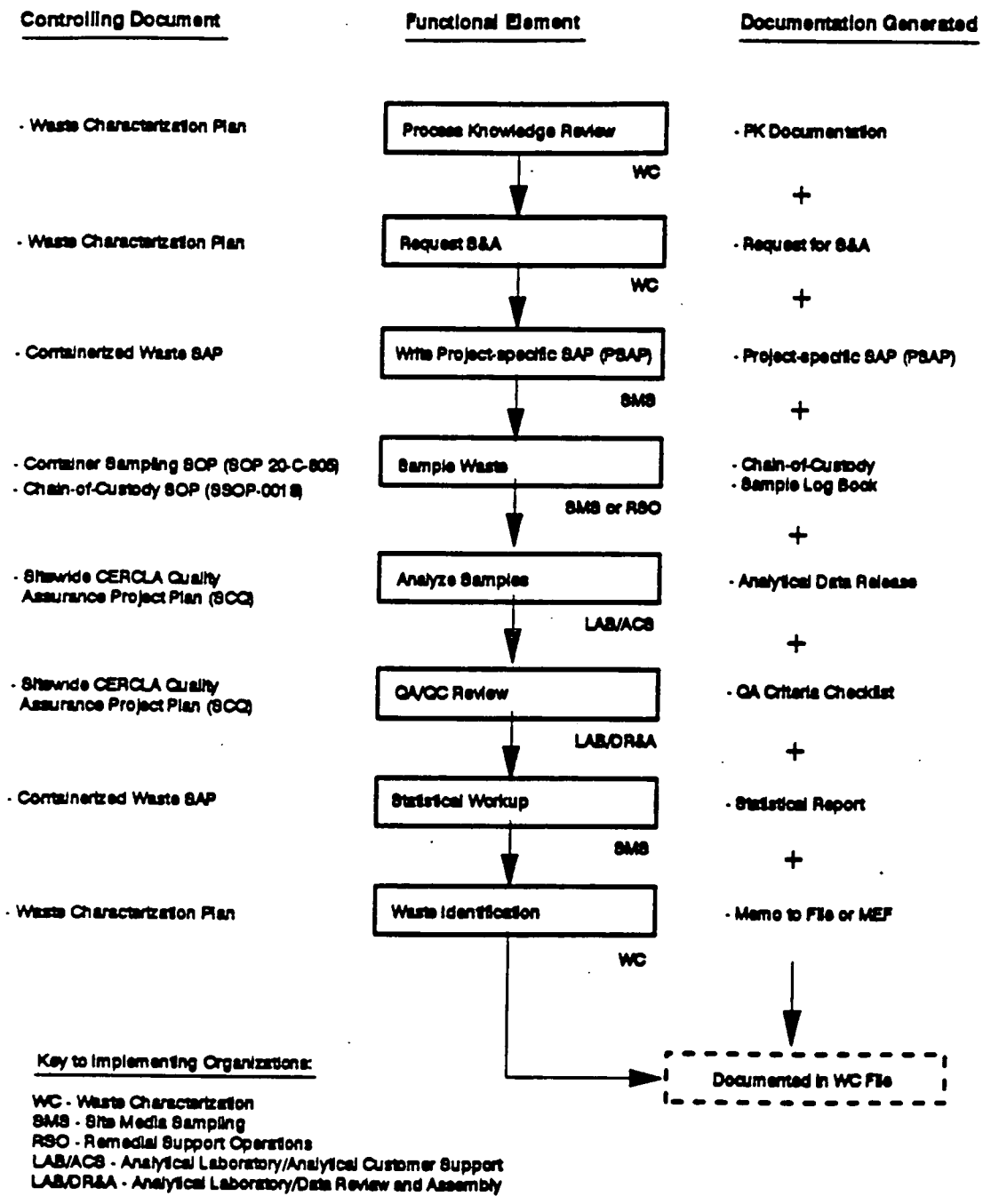


Figure 2.1 FEMP Waste Characterization Flow Diagram

3.0 Data Quality Objectives

Containerized waste sampling and analysis is required to satisfy the following data needs:

1) Determine the regulatory status of the waste materials (at a 90% confidence level) and ensure compliance with NVO-325 (Rev. 1) requirements

2) Determine the appropriate level of health and safety requirements for protection of site workers during waste disposal, treatment, or storage

3) Determine the waste characteristics to evaluate the proper disposal, treatment, or storage option

4) Assess risks to human health or the environment if wastes must be stored at the FEMP

Analytical Support Levels (ASLs), used to support DQOs, are defined in Appendix C of the FEMP Sitewide CERCLA Quality Assurance Project Plan (SCQ). Appropriate ASLs for each data need are presented in Table 3.1.

DQO Logic Statement and Summary Form NTW-002 for containerized waste material sampling, analysis, and characterization is provided in Appendix C.

In general, the DQO provides a technically-sound sampling and analysis approach capable of satisfying the following items: representativeness, sampling accuracy, sampling precision, analytical method detection limits, completeness, and comparability. These items are addressed in the following sections of this sampling and analysis plan.

Table 3.1
Summary of Data Needs and Appropriate ASLs

Analytical Parameter	ASL (s)	Data Need Satisfied
Organic/Radiologic Screening	A	1 and 2
Total/TCLP VOAs, SVOAs, Metals, Pesticides/Herbicides	B	1, 2, and 3
Flash Point, pH, Corrosivity	B	1, 2, and 3
F001 - F005 Solvents, Cyanides, Sulfides, PCBs	B	1, 2, and 3
Paint Filter Liquids Test	B	1 and 3
Total/Isotopic U and Th	B	1, 2, and 3
TAL VOAs, SVOAS, Pesticides/PCBs, Inorganics	C and D	1, 2, 3, and 4
Full Radiological	D and E	1, 2, 3, and 4

3.1 Representativeness

Representativeness, or the collection of samples that are unbiased and exhibit average properties of the population sampled, is achieved by segregating the containerized wastes into sub-waste streams. A sub-waste stream is generally comprised of a group of containers labeled with the same Material Type and Source Code. Material Type and Source Code identifiers are provided in each PSAP, in Sections A.5 and A.6, respectively.

3.2 Sampling Accuracy

Sampling accuracy, or the closeness of a sample value to its true value, is achieved through randomized sampling of the waste containers within a given sub-waste stream. Randomized sampling minimizes bias in the sample selection process by giving each container an equal probability of being sampled.

3.3 Sampling Precision

Sampling precision, or the closeness of repeated sample values, is achieved by

increasing the number of samples to be collected, increasing the actual volume of the samples, or dividing a population into appropriate strata prior to sampling. Additional samples may be collected when the uniformity of the waste is not known and when sample collection is difficult. In general, the volume of sample material collected at the FEMP exceeds the minimum amount needed for analytical sample preparation and analysis. Lastly, when a sub-waste stream is suspected or known to contain separate physical phases (i.e., solids and liquids), the number of samples required is calculated for each waste phase. During sample collection activities, a sample is collected from each waste phase from the randomly selected waste containers.

3.4 Analytical Method Detection Limits

In general, analytical method detection limits are provided in Appendix G of the SCQ (Vol. II). Method detection limits for solid- and liquid-phased non-radiological analyses, are based upon EPA SW-846 or Contract Laboratory Program (CLP) protocol. Method detection limits for radiological analyses are based upon performance-based standards and protocol.

3.5 Completeness

To satisfy SCQ completeness requirements of 90%, the number of samples required to be collected will be calculated in accordance with methods described in EPA/230-02-89-042, Feb. 1989, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I, Soils and Solid Media. The following equation will be used to determine the number of samples to obtain a 90% completeness level:

$$\#\ \text{of Samples}_{(90\%\ \text{comp})} = \frac{\text{Minimum number of samples required}}{(1 - R)}$$

where,

R = 0.20 (20%), the expected percent of missing or unusable data (i.e., sample holding times exceeded, improper preservation of samples, sample container breakage during shipment to laboratory, etc.)

An R-value of 0.20 (20%) was selected to take the most conservative approach for minimization or elimination of the potential need for resampling activities.

3.6 Comparability

Laboratory facilities contracted to provide analytical services are required to comply with all provisions in the SCQ. Therefore, data sets from differing laboratory facilities should be comparable since the same analytical method and method detection limit is required. However, in order to measure comparability between data sets from distinct laboratories, the FEMP may periodically use split samples. Split sample analytical data may also be used to identify false negative or false positive errors.

4.0 Site Selection/Sampling Procedures

This section provides sample strategy rationale; sample collection, handling, preservation, and shipment procedures; and field quality assurance protocol to be followed during containerized and process generated waste sampling activities. The SCQ shall serve as the primary guidance document for containerized and process generated waste sampling activities. EPA guidance documents (i.e., SW-846), and FEMP standard operating procedures (SOPs) shall serve as support documents to the SCQ.

4.1 Sampling Approach for Containerized Waste

The sampling approach for containerized wastes at the FEMP is dependent on the characteristics of the sub-waste stream as determined by PK/previous analytical data/visual inspection reviews. Sub-waste streams which contain heterogenous materials and lack sufficent PK data will be subjected to "comprehensive" sampling and analysis (i.e., rate of 10% or cube root). Sub-waste streams which contain homogenous materials and/or have preliminary determinations based on PK/previous analytical/visual inspection reviews will be subjected to "confirmatory" sampling and analyses (i.e., log base 10 + 1).

Simple-, systematic-, or stratified-random sampling techniques may be employed based upon the material characteristics, process history, and project-specific data needs. Systematic or stratified random sampling methods will be used for sub-waste streams that have been segregated into multiple container groups (lots) based upon differences in: physical characteristics (i.e., phase and degree of homogeneity) of the waste materials, origin (time and location) of waste materials and their generation processes, or distribution and concentration of contaminants.

Methods of determining simple random sample locations include using a random number generator or random number lists. Computer generation of random numbers is preferred, since it eliminates the potential for error in reading a random number list and reduces bias in the selection of the origin point for a random number list. Systematic or stratified random sample locations will be determined by selecting random sample locations or time intervals as previously described for each container group or lot.

4.1.1 Sampling Approach for Previously Generated Wastes

Sub-waste streams generated by previous FMPC/FEMP operations which contain homogenous waste materials or have preliminary determinations based on PK/previous analytical data/visual inspections, will be subjected to "confirmatory" sampling and analysis using simple-random sample selection techniques. Heterogenous sub-waste streams which lack sufficient PK/previous analytical/visual inspection data will be subjected to comprehensive sampling and analysis using simple-, systematic-, or stratified-random sample selection techniques.

4.1.2 Sampling Approach for Currently Generated Wastes

Sub-waste streams generated by current FMPC/FEMP operations which contain homogenous waste materials based on PK/previous analytical data/visual inspection reviews will be subjected to "confirmatory" sampling and analysis. Confirmatory samples will be collected during the first day of material processing at random 1-hour intervals. Appropriate process control will be identified and documented in WC files to demonstrate that the process generates homogenous sub-waste stream materials.

Heterogenous sub-waste streams which lack sufficient PK/previous analytical/ visual inspection data will be subjected to "comprehensive" sampling and analysis using simple- or systematic-random sample selection techniques. Comprehensive samples will be collected at random time intervals from initiation to completion of respective material processing operations. Comprehensive samples may be

collected in distinct batches for long-term processes that may generate volumes of waste materials in excess of respective storage capacities.

4.2 Number of Samples

For drummed waste sampling at the FEMP, typically the number of samples required equals 10% of the number of drums in a sub-waste stream. However, for sub-waste streams containing more than 100 drums, collecting samples for analyses at a rate of 10% may not be economically feasible or practical. Therefore, the FEMP intends to use the 10% method for sub-waste streams with < 100 drums and the cube root method for sub-waste streams with > 100 drums. Using this approach, the number of samples required for waste characterization is as follows:

Number of Drums	Min. # of Samples for Analysis	Number of Samples for Completeness*
1 to 20	2	3
21 to 100	10%	12.5%
101 to 1000	10	13
1001 to 10000	22	28

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%).

For white metal box, Sea/Land^R, or Top Load container sampling, the proposed number of samples required shall be as follows:

Number of Boxes	Min. # of Boxes to be Sampled	# of Samples/Boxes for Completeness*
1	1	3
2 to 100	10% + 1	12.5% + 1.25
101 to 1000	11	14
1001 to 10000	23	29

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%). This number includes collecting one random sample from white metal box, Sea/Land^R, or Top Load containers in addition to the minimum number of containers to be sampled.

For sub-waste streams that have been characterized by process knowledge but do

not meet one of the conditions in Section 1.5 of this SAP, the number of required confirmatory samples per sub-waste stream is as follows:

Number of Containers	Min. # of Samples for Analysis	Number of Samples for Completeness*
1 to 10	2	3
11 to 100	3	4
101 to 1000	4	5
over 1001	5	6

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%). If the containers are white metal, Sea/Land^R, or Top Load boxes, the required number of samples is equal to the number of samples in this table plus one additional sample.

Parametric analysis, or EPA SW-846 Equation 8, is the preferred method to select the required number of samples required to satisfy the NVO-325 90% confidence level requirement. However, EPA SW-846 Equation 8 requires previous analytical data to determine the mean and associated standard deviation for the analyte with the most restrictive regulatory threshold level. EPA SW-846 Equation 8 may be used as a tertiary method, in situations where the upper limit of a 90% confidence level approximates or exceeds the regulatory threshold value for a given analyte, to determine if additional sample collection and analysis is warranted. In addition, in situations where sufficient previous analytical data exists for a sub-waste stream, EPA SW-846 Equation 8 may be used in lieu of the sample frequency identified above.

4.3 Sample Volumes, Containers, Preservation and Holding Times

Required sample volumes, containers, preservatives, and holding times are provided in Appendix A, Table 6.1 of the SCQ. Sample volumes, containers, preservatives, and holding times are presented in Section 6.0 of this SAP, and in Sections B.2, B.3, and C of each PSAP.

4.4 Sample Collection Procedures/Equipment

Drummed waste sample collection procedures and appropriate sampling equipment, in accordance with Appendix K (Sections K.5.5.4 through K.5.5.6) of the SCQ and

FEMP SOP 20-C-805, "Sampling Drummed Waste for Hazard Identification," are as follows:

Solid Matrix Waste Materials

1. Use a **grain sampler** for free-flowing (loose) particulate solids that are easy to penetrate. Extract a sample as follows:

   a. Ensure that grain sampler is in closed position with slots in the outer tube facing upwards.

   b. Insert grain sampler diagonally at a point near the side of the drum, through the center, to a point at the drum base directly opposite to the entry point.

   c. Rotate inner tube of the grain sampler to the open position, collect sample, then rotate inner tube to closed position.

   d. Withdraw grain sampler and place in a horizontal position with slots in the outer tube facing upwards.

   e. Rotate inner tube to the open position and transfer material to appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

2. Use a **stainless steel pipe sampler, hand-auger, or coring device** for moist or cohesive particulate solids that can be extracted as a core. Extract a sample as follows:

   a. Insert pipe sampler diagonally at a point near the side of the drum, through the center, to a point at the drum base directly opposite to the entry point.

   b. Rotate pipe sampler twice until slot is facing upwards.

   c. Withdraw pipe sampler and place in a horizontal position. Ensure that the entire length of pipe contains sample material. If not, repeat steps a and b.

   d. Use a clean stainless steel spatula to transfer material to appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

Liquid Matrix Waste Materials

1. Use a **glass COLIWASA** for liquid wastes that can degrade a plastic COLIWASA or for Volatile Organics sample collection. Extract a sample as follows:

a. Insert inner rod of the glass COLIWASA inside the sheath.

b. Lower glass COLIWASA vertically, keeping the ground glass end of inner rod away from hole in sheath bottom, at a rate so that the liquid levels inside and outside the sample tube remain even.

c. Push inner rod downwards to close the sampling device (ground glass end placed in hole of sheath bottom) when the drum base has been encountered.

d. Withdraw glass COLIWASA with one hand while decontaminating outside surface with a clean, disposable cloth. Dispose of cloth as described in Section 8 of this SAP.

e. Pull inner rod upwards to transfer material to appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

f. Collect Volatile Organics samples as follows:

(1) Fill 40-milliliter (mL) septum vial to lip until meniscus forms.

(2) Slide teflon septum across vial opening and screw lid on vial.

(3) Turn vial upside down and gently tap to check for air bubbles.

(4) Repeat steps 1, 2, and 3 if air bubbles are present.

For white metal box, Sea/Land^{R}, and Top Load containers, waste material sample collection procedures and appropriate sampling equipment are provided in Appendix K (Section K.8) of the SCQ, and Chapter 5 of EPA 600/R-92/033, Characterizing Heterogeneous Wastes: Methods and Recommendations. A generalized procedure, based on excerpts of these documents, is as follows:

1. Establish a 1-foot length by 1-foot width grid pattern at the container top.

2. Collect waste material samples from the grid and random sample depth locations indicated in the PSAP for each container identified. Extract a waste material sample as follows:

a. Use a stainless-steel hand auger or coring tube device for soils and solid media that can be easily penetrated.

(1) Advance auger or coring tube device to random depth indicated

for given grid location.

(2) Transfer waste material from auger or coring device, using a clean, stainless-steel spatula or scoop, to appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

b. Use scissors or shears for paper, cloth, rags, plastic, etc., that exhibit evidence of stains or surface residues. Sample collection processes for volatile and semi-volatile organic samples will be expedited to minimize devolatilization of such compounds.

(1) Collect samples by cutting material into pieces of less than 9.5 millimeter (mm) diameter and placing in appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

c. Use a rotary drill and decontaminated bits for wood, concrete, etc., that exhibit evidence of stains or surface residues. Sample collection processes for volatile and semi-volatile organic samples will be expedited to minimize devolatilization of such compounds.

(1) Collect wood or concrete cuttings in a clean, stainless steel pan or tray.

(2) Transfer cuttings from pan or tray, using stainless steel scoop or spoon to appropriate sample containers as specified in Tables 6.1 and 6.2 of this SAP.

Sampling equipment decontamination procedures are presented in Appendix K, (Section K. 11) of the SCQ, SOP 20-C-805, and EP-SMS-003, "Equipment Decontamination."

4.5 Sample Handling and Shipment

Field storage and shipment of samples procedures are presented in Section 6.7 and Appendix K (Section K.10) of the SCQ, SOP-C-805, and EP-SMS-004, "Conduct and Coordination of Field Operations."

4.6 Field Quality Control

A discussion of the types and frequency of field quality control samples are presented in Section 7.1.1 of this SAP, and Section 4.1.1 and Appendix A, Table 2.2 of the SCQ. The type of field quality control samples will be determined based on the project-specific needs and identified in Section B.11 of the PSAP.

5.0 Documentation and Sample Custody

This section provides specific references to the SCQ and FEMP SOPs for sample identification and labeling, recordkeeping, chain-of-custody and analysis request documentation requirements.

5.1 Sample Identification and Labeling

Sample identification and labeling procedures are presented in Section 7.1.3 and Appendix K (Section K.10) of the SCQ, SOP 20-C-805, and EP-SMS-004. An example of a sample label used at the FEMP is provided in Appendix B of the SCQ and Appendix D of this SAP.

5.2 Recordkeeping

Field activities will be recorded on sequentially-numbered pages in bound logbooks. Media-specific sample collection logs, calibration logs, sketches, and photographs may also be used to document field activities, site conditions, or unusual observations.

Detailed recordkeeping requirements are provided in Section 7.1.2 and Appendix J of the SCQ, SOP 20-C-805, and EP-SMS-001, "Field Logbook Procedure." Examples of recordkeeping documents used at the FEMP, are provided in Appendix B of the SCQ and Appendix D of this SAP.

5.3 Sample Custody and Analysis Requests

Pertinent sample collection data will be recorded on the FEMP Sitewide Analysis Request/Custody Record (SAR/CR), which will accompany the respective samples to the FEMP analytical laboratory facility for analysis or shipment to a FEMP-contracted laboratory for analysis. Samples shipped to offsite laboratories are accompanied by a Request for Analyses/Off-Site Custody Transfer Record

(RFA/OSCTR).

Detailed sample custody and request for analysis procedures are provided in Sections 6.7, 7.1, and Appendix K (Section K.10) of the SCQ and SSOP-0018, "Processing the Site Wide Analysis Request/Custody Record for Sample Control." An example of the FEMP SAR/CR and RFA/OSCTR, is provided in Appendix B of the SCQ and Appendix D of this SAP.

5.4 Other Miscellaneous Forms

All sampling and analysis projects at the FEMP require a Radiation Work Permit as a minimum. Other forms, such as a Chemical Hazard/Confined Space Entry Permit or a Construction/Excavation Permit may be required based on the nature of the project. In addition, SMS personnel complete a FEMP Minutes of Safety Meeting form at the initiation of each project. This form is valid for a period of one week or until project conditions change, whichever is more frequent. Copies of other miscellaneous forms used at the FEMP to support sampling and analysis activities are provided in Appendix D.

6.0 Analysis of Waste Samples

This section provides the required non-radiological and radiological analyses to be conducted for this characterization, and sample container, preservation, and holding time requirements for solid and liquid matrix samples. Non-radiological analyses will be performed in accordance with EPA SW-846 or CLP methods. Standard analytical procedures for radiological analyses shall be selected based on the project performance requirements.

6.1 Waste Analytical Parameters and Methods

In general, WC personnel determine the appropriate waste analytical parameters based on PK and/or reviews of previous analytical data. This information is provided to SMS via a RSA and is incorporated into the PSAP.

6.1.1 Non-Radiological Parameters and Methods

Based on PK and/or previous analytical data reviews, one or more of the following non-radiological analyses may be performed to characterize the chemical constituents within, and identify the regulatory status of the waste materials:

Analytical Parameter	Test Method(s)
RCRA Analyses	
Ignitability	EPA 1010/1020
Reactivity	40 CFR 261.23
Corrosivity	EPA 9040
Toxicity Characteristic	EPA 1311
LDR Solvents	TCLP (F001-F005)
LDR Halogenated Org.	EPA 9020
Cyanides	EPA 9010/9012
Sulfides	EPA 9030
Other NVO-325 (Rev. 1) Analyses	
Free Liquids	EPA 9095
PCBs	EPA 8080

The FEMP intends to use analytical screening methods (Total concentration) to determine if Toxicity Characteristic Leaching Procedure (TCLP) or Land Disposal Restriction (LDR) analyses are warranted. The proposed analytical screening methods are as follows:

Analytical Parameter	Test Methods (EPA)
Organics (Gas Chromatography)	8010, 8015, 8020 8030, 8040, 8060 8080, 8090, 8120 8140, 8150
Organics (Gas Chromatography/ Mass Spectroscopy)	8240, 8250 8270, 8280
Inorganics/Metals (Atomic Absorption Spectroscopy)	40 CFR 261, App. III
Inorganics/Metals (Inductively Coupled Plasma/ Atomic Emission Spectroscopy)	

In general, the FEMP uses a 20:1 ratio of Total concentration results for solid matrix samples to TCLP regulatory threshold limits to determine if TCLP analyses are required. If the analyte-specific upper limit of the 90% confidence interval exceeds the 20:1 ratio to its associated TCLP regulatory value, WC will evaluate the leachability of this analyte to determine if TCLP analyses are warranted. If additional analyses are not warranted, WC will prepare a letter to the waste characterization file documenting the reason(s) for this decision.

Additional analytical parameters may be required to satisfy secondary objectives identified in this SAP. For example, if the sub-waste stream is determined to be "mixed hazardous waste", then Target Analyte List (TAL) or Target Compound List (TCL) analytical data may be required to assess the potential risks of storing these containers at the FEMP. The need for these parameters will be reviewed on a case-by-case basis.

6.1.2 Radiological Parameters and Methods

Based on PK and/or previous analytical data reviews, one or more of the following radiological analyses may be performed to characterize the radiological component of the waste materials:

Analytical Parameter
Total/Isotopic Uranium
Total/Isotopic Thorium

To satisfy secondary objectives identified in this SAP, additional waste samples may be collected and analyzed for ASL D Total Radiological Parameter analyses to determine the following constituents:

- Uranium (U-234, U-235, U-238), in pCi/g
- Thorium (Th-230, Th-232), in pCi/g
- Radium (Ra-226, Ra-228), in pCi/g
- Actinium (Ac-230, Ac-232), in pCi/g
- Lead (Pb-210), in pCi/g
- Polonium (Po-210), in pCi/g
- Technetium (Tc-99), in pCi/g
- Neptunium (Np-237), in pCi/g
- Plutonium (Pu-238, Pu-239, Pu-240), in pCi/g
- Strontium (Sr-90), in pCi/g
- Ruthenium (Ru-106), in pCi/g
- Cesium (Cs-137), in pCi/g

6.2 Sample Container, Preservation, and Holding Time Requirements

6.2.1 Non-Radiological Analyses

Sample container, preservation, and holding time requirements for non-radiological analyses are provided in Table 6.1.

6.2.2 Radiological Analyses

Sample container, preservation, and holding time requirements for radiological analyses are provided in Table 6.2.

Table 6.1
Sample Container, Preservation, and Holding Time Requirements
Non-Radiological Samples

Analytical Parameter	Sample Matrix	Sample Container	Preservation	Holding Time
Total/TCLP VOAs	Liquid	3 x 40-mL VOA vials, TLS	HCl to pH < 2 Cool 4 deg. C	14 days
Total/TCLP SVOAs/Pest. Herb./PCBs	Liquid	1 Gal. Amber Glass, TLC	Cool 4 deg. C	7 days
Total/TCLP Metals	Liquid	1 x 1-liter polyethylene	50% HNO_3 to pH < 2	180 days 28 days (Hg)
Cyanide	Liquid	1 x 1-liter polyethylene	NaOH to pH > 12 Cool 4 deg. C	14 days
Flash Point pH	Liquid	8-oz. widemouth Glass, TLC	None	28 days, ASAP for pH
Sulfides	Liquid	1 x 1-liter polyethylene	NaOH to pH > 9 Cool 4 deg. C	7 days
Total/TCLP VOAs	Solid	3 x 4-oz. jars* glass, TLC	Cool 4 deg. C	14 days
Total/TCLP SVOAs/Pest. Herb./PCBs	Solid	1 x 8-oz jar** Amber Glass, TLC	Cool 4 deg. C	14 days
Total/TCLP Metals	Solid	1 x 8-oz jar** Glass, TLC	Cool 4 deg. C	180 days 28 days (Hg)
PFLT	Solid	1 x 4-oz. glass or polyethylene	None	28 days

Notes:

VOA, SVOA = Volatile Organic Analysis, Semi-Volatile Organic Analysis
Pest., Herb., PCBs = Pesticides, Herbicides, Polychlorinated Biphenols
PFLT = Paint Filter Liquids Test
TLC, TLS = Teflon-Lined Closure, Teflon-Lined Septum
HCl, HNO_3, NaOH = Hydrochloric acid, Nitric acid, Sodium hydroxide
* - Minimum of 25 grams/container for low-density waste materials
** - Minimum of 100 grams/container for low-density waste materials

Table 6.2
Sample Container, Preservation, and Holding Time Requirements
Radiological Samples

Analytical Parameter	Sample Matrix	Sample Container	Preservation	Holding Time
Total Uranium	Solid	8-ounce jar Plastic/Glass	None	180 days
Total Uranium	Liquid	1-liter bottle Plastic/Glass	HNO_3 to pH <2	180 days
Isotopic Uranium	Solid	8-ounce jar Plastic/Glass	None	180 days
Isotopic Uranium	Liquid	1-liter bottle Plastic/Glass	HNO_3 to pH <2	180 days
Total Thorium	Solid	8-ounce jar Plastic/Glass	None	180 days
Total Thorium	Liquid	1-liter bottle Plastic/Glass	HNO_3 to pH <2	180 days
Isotopic Thorium	Solid	8-ounce jar Plastic/Glass	None	180 days
Isotopic Thorium	Liquid	1-liter bottle Plastic/Glass	HNO_3 to pH <2	180 days
Total Radiological Parameter	Solid	1-Quart Jar Plastic/Glass	None	180 days
Total Radiological Parameter	Liquid	4-Liter Cubetainer	HNO_3 to pH <2	180 days

7.0 Quality Assurance/Quality Control

This section provides field and laboratory quality assurance/quality control (QA/QC) requirements and protocols applicable to this SAP. Detailed information concerning QA/QC requirements and protocol is provided in Sections 3.0, 4.0, 8.0, 10.0, 11.0, 15.0, and 16.0; and Appendices A, C, D, E, F, I, and J of the SCQ.

7.1 Field QA/QC

7.1.1 Field QC Samples

The following field QC samples may be collected (types selected based on the project-specific needs and identified in Section B.11 of the PSAP) and analyzed for the constituents identified in Section 6.0:

- Container blanks - not required when vendor-supplied assay data is provided with container shipment. When required, collect one blank per each container batch or one per sampling round, whichever is more frequent.
- Duplicate samples - one per every twenty samples per media matrix or one per sampling round per media matrix, whichever is more frequent.
- Equipment rinsates - one per twenty pieces of a type of equipment cleaned by a specific decontamination method or one per sampling round, whichever is more frequent.
- Field Blanks - one per twenty samples or one per sampling round, whichever is more frequent.
- Field Spikes - if required, one per every sixty days, one per project, or when accuracy of a particular laboratory is in question.
- Preservative blanks - not required when vendor-supplied assay data is provided with preservative shipment. When required, collect one blank per each container batch or one per sampling round, whichever is more frequent.
- Split samples - if required, one per every twenty samples per media matrix or one per sampling round per media matrix.

- Trip blanks - daily, one trip blank per cooler containing Volatile Organics samples sent to laboratory. Analyzed for Volatile Organics only.

In accordance with Section D of the SCQ, field duplicate sample analytical data may be used to calculate the relative percent difference (RPD) for evaluation of sampling precision or degree of homogeneity/heterogeneity of the waste materials.

Equipment rinsate analytical data may be used to evaluate the effectiveness of the decontamination procedure or estimate the amount of cross contamination between sample point locations.

Field blank analytical data may be used to estimate the amount of contamination associated with the sampling environment.

Field spike results may be used to evaluate the accuracy of the analytical data generated by the FEMP laboratory or a contracted laboratory facility and identify any false positives or false negatives. In accordance with Section D of the SCQ, field spike recovery shall be within 75 to 125 percent; however, spike recovery limits shall not apply when sample concentration exceeds spike concentration by a factor of four or more.

Split sample analytical data may be used to evaluate the accuracy of analytical performance between two distinct laboratory facilities and identify the potential for false positives or false negatives.

7.1.2 Field Screening Equipment Calibration and Documentation

Field screening instrumentation, such as radiation detection and photoionization detection (PID) devices, will be checked on a daily basis for proper operation. Any equipment that fails calibration (limit of +/- 10% of calibration gas value) or becomes inoperable will be tagged and taken out of service. Such equipment will be repaired and recalibrated before reuse.

Radiation detection devices will be checked before each use to ensure that the date of required calibration has not been exceeded. PID devices will be calibrated, on a daily basis and prior to use, to a known concentration of volatile gas in air mixture (i.e., isobutylene, benzene, etc.). Subsequent to completion of field activities, on a daily basis, the PID instrument will be checked by analyzing the respective gas-air mixture used for calibration. Field screening instrumentation checks and calibration will be recorded in bound field logbooks or field activity daily logs and instrument-specific calibration logs.

7.1.3 Field Audits/Surveillances

In accordance with NVO-325 Rev. 1, DOE-NV will conduct an annual audit of the sampling activities covered under this SAP. In addition, the FEMP may conduct surveillances of sampling activities to verify conformance with the requirements and procedures identified in this SAP. These surveillances will be documented by checklists similar to Form 12-1 of the SCQ, provided in Appendix D of this SAP.

Upon completion of each sampling event, QC shall review field logbook entries, SWAR/CRs, etc., to ensure that sample collection and documentation were conducted in accordance with requirements of this SAP, its respective PSAP, and the SCQ. This review will be documented through the use of data validation checklists provided in Appendix B of the SCQ. The completed field-generated documentation and data validation checklist(s) will be retained in SMS project and WC MEF files.

7.2 Laboratory QA/QC

7.2.1 Laboratory QC Samples

Laboratory QC sample requirements are provided in Appendix A (Table 2-4) and Appendix G of the SCQ and based upon the requested ASL. In general, the types of laboratory QC samples will be selected based on project-specific needs.

7.2.2 Analytical Instrumentation/Equipment Calibration and Documentation

Analytical laboratory instrument and equipment calibration procedures are provided in Section 8.0 and Appendix E of the SCQ. The FEMP and FEMP-contracted analytical laboratory facilities will be responsible for ensuring that all analytical instrumentation and equipment is operating properly and is within prescribed calibration limits.

7.2.3 QA/QC Checks and Procedures

Laboratory quality control checks and procedures for inorganic, organic, and radiological analyses are provided in Section 10.0 and Appendices A, B and E of the SCQ. The FEMP and FEMP-contracted laboratory facilities will be responsible for adherence to these quality control checks and procedures.

In accordance with NVO-325LRD Rev. 1 and Section 12.4 of the SCQ, the FEMP will conduct a laboratory qualification audit prior to contract award for analytical services. In addition, a system audit will be conducted for each FEMP-contract laboratory on an annual basis to assure continued acceptable performance. Lastly, each data package submitted by a FEMP-contract laboratory is reviewed by DR&A to ensure that contractual issues have been satisfied. A list of FEMP-approved laboratory facilities is provided in Table 7.1.

7.3 Data Reporting and Validation

The FEMP laboratory and FEMP-contracted laboratory facilities shall provide data packages on floppy disk and/or hard copy in such a fashion that allows for DOE-NV to validate data as required in NVO-325LRD Rev. 1. In addition, field- and laboratory-generated data packages shall be validated in accordance with the FEMP Validation Plan in Appendix D of the SCQ and SSOP-1004, "FEMP Data Validation Procedure." Data Validation forms are currently being reviewed by OEPA and EPA personnel and will provided in Appendix B of the SCQ upon approval by these agencies. Validated data shall be used to support waste determinations as described in Section 1.6 of this SAP.

Table 7.1
FEMP-Approved List of Laboratories

Laboratory Name and Location	Analysis Category	Contract	Period of Performance	Date of Last Audit	Approval Status	Remarks
Clemson Technical Center, Inc. Clemson Research Park 100 Technology Drive Anderson, SC 29625	Chemical	RCRA/CERLA	9/93 - 9/94	10/13/93 thru 10/17/93	Approved & Contracted	Available for NTS
DataChem Laboratories 960 West Levoy Drive Salt Lake City, UT 84123	Chemical Radiological	RCRA/CERCLA RLS -TOS	9/93 - 9/94	10/11/93 thru 10/15/93 Rad Audit Pending	Approved & Contracted	Available to send samples for both Chem and Rad
ITAS - St. Louis 13715 Rider Trail North Earth City, MO 63045	Chemical	RCRA/CERCLA	9/93 - 9/94	10/13/93 thru 10/17/93	Approved & Contracted	Available for NTS
Lockheed Analytical Laboratories 975 Kelly Drive Las Vegas, NV 89119-3705	Chemical Radiological	RCRA/CERCLA RLS-TOS	9/93 - 9/94	9/27/93 thru 10/1/93	Approved & Contracted	Radiological data pending review of SCQ data. Estimated date available 6/13/94. Available for NTS for Chem, Rad pending
Twin City Testing 1908 Innerbelt Business Center St. Louis, MO 63114-5700	Chemical	RCRA/CERCLA	9/93 - 9/94	9/13/93 thru 9/17/93	Approved & Contracted	Available for NTS
FERMCO Analytical 7400 Willey Road Fernald, OH 45030	Chemical Radiological	N/A	1/94 - 1/95	1/24/94 thru 1/28/94	Approved	Available for NTS

8.0 Waste Disposition

The following materials may be generated during containerized waste sampling and analysis activities:

- Contact wastes
- Equipment decontamination solutions

The following subsections provide the proposed disposition methodology for each type of waste generated.

8.1 Contact Wastes

Contact wastes, such as personal protective equipment (PPE) and rags or wipes (paper towels, Chemwipes®, etc.), are typically placed in 5-gallon pails or 55-gallon drums, lot marked so that they can be traced to (associated with) the waste stream sampled, and stored at the FEMP for appropriate disposition. Separate 55-gallon drums will be provided, for segregation of PPE wastes, and labeled as follows:

- Used Respirators
- Used Rubber Shoe Covers
- Used Tyvek/Saranex, Cartridges, Tape, Gloves

8.2 Decontamination Solutions

Equipment decontamination solutions are typically transferred to DOT-approved, bung-type, 55-gallon drums or 5-gallon pails, lot marked so that they can be traced to (associated with) the waste stream being sampled. The drums are placed within a Satellite Accumulation Area (SAA) with diked Herculite sheeting or containment devices, capable of capturing 1/2 the capacity of the drum volume, to prevent contaminant migration resulting from spills, or leaks. The drummed decontamination solutions are stored at the FEMP until the appropriate disposal or placement option can be identified.

Appendix A PSAP Format for Drummed and Boxed Wastes

Drummed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

A. Identifying Information
1) **Project Name:**
2) **Plan No.:**
3) **Material Description/Matrix Code(s):**
4) **Number of Drums in Sub-Waste Stream:**
5) **Material Type:**
6) **Source Code:**
7) **Material Evaluation Form #:**
8) **Sampling Location for Drums:**
9) **Process Knowledge:**

B. Sampling Information
1) **General:** Samples taken will be contained in glass or polyethylene jars with teflon lined lids.
2) **Preservation Method:** See Analytical Requirements in Section C.
3) **Holding Times:** See Preservative and Holding Time Guidelines in Section G and/or Tables 6.1 and 6.2 of "Prototype Sampling Anad Analysis Plan for Containerized Waste at the FEMP."
4) **Sample Technique:**
5) **Number of Drums to be Sampled and Analyzed:** x, see page 2.
6) **Composite Samples:** Yes (No)
7) **Visual Inspection Performed?:** Yes (No)
8) **Field Contact:**
9) **Send Results to:**
10) **Charge No./Project Manager:**
11) **Required QA/QC Samples:**

Field QC	Yes	No	Notes
Trip Blank	___	___	daily, for VOA samples only
Field Blank	___	___	1 per 20 samples or 1 per sampling round
Equipment Rinsate	___	___	1 per 20 samples or 1 per sampling round
Duplicate/Split	___	___	1 per 20 samples or 1 per sampling round
Field Spike	___	___	1 per sixty days or 1 per sampling round

Laboratory QC

Laboratory QC sample type and frequency requirements are provided in Appendix A (Table 2-4), and Appendix G of the SCQ.

Authorized Signature/Date Approved/Date

Drummed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

Sampling Information

Start with Sample Number xx-yyy-1 for the first drum sample, then number consecutively until sampling is completed. The drum that is to be sampled in duplicate will be indicated with an asterisk (*). The duplicate samples will be given different sample numbers.

Sample Number	Sample Matrix	Inv. Number	Lot Number	Drum Number

Authorized Signature/Date Approved/Date

Drummed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

C. Analytical Requirements

In order to satisfy waste characterization requirements the following analyses may be performed:

Analysis Requested (Analysis Code) ASL = Analytical Support Level VOA = Volatile Organics Analysis SVOA = Semi-Volatile Organics Analysis U,Th = Uranium, Thorium PFLT = Paint Filter Liquids Test	Solid Matrix Samples Container and Preservative/Unit Codes m, g, l = ounce, gram, liter kg, mg, ug = kilogram, milligram, microgram P00, P01 = No preservation, Cool 4 deg. C U02, U04, U07, U19 = mg/L, mg/kg, ug/g, pCi/g U99 = present/absent TLC = Teflon Lined Closure		Concentrated Liquid Waste Samples Container and Preservative/Unit Codes mL, L = milliliter, Liter P00, P01 = no preservation, cool 4 deg. C P11, P13 = HNO_3 to pH < 2, HNO_3 to pH < 2 + cool 4 deg C U02, U06, U18 = mg/L, ug/L, pCi/L U35, U37 = pH units, degrees Fahrenheit TLS = Teflon Lined Septum	
Total VOAs (2411)* TCLP VOAs (2459)** ASL B	(3) x 4-oz. or (3) x 25 grams glass, TLC	P01/U04 (U02 for TCLP)	(3) x 40 mL glass vial TLS	P01/U02
Total SVOAs (2470)* TCLP SVOAs (2471)** ASL B	(1) x 8-oz. or 100 grams amber glass, TLC	P01/U04 (U02 for TCLP)	(1) x 250 mL amber glass, TLC	P01/U02
Total Metals (2402)* TCLP Metals (2401)** ASL B	(1) x 8-oz. or 100 grams glass or polyethylene	P01/U04 (U02 for TCLP)	(1) x 250 mL glass, TLC	P13/U02
Flash Point (2434) pH (2436) ASL B	-----	---	(1) x 250 mL glass, TLC	P00/U37 P00/U35
Total U (2442) Total Th (2002) ASL B	(1) x 8-oz. glass or polyethylene	P00/U07	(1) x 120 mL glass or polyethylene	P11/U06
Isotopic U (2026-29) Isotopic Th (2015-17) ASL B	(1) x 8-oz. glass or polyethylene	P00/U19	(1) x 250 mL glass or polyethylene	P11/U18
PFLT (2053) ASL B	(1) x 4-oz. glass or polyethylene	P00/U99	-----	---
Alpha-Beta (2005)	(1) x 4-oz. polyethylene	P00/U19	(1) x 120 mL polyethylene	P11/U18
Description of material (Color, appearance, consistency, etc.)				

Note: * - Perform analysis for concentrated waste samples.
** - For solid matrix samples only. Prepare sample extract, then conduct Total concentration screening analyses. If Total concentrations exceed 20 times the TCLP regulatory value, then analyze the sample extract.

Drummed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

C. Analytical Requirements (cont.)

Analysis Requested (Analysis Code) ASL = Analytical Support Level VOA = Volatile Organics Analysis SVOA = Semi-Volatile Organics Analysis U,Th = Uranium, Thorium PFLT = Paint Filter Liquid Test	Low to Medium Concentration Liquid Samples Container and Preservative/Unit Codes mL, L = milliliter, Liter P01, P09 = Cool 4 deg. C, HCl to pH < 2, P11, P13 = HNO_3 to pH < 2, HNO_3 to pH < 2 + cool 4 deg C U02, U06, U18 = mg/L, ug/L, pCi/L U35, U37 = pH units, degrees Fahrenheit TLS = Teflon Lined Septum TLC = Teflon Lined Closure		Quality Control Samples Container and Preservative/Unit Codes mL, L = milliliter, Liter P01, P09 = Cool 4 deg. C, HCl to pH < 2, P11, P13 = HNO_3 to pH < 2, HNO_3 to pH < 2 + cool 4 deg C U02, U06, U18 = mg/L, ug/L, pCi/L U35, U37 = pH units, degrees Fahrenheit TLS = Teflon Lined Septum TLC = Teflon Lined Closure	
Total VOAs (2411) ASL B	(3) x 40 mL glass vials, TLS	P01,P09/U02	(3) x 40 mL glass vials, TLS	P01,P09/U02
Total SVOAs (2470) ASL B	(1) x 1 gallon jar amber glass, TLC	P01/U02	(1) x 1 gallon jar amber glass, TLC	P01/U02
Total Metals (2402) ASL B	(1) x 1 L jar, polyethylene	P13/U02	(1) x 1 L jar, polyethylene	P13/U02
Flash Point (2434), pH (2435) ASL B	(1) x 250 mL glass, TLC	P00/U37 P00/U35	Not Applicable	Not Applicable
Total U (2442) Total Th (2002) ASL B	(1) x 1 L jar, glass or polyethylene	P11/U06	(1) x 1 L jar glass or polyethylene	P11/U06
Isotopic U (2026-29) Isotopic Th (2016-17) ASL B	(1) x 1 L jar, glass or polyethylene	P11/U18	(1) x 1 L jar glass or polyethylene	P11/U18
PFLT (2053) ASL B	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Alpha-Beta (2005)	(1) x 120 mL polyethylene	P11/U18	(1) x 120 mL polyethylene	P11/U18
Description of material (Color, appearance, consistency, etc.)				

Authorized Signature/Date Approved/Date

Drummed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

D. Sub-Waste Stream Description

The sub-waste stream consists of "x" drums in "x" lots. The material type of "yyy" and the source code of "zzz" indicate that this material is " ".

E. Safety Concerns

See SOP 20-C-805, Sections 6.0 to 6.14 for Health and Safety requirements.

F. Representative Sampling Procedure

"x" drums were chosen at random, and are listed on page 2 of this form. If visual inspection indicates that the material has free liquid or is completely dry, then a P.F.L.T is not necessary. Record pertinent information in the Field Log Book for each drum sampled as specified in SOP 20-C-805, Section 7.2.13.

G. Preservative and Holding Time Guidelines

Preservative and holding time requirements are provided in Tables 6.1 and 6.2 of the "Prototype Sampling and Analysis Plan for Containerized Wastes at the FEMP," and Volume II of the SCQ, Appendix A, Table 6-1 "Sample Container and Preservation Requirements." Preservative and holding time requirements for analyses not covered by the SCQ are provided by the FEMP laboratory. These requirements are provided in this PSAP as permitted in Section 3.3.2 of the SCQ.

This form must be dated and signed by an authorized individual.

If this Sub-Waste Stream is sampled and analyzed according to the information on this form, the results generated will be in agreement with the sampling and analysis requirements of NVO-325 (Rev. 1), Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements; and the Fernald Environmental Management Project (FEMP) Sitewide CERCLA Quality Assurance Project Plan (SCQ).

Authorized Signature/Date Approved/Date

Boxed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

A. Identifying Information

1) **Project Name:**
2) **Plan No.:**
3) **Material Description/Matrix Code(s):**
4) **Number of Boxes in Sub-Waste Stream:**
5) **Material Type:**
6) **Source Code:**
7) **Material Evaluation Form #:**
8) **Sampling Location for Boxes:**
9) **Process Knowledge:**

B. Sampling Information

1) **General:** Samples taken will be contained in glass or polyethylene jars with teflon lined lids.
2) **Preservation Method:** See Analytical Requirements in Section C.
3) **Holding Times:** See Preservative and Holding Time Guidelines in Section G and/or Tables 6.1 and 6.2 of "Prototype Sampling Anad Analysis Plan for Containerized Waste at the FEMP."
4) **Sample Technique:**
5) **Number of Boxes to be Sampled and Analyzed:** x, see page 2.
6) **Composite Samples:** Yes (No)
7) **Visual Inspection Performed?:** Yes (No)
8) **Field Contact:**
9) **Send Results to:**
10) **Charge No./Project Manager:**
11) **Required QA/QC Samples:**

Field QC	Yes	No	Notes
Trip Blank	___	___	daily, for VOA samples only
Field Blank	___	___	1 per 20 samples or 1 per sampling round
Equipment Rinsate	___	___	1 per 20 samples or 1 per sampling round
Duplicate/Split	___	___	1 per 20 samples or 1 per sampling round
Field Spike	___	___	1 per sixty days or 1 per sampling round

Laboratory QC

Laboratory QC sample type and frequency requirements are provided in Appendix A (Table 2-4), and Appendix G of the SCQ.

Authorized Signature/Date _____ Approved/Date _____

Boxed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

B. Sampling Information

12) **Box/Grid/Random Depth Information:**

Sample Number	Sample Type	Box Number	Grid Number	Random Depth (ft)

Authorized Signature/Date

Approved/Date

Boxed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

C. Analytical Requirements

In order to satisfy waste characterization requirements the following analyses may be performed:

Analysis Requested (Analysis Code) ASL - Analytical Support Level	Solid Matrix Samples Containers and Preservative/Unit Codes oz., g, L - ounce, gram, liter kg, mg, ug - kilogram, milligram, microgram P00, P01 - No preservative, Cool 4 deg. C U02, U04, U06, U19 - mg/L, mg/kg, ug/g, pCi/g TLC - Teflon Lined Closure		Quality Control Samples Container and Preservative/Unit Codes mL, L - milliliter, Liter P01, P09 - Cool 4 deg. C, HCl to pH < 2 P11, P13 - H_2SO_4 to pH < 2, H_2SO_4 to pH < 2 + cool 4 deg. C U02, U07, U19 - mg/L, ug/L, pCi/L U06, U07 - pH units, degrees Fahrenheit TLS - Teflon Lined Septum	
Total VOAs (2411)* TCLP VOAs (2471)** ASL B	(3) x 4-oz. or (3) x 25 grams glass, TLC	P01/U04	(3) x 40 mL glass vial TLS	P01/U02
Total SVOAs (2470)* TCLP SVOAs (2459)** ASL B	(1) x 8-oz. or (1) x 100 grams amber glass, TLC	P01/U04	1 x 4 L amber glass, TLC	P01/U02
Total Metals (2402)* TCLP Metals (2401)** ASL B	(1) x 8-oz. or 100 g glass or polyethylene	P01/U04	(1) x 1 L polyethylene	P13/U02
Total U (2442) Total Th (2002) ASL B	(1) x 8-oz. glass or polyethylene	P00/U06	(1) x 1 L glass or polyethylene	P11/U07
Alpha-Beta (2005)	(1) x 4-oz. glass or polyethylene	P00/U19	(1) x 120 mL glass or polyethylene	P11/U18
Description of material (Color, appearance, consistency, etc.)				

Note: * - Perform analysis for concentrated waste samples.
** - For solid matrix samples only. Prepare sample extract, then conduct Total concentration screening analyses. If Total concentrations exceed 20 times the TCLP regulatory value, then analyze the sample extract.

Authorized Signature/Date Approved/Date

Boxed Waste Material
Project-Specific Sampling and Analysis Plan

Number:
Date: 8-19-94

D. Waste Stream Description

The sub-waste stream consists of "x" boxes in "x" lots. The material type of "yyy" and the source code of "zzz" indicate that this material is " ".

E. Safety Concerns

See Site Media Sampling project-specific health and safety plan for 13~.

F. Representative Sampling Procedure

"x" boxes were chosen at random, and are listed on page 2 of this form. If visual inspection indicates that the material has free liquid or is completely dry, then a P.F.L.T is not necessary. Record pertinent information in the Field Log Book for each box sampled as specified in the Sitewide CERCLA Quality Assurance Project Plan (SCQ) - Volume II, Appendix J, Section J.4.1 and EM-SM-001.

G. Preservative and Holding Time Guidelines

See the Sitewide CERCLA Quality Assurance Project Plan (SCQ) - Volume II, Appendix A, Table 6-1 "Sample Container and Preservation Requirements."

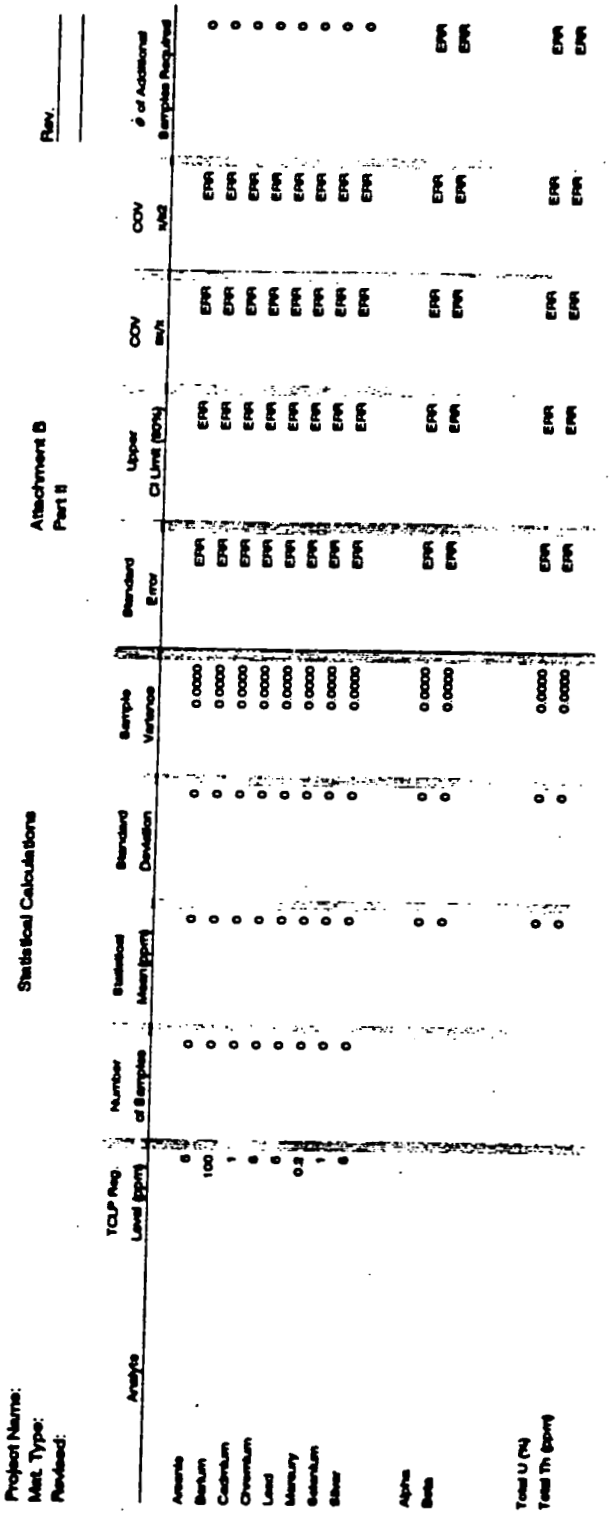
This form must be dated and signed by an authorized individual.

If this Sub-Waste Stream is sampled and analyzed according to the information on this form, the results generated will be in agreement with the sampling and analysis requirements of NVO-325 (Rev. 1), Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements; and the Fernald Environmental Management Project (FEMP) Sitewide CERCLA Quality Assurance Project Plan (SCQ).

Authorized Signature/Date Approved/Date

Appendix B SMS Statistical Report Format

SMS Statistical Report Format



Appendix C DQO Logic Statement and Summary Form NTW-002

DQO Logic Statement and Summary Form NTW-002

Step 1: Statement of the Problem

The following FEMP personnel may be involved in planning input and decision-making processes associated with containerized waste sampling, analysis, characterization, and disposition activities:

Rick Bardo, Environmental Safety & Health, Statistician
Neal Frink, Waste Management, Technical Consultant
Jerome Gnoose Jr., Site Media Sampling, SAP Author
David Rast, Department of Energy Fernald Office
Jeff Rowe, Waste Storage & Disposition, Technical Consultant
Analytical Customer Support/Laboratory
Environmental Programs
Environmental Safety & Health
Legal Affairs
Office of the President
Quality Assurance/Quality Control
Regulatory Programs
Remedial Support Operations
Waste Characterization

According to NVO-325 Rev. 1, DOE Nevada Field Office waste acceptance criteria, characterization, and certification requirements became effective in June 1992. Although a formal milestone has not been established, the FEMP has taken a pro-active approach to satisfy NVO-325 requirements regardless of budgetary or manpower constraints.

NVO-325 Rev. 1 requires that the waste generator must submit a sampling and analysis plan (SAP) for each potential waste stream prior to sampling and characterization efforts. This requirement was deemed necessary to ensure that: 1) samples collected will be representative of the waste inventory, 2) appropriate analytical procedures are used, and 3) quality control procedures are implemented to provide defensible data.

As stated the NVO-325 Rev. 1 requirement for DOE-NV approval of each SAP prior to waste stream sampling and characterization may have the following impacts:

1) Milestones covered under the Consent Decree with OEPA may not be met due to the amount of time required for SAP review and revision cycles

2) Review of each SAP prior to sampling and characterization would not be cost- or time-effective for either the FEMP or DOE-NV

In order to satisfy NVO-325 Rev. 1 requirements with the most cost- and time-effective approach, the FEMP petitioned DOE-NV to create a generic (prototype) SAP to support characterization of containerized wastes. This prototype SAP will serve as the controlling document to govern sampling, analysis, characterization,

and evaluation of these waste streams. In addition, this SAP will contain a project-specific sampling and analysis plan (PSAP) format that will be generated for each sub-waste stream.

In order to ensure compliance with NVO-325 Rev. 1, DOE-NV has agreed to review each prototype SAP and associated PSAP format. Subsequent to DOE-NV approval, the FEMP will generate appropriate PSAPs. DOE-NV will select a representative sample of PSAPs for review and approval. Subsequent to DOE-NV approval of the PSAP documents, the FEMP will implement sampling and analysis of the sub-waste streams. Lastly, DOE-NV will conduct annual recertification audits.

The prototype SAP has been designed to satisfy NVO-325 Rev. 1 requirements; however, it should be flexible to include CERCLA- or other ARAR-driven requirements. By taking this approach, the FEMP would have one generic plan for containerized waste material sampling and analysis for projects covered under CERCLA, RCRA, CWA, NPDES, etc. In other words the sampling approach and techniques would remain constant regardless of the regulatory driver; while, the types of analyses (ASLs and methods), level of quality control, and data uses would fluctuate dependent on the regulatory requirements or the data user's needs.

Lastly, NTS will only accept low-level radiological wastes from the FEMP. Therefore, the FEMP must generate representative data of sufficient quality to determine the correct regulatory status (at a 90% level of confidence) and proper disposition of the waste materials. Inadvertent shipment of materials to NTS that are found to be hazardous or mixed wastes could result in termination of the FEMP's permit by DOE-NV, as well as various legal and social/economic problems.

A variety of the FEMP's restoration activities, as well as facility support and maintenance functions, are currently generating and will continue to generate waste materials. In addition, when the FMPC ceased production in 1989, a large, but finite inventory of materials associated with the uranium metal production processes were retained. These wastes/materials require characterization to ensure safe, compliant, and appropriate management to support environmental restoration and waste management goals at the FEMP and supporting programs and facilities.

Step 2: Identification of a Decision that Addresses the Problem

The first step of waste characterization is to conduct process knowledge, previous analytical data, and visual inspection reviews for an accurate assessment of the physical, chemical, and spatial characteristics of the containerized waste material. The next step is to determine the target analytes and number of samples required to generate data at a 90% confidence level to support a RCRA determination. According to NVO-325 Rev. 1, EPA SW-846 Equation 8 is the preferred method for generating the number of sample points. However, this requires previous analytical data to estimate the analyte-specific mean and standard deviation in comparison to its associated regulatory threshold level (RTL). If previous analytical data are not available or are not of sufficient quality, then a minimum of four samples must be collected, analyzed, and evaluated to determine if additional samples are warranted. This alternative method may not be cost- or time-effective; therefore, the FEMP has recommended the use of alternative methods, such as a combination of the 10% and Cube-Root methods (based on the number of containers), or the Log Base 10 Method (for confirmatory sampling projects) to determine the number of required samples. EPA SW-846 Equation 8 may then be used as a tertiary method to determine if additional samples are warranted.

Subsequent to determination of the number of required samples, the sample plan writer must evaluate sampling strategies, identify required equipment, and provide sampling methodologies or references to SCQ procedures. The sample plan writer must also ensure that sampling personnel are adequately trained in the use of the prescribed sampling equipment and methods and that they are capable of generating quality work. Lastly, the sample plan writer must clearly define the required analytical methods, level of quality associated with these analyses, and the level of effort required to ensue that the data is valid for the intended use.

Subsequent to sample collection and analysis, the sample plan writer must evaluate the population mean and the standard error of the mean to the appropriate RTL (i.e., determine the upper limit of the 90% confidence interval). This information is submitted to Waste Characterization for additional data evaluation and a determination of the regulatory status of the material or the need for additional sampling for a more accurate estimate of the mean.

Subsequent to data analysis and evaluation, the initial action taken is to accurately determine the physical/chemical/ radiological characteristics and regulatory status (e.g., conventional waste, non-RCRA low-level radioactive waste, RCRA or hazardous waste, or mixed waste) of the containerized materials. This action is extremely critical since the following actions are dependent on this initial action.

The next action is to determine the appropriate disposition (e.g., disposal, treatment, or storage) of the containerized waste materials based upon their characteristics and regulatory status. This action is be dependent on the

initial action; therefore, an error in the initial action could have a significant impact on the selection of the appropriate disposition option. The final action is to determine the impacts to the environment and health and safety of the workers/surrounding population if storage at the FEMP is the only viable disposition option for the containerized waste materials.

Criteria used to determine the appropriate action to be taken are as follows:

Action No. 1

a) If the containerized waste materials do not contain radiological nuclides regulated under the Atomic Energy Act of 1954 or exhibit properties of listed- or characteristic-waste as defined in Chapter 3745-51 of the Ohio Administrative Code (OAC), then consider these materials as conventional waste.

b) If the containerized waste materials contain radiological nuclides regulated under the Atomic Energy Act of 1954 in concentrations which are not economically feasible to recover, but do not exhibit properties of listed- or characteristic-waste as defined in Chapter 3745-51 of the Ohio Administrative Code (OAC), then consider these materials as low-level radiological waste.

c) If the containerized waste materials do not contain radiological nuclides regulated under the Atomic Energy Act of 1954, but do exhibit properties of listed- or characteristic-waste as defined in Chapter 3745-51 of the Ohio Administrative Code (OAC), then consider these materials as hazardous waste.

d) If the containerized waste materials contain radiological nuclides regulated under the Atomic Energy Act of 1954 in concentrations which are not economically feasible to recover, and exhibit properties of listed- or characteristic-waste as defined in Chapter 3745-51 of the Ohio Administrative Code (OAC), then consider these materials as mixed waste.

Action No. 2

a) If the containerized waste materials are liquids and determined to be conventional waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for conventional wastes. Conventional liquid materials that meet NPDES permit requirements may be dispositioned to the General Sump.

b) If the containerized waste materials are liquids and determined to be low-level radiological waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for low-level waste.

c) If the containerized waste materials are liquids and determined to be hazardous waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for hazardous waste.

d) If the containerized waste materials are liquids and determined to be mixed waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for mixed waste.

e) If the containerized waste materials are solids with less than 0.5% free liquids and determined to be conventional waste, then retain for unrestricted FEMP use or ship to an approved solid waste landfill for disposal. Conventional solid materials with greater than 0.5% free liquids must be treated prior to disposal.

f) If the containerized waste materials are solids with less than 0.5% free liquids and determined to be low-level radiological waste, then ship to NTS for disposal as low-level waste. Low-level radiological solids with greater than 0.5% free liquids, must be treated to remove the free liquid (e.g., filtered, dried, etc.) prior to shipment to NTS for disposal.

g) If the containerized waste materials are solids and determined to be hazardous waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for hazardous waste.

h) If the containerized waste materials are solids and determined to be mixed waste, then manage these materials in accordance with appropriate FEMP procedures or regulatory directives/policies for mixed waste.

i) If the containerized waste materials consist of distinct physical phases (i.e., liquids and solids), then segregate these phases and manage each phase in accordance with the appropriate FEMP procedure or regulatory directives/policies for the respective waste determination.

Action No. 3

a) If the containerized waste materials must be stored at the FEMP, then resample materials for Target Analyte List constituents at a sufficient level of quality to allow for a risk assessment of the potential impact to human health or the environment associated with storage of these materials.

In general, the uranium metal production processes did not generate transuranic or high-level radioactive wastes. Therefore, the objective of radiological characterization is to provide total and isotopic activity concentrations for safe management and proper disposition of the waste material at the FEMP.

The FEMP will use process knowledge/previous analytical data/visual inspection review to obtain as much information as possible concerning the characteristics of the waste materials. In situations where there is sufficient information, a limited number of samples will be collected and analyzed to verify/refute the RCRA determination and/or radiological characterization. In situations where there is insufficient information, a more comprehensive sampling and analysis program (based on total concentrations of TCLP constituents) will be implemented to accurately characterize the waste material.

Subsequent to data collection, the FEMP will use statistical methodologies described in EPA SW-846 and other supporting documents/literature to estimate the analyte-specific population mean to its respective RTL. In situations where the upper limit of the 90% confidence interval approaches or slightly exceeds the RTL, the FEMP may evaluate the leachability of the respective analyte in question and/or determine the normality of the data distribution. Actions that may be taken are: 1) analyze the samples using TCLP extraction protocol, 2) transform the original data to produce a normal distribution, or 3) no action. In a majority of these situations, the FEMP will probably resample for the analyte in question using TCLP extraction/analysis methodology to verify/refute the upper limit of the 90% confidence interval.

Subsequent to regulatory status determination, the FEMP will identify safe management and disposition options for the waste materials. Conventional solid wastes may be managed in stockpiles or shipped to an approved solid waste disposal facility; while, conventional liquid wastes may be transferred to the FEMP General Sump for discharge to the Great Miami River. Low-level solid wastes will be shipped to NTS; while, low-level liquid wastes may be transferred to an uranium wastewater treatment facility then discharged to the Great Miami River. Lastly, hazardous or mixed wastes (solid or liquid) will be managed at approved RCRA storage facilities at the FEMP until the appropriate disposition option can be identified and implemented.

Step 3: Identify Inputs that Affect the Decision(s)

The following inputs are required to accurately characterize and disposition containerized waste materials:

Physical Characteristics - nature of waste phases (liquid vs. solid)
Radiological/Chemical Properties

* Radionuclides, such as uranium, thorium, and radium, using gamma spectroscopy, alpha spectroscopy, fluorimetry, liquid scintillation, alpha counting, beta counting, and thermal ionization mass spectroscopy.

* Organics using gas chromatographic methods, such as EPA 8010 or 8020; or gas chromatographic/mass spectroscopy methods, such as EPA 8270.

* Inorganics/Metals using atomic absorption spectroscopy (AAS) or inductively coupled plasma-atomic emission spectroscopy (ICPES).

** Ignitability using EPA Method 1010

** Reactivity using 40 CFR 261.23, EPA SW-846, Part 7.3.3.2 and 7.3.4.3

** Corrosivity using EPA Method 9040

** Toxicity using EPA Method 1311

** LDR solvents (TCLP F001 - F005)

** LDR halogenated organic compounds using EPA Method 9020

** Cyanides using EPA Method 9010

** Sulfides using EPA Method 9030

** Free Liquids using EPA Method 9095 (Paint Filter Liquids Test)

** PCBs using EPA Method 8080

Note : * - Primary target analytes, list may vary based on results of process knowledge/previous analytical data reviews.

** - Secondary target analytes, list may vary based on result of process knowledge/previous analytical data/visual inspection review and/or analysis of primary target constituents.

Physical Characteristics

The physical characteristics of the waste phases may dictate the type of analyses that may or may not be conducted and/or impact a decision. In general, solid matrix samples do not typically require ignitability, reactivity, or corrosivity analyses; while, liquid matrix samples do not require Paint Filter Liquids Test analysis. In addition, the nature of the waste phase may directly or indirectly determine its disposition. For example, consider a drum lot which contains liquid- phased material overlying a layer of solids/sludge. NVO-325 Rev. 1 waste acceptance criteria are pertinent to dry solid wastes only (i.e., no liquid waste will be accepted at NTS); however, the liquid phase requires characterization to evaluate any impacts to or from the solid/sludge material and its appropriate disposition option.

Radionuclides

Removal Action 17 Work Plan has identified maximum uranium, thorium, and radium concentrations of 100 pCi/g, 50 pCi/g, or 5 pCi/g, respectively, for addition of solid waste materials to the FEMP OU-3 controlled stockpile. Waste materials containing radiological concentrations in excess of these levels must be managed as low-level waste.

Organics, Inorganics/Metals

In accordance with the FEMP Waste Characterization Plan, total screening concentrations in excess of 20 times Toxicity Characteristic Leachate Procedure (TCLP) regulatory threshold values as listed in Title 40 CFR 261 or Chapter 3745-51 of the Ohio Administrative Code (OAC) may trigger additional analyses for TCLP extraction constituents, LDR solvents or halogenated organic compounds, or Target Analyte List (TAL) constituents.

In general, each variable can be qualitatively or quantitatively measured through process knowledge/previous analytical data/visual inspection reviews and detailed sampling and analysis.

Step 4: Specification of the Domain of the Decision

The containerized waste materials are separated into the following distinct populations: Newly Generated Materials (NGM), Newly Identified Materials (NIM), and Legacy Wastes. There are no spatial or temporal population boundaries to be considered per se, since containerized waste materials may generated from any physical location or during any given time frame at the FEMP.

Process knowledge, previous analytical data, or visual inspection information may be required in cases where there is distinct layering effects of liquid and/or solid phases. This information may allow for segregation of waste strata into individual sub-populations based on differences in: physical or chemical/radiological properties; time, nature, and location of waste generation processes; or volume of waste generated. If applicable or warranted, multi-layered phases segregated by differences in volume may be considered as a single sub-population by applying a weighted correction factor to the analytical results and calculating the mean and standard deviation of the mean.

Each population will be subdivided into sub-populations based on the lot code sequence (Material Type and Source Code) and their physical characteristics. As previously discussed, each waste phase may be further subdivided if distinct layer effects are observed. Characterization of containerized materials on a sub-population basis should provide more effective controls to ensure that NTS receives low-level radioactive wastes only. Sub-populations exhibiting contaminant concentrations above the respective RTL will be managed as potential hazardous waste unless additional characterization refutes this claim.

Step 5: Development of Logic Statement

Analytical data are submitted to Site Media Sampling for statistical analyses (in accordance with EPA SW-846) and reporting to assist Waste Characterization in the RCRA determination process. The statistical report provides tabulated analytical data used in the statistical analyses and the analyte-specific TCLP regulatory threshold level (RTL), mean, standard error of the mean, confidence interval (80% two-sided), and coefficient of variance (COV) generated by statistical analyses. For decisions that require comparison with the analyte-specific RTL, only the upper limit of the 80% confidence interval (a 90% one-sided confidence interval) is evaluated. A summary of the statistical analysis methodology, in accordance with the FEMP Waste Characterization Plan, is as follows:

The inferential calculations used to form the 90% (one-sided) confidence limit are based on the assumption that the population is approximately normally distributed. Two primary criteria for determining whether a population is normally distributed based on review of a sample set are:

1) Visual inspection of the data (i.e., a graph or plot of the data) and/or

2) Mathematical comparison of the values for the sample mean ($\bar{x}$) and the standard error of the mean ($s\bar{x}$) to produce the COV

For ASL B data where the constituent concentration is expressed as "less than" the detection limit (DL), a value of 1/2 the DL is used as an input for statistical treatment. For ASLs C, D, and E, estimated values (i.e., expressed with a data qualifier of "J") the reported value is used. However, these data are only considered valid when the reported DL or estimated value is below the regulatory limit with which data are to be compared. This approach minimizes error in decision making (as opposed to using a value of zero or the actual DL in the decision making).

Duplicate and split sample analyses are an integral part of SW-846 quality assurance protocol and are used to measure sampling performance in terms of precision (reproducability) and/or comparability. A sample and its duplicate or split are designed to be equivalent (i.e., sampled and analyzed in precisely the same manner), therefore any distinction between a sample and its duplicate or split is arbitrary. For purposes of statistical treatment of data, the average value of the duplicate or split analyses for each constituent for a given sample is used for calculating statistics.

If any given sample result exceeds its respective RTL, then the FEMP will conduct an inspection of the supporting analytical QC data and analytical notes to verify that the reported value is valid in accordance with FEMP SSOP-1004, "FEMP Data Validation Procedure". If the reported value is not valid, the FEMP will document this finding, treat the result as missing or unusable data, and resample and reanalyze if warranted. If the reported value is valid, then the FEMP may

resample and reanalyze the affected waste materials for the given suspect analyte(s).

If the analyte-specific 90% confidence limit exceeds the RTL, then the FEMP will conduct an inspection of the analytical data to determine its validity. If the data is not valid, then the FEMP may resample and reanalyze the waste materials. If the data is valid, then the FEMP will determine the normality of the data distribution. If the COV value is less than 1.25 (i.e., $sx/\bar{x}$ is <1.25), the data may be assumed to be approximately normally distributed. If this test indicates that the data are not normally distributed, then the following steps are taken in accordance with established guidance at the FEMP:

1) Process knowledge (PK) and the Sampling and Analysis (S&A) effort are revisited to determine if the apparent distribution may be an artifact of S&A. Resampling may be necessary if this is deemed to be the case.

2) If the data correlate to an apparent stratification of the sub-waste stream and this correlation is substantiated by PK, then the waste may be evaluated as a stratified sub-waste stream.

3) If the data are determined to meet an alternate distribution profile, a data transformation and subsequent statistical evaluation may be performed (e.g., log-normal transformation followed by anti-log transformation of the 90% confidence limit).

4) If the transformation does not normalize the data, non-parametric approaches may be utilized to form the required 90% confidence limit.

5) Alternatively, additional samples may be collected to expand the number of data points representing the waste. This additional data provides a broader base with which to evaluate assumptions of normality.

If the normalized data indicate that the analyte-specific 90% confidence limit exceeds its respective RTL, then the FEMP will make a qualitative determination of its leachability. If the analyte has a high potential for leachability, the FEMP may submit samples for TCLP extraction and analysis.

By taking the approach described in the "Prototype Sampling and Analysis Plan for Containerized Waste at the FEMP", the FEMP is attempting to satisfy regulatory requirements with the most cost- and time-effective strategy. As stated previously, PK/previous analytical data/visual inspection reviews will allow for the development of a target list of analytes. In addition, the FEMP will use total screening methods for organics and inorganics/metals to evaluate if additional analyses (TCLP or TAL) are warranted. Additional testing, if

warranted, will only be conducted for suspect analytes (i.e., exceed respective RTL).

Containerized waste material sampling and analysis is required to satisfy the following data needs:

1) Determine the regulatory status of the waste materials (at a 90% confidence level) and ensure compliance with NVO-325 (Rev. 1) requirements

2) Determine the appropriate level of health and safety requirements for protection of site workers during waste disposal, treatment, or storage

3) Determine the waste characteristics to evaluate the proper disposal, treatment, or storage option

4) Assess risks to human health or the environment if wastes must be stored at the FEMP

The intended data users are Waste Characterization and Waste Storage and Disposition. Other potential data users are CRU1, CRU2, CRU3, CRU4, and CRU5 for treatability studies and CERCLA RI/FS activities, and Materials Control and Accountability (MC&A) for inventory and proper storage of radiologically-contaminated and/or RCRA materials.

Step 6: Establish Constraints on Uncertainty

An example of a false positive error that would affect the decision is uranium interference during metals analysis using inductively coupled plasma-atomic emission spectroscopy (ICPES). Previous experiences have indicated positive hits for certain metallic constituents, that were associated with errors in counting due to detection of uranium activity energies. Other examples of false positive errors include potential cross-contamination of sample equipment and inherent variabilities associated with statistical analyses of the data set.

An example of a false negative error that would affect the decision process, would be to determine that the waste is not RCRA or hazardous, when in reality they should be. Factors that could lead to such an error is the inherent variability associated with laboratory and statistical analyses, or persons with insufficient training or experience that may be involved in the decision process.

False negative errors represent a greater impact than false positive errors. An error (no matter how small or great in magnitude) in the decision to call the waste material non-RCRA, when in actuality the material is RCRA hazardous, could result in termination of the FEMP's disposal permit from NTS. This would result in subjecting NTS to scrutiny and pressures from the Nevada Department of Environment Protection (NDEP), the agency assigned to regulate NTS disposal activities. At the FEMP, such an error would result in an increased strain of providing storage of these materials at approved RCRA facilities, and possibly extensive fines or penalties administered by OEPA for violation of Consent Decree requirements and milestones. In terms of environmental protection and human health and safety, increasing magnitude of the error may result in greater potential for environmental damage or adverse human health effects.

In terms of a false positive error, the magnitude of the error would have minimal impact on environmental protection or human health and safety. The major consequence of calling the waste material RCRA hazardous, when in actuality it is non-RCRA, would be the increased strain of providing storage space at an approved RCRA facility at the FEMP. Although the FEMP may not be in violation of Consent Decree requirements, there would be an impact to the credibility of the FEMP waste characterization and waste management programs.

False negative errors in the decision to call material non-RCRA when in actuality it is RCRA hazardous and ship such material to NTS are <u>never acceptable</u>. In terms of political/social and economic consequences with OEPA and health/ecological risks, such errors may be almost never to sometimes acceptable. False positive errors may be sometimes acceptable since they have a lesser magnitude of impact than false negative errors. However, these errors should be minimized whenever possible.

In order to maintain a 90% confidence level in the data generated under the prototype sampling and analysis format, the following probabilities are acceptable:

False positive rate, alpha, of 10% or 0.10 (1 - alpha = 90% or 0.90)
False negative rate, beta, of 5% or 0.05 (1 - beta = 95% or 0.95)

The region of indifference for false positive errors can range from 10% to 100% with little or no impact on the decision. As the false positive rate increases, the most conservative approach is to assume that the errors are consistent throughout the sub-population or population, and that the material is RCRA hazardous until subsequent data can be presented (i.e., correction of causes of error) to refute the decision.

The region of indifference for false negative errors is greater than 10%. Basically, if the false negative rate exceeds 10%, the most conservative approach is to identify the material as RCRA hazardous until subsequent data can be presented to refute the decision.

In practical terms, false negative and false positive errors may be minimized by selecting a representative portion of data releases for investigation/ evaluation of waste/QC sample data calculations, analytical procedures, instrument histories, etc. (i.e., data validation). If the reported values can be considered valid at a 90% confidence level or better, the FEMP can assume that the population of data values are correct. In addition, the FEMP could utilize split sample analyses to identify possible data reporting errors. If the split sample results are in agreement on a consistent basis, then the FEMP can assume that population data are valid.

If the false positive or false negative rates exceed 10%, the FEMP will take the most conservative approach of identifying the waste materials as RCRA hazardous to avoid unintentional shipment of RCRA materials to NTS.

Step 7: Optimize Design for Obtaining Data

In general, containerized wastes at the FEMP were previously generated as a result of uranium metal production processes, equipment decontamination, sump-cleanout, by-product storage, etc. Containerized wastes are currently being generated as a result of temporary storage of materials disturbed by CERCLA RI/FS studies, removal actions, construction/demolition activities, and daily FEMP operations.

Contaminants of concern vary across the FEMP site and within each OU as well. Contaminants of concern for the OUs are as follows:

- OU-1 - radionuclides, trace metals, asbestos, volatile organics
- OU-2 - radionuclides, trace metals
- OU-3 - radionuclides, trace metals, volatile organics, semi-volatile organics, pesticides, PCBs, asbestos, acids, fuel oils, and lubricating oils.
- OU-4 - radionuclides and trace metals
- OU-5 - all contaminants of concern in OUs 1 through 4

Contaminant distributions within each sub-population are expected to vary between the solid and liquid phases. The difference in the distribution of contaminants is primarily related to differences in the waste generation processes. A majority of the solid or sludge materials were deposited during uranium metal production processes; while, the liquid materials represent stormwater runoff collection or sanitary-sewer effluent collection.

In general, the sampling approach for containerized wastes at the FEMP is dependent on the characteristics of the sub-waste stream as determined by PK/previous analytical data/visual inspection reviews. Simple random sampling methods are used for sub-waste streams which contain single-phased (i.e., either solid or liquid) and relatively homogenous waste materials. Stratified random sampling methods are used for sub-waste streams that have been segregated into multiple container groups (lots) based upon differences in: the physical characteristics (i.e., phase and degree of homogeneity) of the waste materials, the origin (time and location) of waste materials and their generation processes, or the distribution and concentration of contaminants.

Random sample point locations will be generated using computer algorithms designed based upon guidance criteria provided in EPA/230-02-89-042, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I, Soils and Solid Media. Sample locations for stratified random sampling can be determined using the following methods: 1) select random sample locations as previously described and collect a sample from each stratum or media type (i.e. liquid and sludge), or 2) calculate random sample locations for each stratum or media type independently. A major assumption of using this methodology is that each stratum or media type is evenly dispersed throughout the surface impoundment.

Typically, the number of samples required equals 10% of the number of drums in a sub-waste stream. However, for sub-waste streams containing more than 100 drums, collecting samples for analyses at a rate of 10% may not be economically feasible or practical. Therefore, the FEMP intends to use the 10% method for sub-waste streams with < 100 drums and the cube root method for sub-waste streams with > 100 drums. Using this approach, the number of samples required for waste characterization is as follows:

Number of Drums	Min. # of Samples for Analysis	Number of Samples for Completeness*
1 to 20	2	3
21 to 100	10%	12.5%
101 to 1000	10	13
1001 to 10000	22	28

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%).

For white metal box, Sea/Land^R, or Top Load container sampling, the proposed number of samples required shall be equal to 10% of the containers in the sub-waste stream, as follows:

Number of Boxes	Min. # of Boxes to be Sampled	Number of Samples for Completeness*
1	1	3
2 to 20	2	5
21 to 30	3	8
16 to 40	4	10
41 to 50	5	13
over 50	10%	25%

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%). This number includes collecting two random samples from each white metal box, Sea/Land^R, or Top Load container sampled.

For sub-waste streams that have been characterized by process knowledge but do not meet one of the conditions in Section 1.5 of this SAP, the number of required confirmatory samples per sub-waste stream is as follows:

Number of Containers	Min. # of Samples for Analysis	Number of Samples for Completeness*
1 to 10	2	3
11 to 100	3	4
101 to 1000	4	5
over 1001	5	6

* - Total number of samples required to maintain 90% completeness using a conservative R-value of 0.20 (20%). If the containers are white metal, Sea/Land®, or Top Load boxes, the required number of samples in this table is doubled.

Parametric analysis, or EPA SW-846 Equation 8, is the preferred method to select the required number of samples required to satisfy the NVO-325 90% confidence level requirement. However, EPA SW-846 Equation 8 requires previous analytical data to determine the mean and associated standard deviation for the analyte with the most restrictive regulatory threshold level. EPA SW-846 Equation 8 may be used as a tertiary method, in situations where the upper limit of a 90% confidence level approximates or exceeds the regulatory threshold value for a given analyte, to determine if additional sample collection and analysis is warranted.

Visual inspection, photoionization detection (PID) and alpha and/or beta/gamma detection field screening analyses at ASL A. Laboratory analyses at ASL B initially, additional data uses may require ASL C or D.

Representativeness, or the collection of samples that are unbiased and exhibit average properties of the population sampled, is achieved by segregating the waste materials into sub-waste streams. A sub-waste stream is generally comprised of a group of materials labeled with the same Material Type and Source Code. Material Type and Source Code identifiers are provided in each PSAP, in Sections A.5 and A.6, respectively.

Sampling accuracy is achieved through randomized sampling of the waste materials within a given sub-waste stream. Randomized sampling minimizes bias in the sample selection process by giving each portion of the waste materials an equal probability of being sampled.

Sampling precision is achieved by increasing the number of samples to be collected, increasing the actual volume of the samples, or dividing a population into appropriate strata prior to sampling. Additional samples may be collected when the uniformity of the waste is not known and when sample collection is difficult. In general, the volume of sample material collected at the FEMP exceeds the minimum amount needed for analytical sample preparation and analysis. Lastly, when a sub-waste stream is suspected or known to contain separate physical phases (i.e., solids and liquids), the number of samples required is calculated for each waste phase. During sample collection activities, a sample is collected from each waste phase from the randomly selected sample points.

Method detection limits for solid- and liquid-phased samples, in accordance with EPA SW-846, are provided in Table G-1 of the SCQ (Vol. II).

As previously mentioned, additional samples may be collected when appropriate. To satisfy SCQ completeness requirements of 90%, the number of samples required to be collected will be calculated in accordance with methods described in

EPA/230-02-89-042, Feb. 1989, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I, Soils and Solid Media. The following equation will be used to determine the number of samples to satisfy the SCQ 90% completeness level requirement:

$$\#\ \text{of Samples}_{(90\%\ \text{comp})} = \frac{\text{Minimum number of samples required}}{(1 - R)}$$

where,

R = 0.20 (20%), the expected percent of missing or unusable data (i.e., sample holding times exceeded, improper preservation of samples, sample container breakage during shipment to laboratory, etc.)

An R-value of 0.20 (20%) was selected to take the most conservative approach for minimization or elimination of the potential need for resampling activities.

Lastly, laboratories contracted to provide analytical services are required to comply with all provisions in the SCQ. Therefore, data sets from differing laboratory facilities should be comparable since the same analytical method and method detection limit is required.

Required analytical methods are as follows:

Analytical Parameter	EPA SW-846 Test Method(s)
Organics (Gas Chromatography)	8010, 8020
Organics (Gas Chromatography/ Mass Spectroscopy)	8270
Inorganics/Metals (Atomic Absorption Spectroscopy)	40 CFR 261, App. III SW-846 Parts 7.3.3.2 and 7.3.4.3
Inorganics/Metals (Inductively Coupled Plasma/ Atomic Emission Spectroscopy)	6010

DQO Logic Statement and Summary Form NTW-002

RCRA Analyses	
Ignitability	1010
Reactivity	40 CFR 261.23 Parts 7.3.3.2 and 7.3.4.3
Corrosivity	9040 (NVO-325) 1110 (SCQ)
Toxicity Characteristic	1311
LDR Solvents	TCLP (F001-F005)
LDR Halogenated Org.	9020
Cyanides	9010/9012 (NVO-325) 335.2/335.3 (SCQ)
Sulfides	9030
Other NVO-325 (Rev. 1) Analyses	
Free Liquids	9095
PCBs	8080 (No SCQ Reference)

DQO Logic Statement and Summary Form NTW-002

1.A. Task/Description: Physical, chemical, and radiological characterization of containerized waste materials. OU #: OUs 1 - 5

1.B. Project Phase: (Circle the appropriate selection.)

RI FS RD RA RA OTHER (specify) Waste Characterization/Management

1.C. DQO No.: NTW-002 DQO Reference No.: _____

---

2. Media Characterization: (Circle the appropriate selection.)

Air Biological Groundwater Sediment Soil

Waste Waste water Surface water Other (specify) _____

---

3. Data Use with Analytical Support Level (A-E): (Circle the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization A B C D E Risk Assessment A B C D E
Evaluation of Alternatives A B C D E Engineering Design A B C D E
Monitoring during remediation activities A B C D E
Other A B C D E (Explain) Waste Characterization

4.A. Drivers:
1) NVO-325 Rev. 1, "Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements"
2) Consent Decree with Ohio Environmental Protection Agency
3) Amended Consent Agreement with USEPA
4) DOE Order 5820.2A, "Radioactive Waste Management"

4.B.Objective:
1) Generate and maintain data of sufficient quality to identify the regulatory status of and safely manage containerized waste materials.
2) Determine appropriate waste disposition options, including treatment and disposal.

---

5. Site Information (Description): The FEMP, formerly FMPC, is a DOE facility located 27 kilometers northwest of Cincinnati, Ohio. The FMPC operated from 1951 to 1989, by processing uranium ore and feed materials for the production of low-enriched uranium metal products. Subsequent to 1989, the site name and mission changed towards implementation of environmental restoration initiatives to address environmental impacts associated with FMPC operational and FEMP remediation activities.

DQO Logic Statement and Summary Form NTW-002

DQO Number: NTW-002

In 1989, a large, but finite inventory of materials associated with the uranium metal production process were retained. In addition, a variety of the FEMP's restoration, facility support, and maintenance functions are currently generating or will continue to generate waste materials. These wastes require characterization to ensure safe, compliant, and appropriate management in support of environmental restoration and waste management goals at the FEMP and supporting programs and facilities.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and QAPjP Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the QAPjP Section.)

1. pH	X	2. Uranium/Thorium	X	3. BTX	
Temperature		Full Radiologic		TPH	
Specific Conductance		Metals	X	Oil/Grease	
Dissolved Oxygen		Cyanide	X		
		Silica			
4. Cations		5. VOA/SVOA	X	6. PFLT	X
Anions		ABN		LDR	X
TOC		Pesticides		Flash Point	X
TCLP	X	PCB	X	F-Listed Solvents	X
CEC					
COD					

6.B. Equipment Selection and QAPjP Reference:

Equipment Selection		Refer to QAPjP Section	
ASL A		QAPjP Section:	
ASL B	SW-846 Methodology, GC/MS, AAS	QAPjP Section:	Appendix G
ASL C	CLP Methodology	QAPjP Section:	Appendix G
ASL D	CLP Methodology	QAPjP Section:	Appendix G
ASL E		QAPjP Section:	

DQO Logic Statement and Summary Form NTW-002

DQO Number: NTW-002

7.A. Sampling Methods: (Circle the appropriate selection.)

Biased Composite Environmental Grab Grid

Intrusive Non-Intrusive Phased Source

Other (specify): Simple or stratified random sampling methods

7.B. Sample Work Plan Reference: (List the samples required. Reference the work plan or sampling plan guiding the sampling activity, as appropriate.)

Background samples: Prototype SAP for Containerized Wastes at the FEMP

7.C. Sample Collection Reference: (Please provide a specific reference to the QAPjP Section and subsection guiding sampling collection procedures.)

Sample Collection Reference: Sections K.5.5.4 - K.5.5.6, and K.8 of the FEMP SCQ

---

8. Quality Assurance/Control Samples: (Place an "X" to the right of the appropriate selection(s).)

8.A. Field Quality Assurance Samples:

Trip Blanks X	Container Blanks __
Field Blanks X	Duplicate Samples X
Equipment Rinsate Samples X	Split Samples __
Preservative Blanks __	Performance Evaluation Samples __
Other (specify) __	

8.B. Laboratory Quality Control Samples:

Method Blank __ Matrix Duplicate/Replicate (Matrix Spike __ Duplicates)

Matrix Spike __ Surrogate Spikes __

Other (specify) X Per Appendix G of the FEMP SCQ

---

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

As a quality assurance measure, NVO-325 Rev. 1 requires that all personnel involved in the waste characterization, determination, certification, and transfer processes have sufficient training to meet the project objectives. Therefore, the data quality and validity may be greatly affected by personnel designing and implementing the requested scope of work for these projects.

Appendix D FEMP Miscellaneous Forms

Fernald Environmental Management Project
MATERIAL EVALUATION FORM (MEF)

Evaluation Section

A. WASTE STREAM IDENTIFICATION

1. MEF #: Revision No.:	2. Date Completed:	3. Provide 15 digit Lot Marking if available or Material Type and Source Code:
4. Evaluator:	5. Phone No.:	6. Badge No./Co. Name:

B. MATERIAL REGULATORY STATUS

Regulated: Material Specific Regulations:	Regulated: Material Specific Regulations:
___ yes ___ no TSCA PCBs ___ yes ___ no CAA Asbestos NESHAPs ___ yes ___ no State of Ohio Infectious waste (See Form REG in material evaluation file) ___ yes ___ no RCRA Solid Waste (See Form Series SW) ___ yes ___ no RCRA Hazardous Waste (See Form Series HW) Hazardous Waste Code(s): _____	___ yes ___ no Low Level Radioactive Waste (LLRW). ___ yes ___ no Transuranic Waste (TRU). ___ yes ___ no Nonradioactive waste***. (See Form RAD in material evaluation file) _____ ***Concurrence, Radiological Assessment Date Re-evaluation Date: _____ NOTE: WASTE STREAM MUST BE RE-EVALUATED BY FMCI IF IT IS GENERATED AFTER THE RE-EVALUATION DATE LISTED ABOVE OR WHEN THERE IS A CHANGE IN THE STREAM/GENERATING PROCESS.

C. MATERIAL MANAGEMENT:

1. Waste Form Criteria:	2. Container Specification:	3. Reactivity Group Code:
___ yes ___ no Health & Safety Addendum Attached. (Note if marked yes do not manage this material without attached H&S Addendum. ___ yes ___ no Material contains free liquids. ___ yes ___ no LLRW meets NVO-325 Waste Acceptance Criteria (See Form WTS in material evaluation file)		
4. DOT Shipping Description:	5. DOT Labels:	6. DOT Identification No.: ☐ UN ☐ NA _____ (Suffix) 7. DOT Hazard Class:

D. DISTRIBUTION

___ Generator _____	___ RCRA Program Manager D. A. Nixon MS# 84
___ MC&A H. J. Kaye MS# 28	___ Site Media Sampling M. F. Ramirez MS# 11
___ Facilities and Warehousing R. S. Perkins MS# 63	___ RI&AT R. L. Fowlkes MS# 31
___ Sample Disposition (if sampled) _____	___ Waste Reduct Prog. L. T. Wiggenga MS# 16
Distributed by:	Date:

FORM EVAL REVISION 1.0; 11/30/92 WCPFORM\EVAL.FRM

Material Evaluation Form (Part 1)

FORM MEPOFF (04/02/92)

MATERIAL EVALUATION FORM
Off-Site Generator Section

A. GENERATOR/WASTE STREAM IDENTIFICATION:

1. MSF #: Revision No.: _____	2. Date Submitted:	3. FEMP Generator SRC ID:
4. Generator Name:	5. Generator USEPA ID:	6. Generator State ID:
7. Facility Address:	8. Technical Contact Name:	10. Technical Contact Phone Number(s):
	9. Technical Contact Title:	

B. GENERATION INFORMATION:

1. Provide best descriptive name for material:

2. Describe how the material is generated:

(Documentation attached: ☐ additional narrative; ☐ SOP; ☐ Manufacturing Spec; ☐ MSDS; ☐ AEDO Log excerpt; ☐ release report; ☐ other: _____)

3. Waste Quantity: Number of Containers: _____ (☐ estimate; ☐ actual) Container Type: _____ Total weight and volume: _____ (☐ estimate; ☐ actual)

C. GROSS CHARACTERISTICS

1. Describe Color/Appearance:

2. Physical State:
☐ Liquid ☐ Solid debris/rubble
☐ Semi-solid/sludge ☐ Dry solid residue
☐ dry powder/dusty residue ☐ Other, specify:

3. Contains Free Liquids:
☐ yes ☐ no ☐ unknown
based on: ☐ visual ☐ PFLT results attached

(NOTE: Do Not Smell the Material)

4. Note Any Incidental Odor:

5. Describe Phase/Layers:
☐ single phase ☐ two-layers ☐ multi-layered

6. pH (specify range or "unknown"): _____ (☐ estimate; ☐ analytical results attached)

7. Flash Point (specify range or "unknown"): _____ (☐ estimate; ☐ analytical results attached)

B. MATERIAL COMPOSITION

1. Components: Min - Max: Basis for identifying:
_____ ____ - ____ % _____
_____ ____ - ____ % _____
_____ ____ - ____ % _____
_____ ____ - ____ % _____
(minimum must meet or exceed 100 %)
(☐ based on knowledge of the material; ☐ analytical data attached)

2. Does the material contain any of the following:
☐ asbestos ☐ polychlorinated biphenyls (PCBs)
☐ cyanides ☐ sulfides
☐ RCRA metals, circle if suspected:
(arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium)
☐ based on knowledge of the material
☐ analytical data attached

3. Radionuclide Contaminants:
☐ material is not contaminated with radionuclides
☐ material contains incidental radionuclide contamination
☐ radionuclide bearing material/residue
(☐ based on knowledge of the material; ☐ analytical data attached)
Radionuclides of Concern if any:
☐ uranium ☐ thorium ☐ transuranics (TRU) ☐ Other: _____

4. Identify any additional characteristics:
☐ water reactive ☐ explosive
☐ pyrophoric ☐ shock sensitive
☐ etiological ☐ other _____

Material Evaluation Form (Part 2)

FEMP REQUEST FOR SAMPLING & ANALYSIS/FIELD ACTIVITIES

PROJECT INFORMATION:

Requestor: Phone:		Project Name:	MSP #:
PE/PM: Phone:		Project/WO #:	SMS Request #:
Field Contact: Phone:		Charge #:	Date Submitted:
Sample Plan Prepared By: Phone:			Requested Completion Date:

SAMPLING PURPOSE:

__ RCRA Waste Characterization __ Waste Conformation __ CERCLA __ Statistical Summary
__ RCRA Closure __ Treatability Study __ Visual Inspection __ Other

WASTE CONFIGURATION (at time of sampling):

__ Containerized (circle container type)

drum/pail - 5, 10, 20, 30, 55, 85, 110 gallon
White Metal Box, Wood Box, ISO Container (Sea/Land)

__ inventory information attached

__ tank/sump
__ pile
__ building/structure
__ surface impoundment
__ waste in process unit
__ landfill/soils in place
__ location/diagram/dimensions of unit attached

WASTE DESCRIPTION (list marking/drum number(s), matrix, consistency, suspected contaminants, percent (volume) of total waste):

PARAMETERS FOR ANALYSIS: (List sample matrix(ces) and identify parameters for each)	Analysis Group (See Reverse)								
	1	2	3	4	5	6	7	8	9
1)									
2)									
3)									
4)									
5)									

DATA QUALITY OBJECTIVE REQUIRED (to be completed by requestor) If completed fill in DQO ? _____ and attach, (see SCQ, vol. II, Appendix C.) - Check Analytical Support Level (ASL) below

(ASL A) FIELD SCREENING ___	(ASL) B SW-846 ___	(ASL C) CLP SOW ___	(ASL D) CONFIRMATIONAL ___	(ASL E) NON-STANDARD ___	OTHER ___

SAMPLING APPROACH:

__ Simple Random __ Stratified Random __ Systematic Random
__ Grid __ Grab __ Other

ADDITIONAL INSTRUCTIONS:

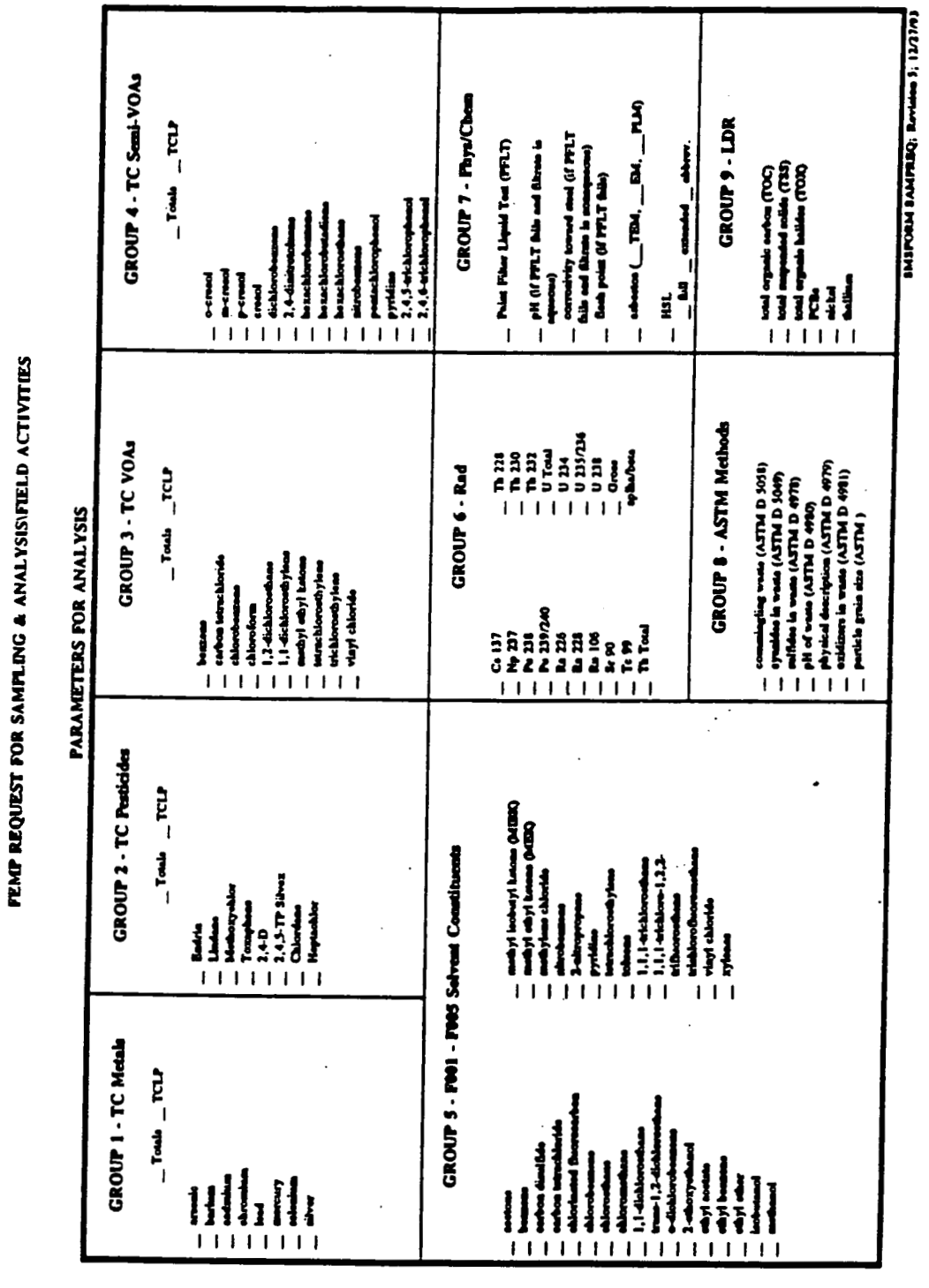
CONCURRENCE:

Waste Characterization: _____ Requestor: _____

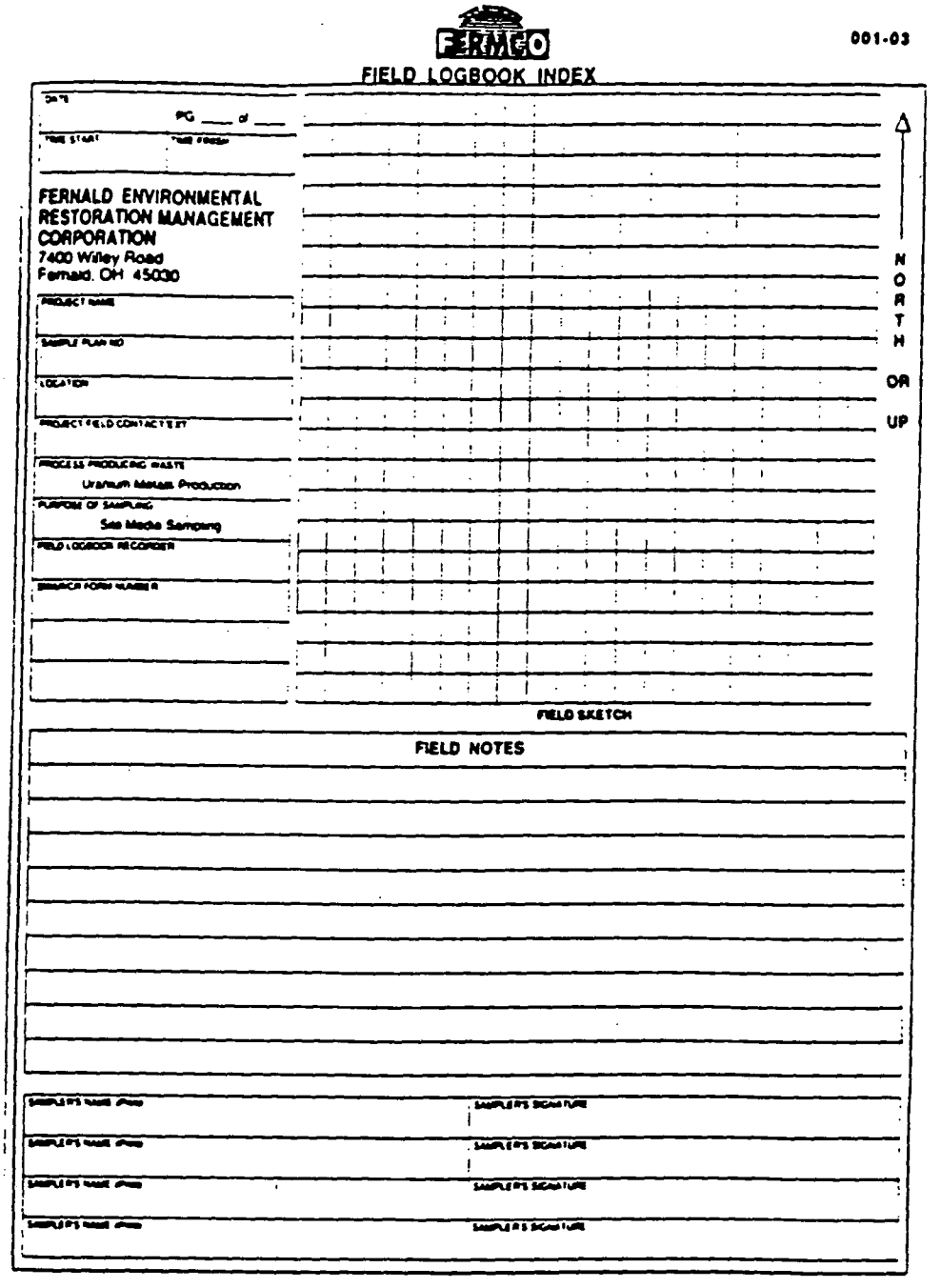
Cost Account Manager (CAM): _____

FORM SAMPREQ;Revision 5; 12/27/93\SMS\FORMS\SAMPREQ.PRM

Request for Sampling and Analysis (Part 1)



Request for Sampling and Analysis (Part 2)



FERMCO

001-03

FIELD LOGBOOK INDEX

PG ___ of ___

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION
7400 Willey Road
Fernald, OH 45030

PROJECT NAME

SAMPLE PLAN NO

LOCATION

PROJECT FIELD CONTACTS ET

PROCESS PRODUCING WASTE
Uranium Metals Production

PURPOSE OF SAMPLING
Site Media Sampling

FIELD LOGBOOK RECORDER

RESEARCH FORM NUMBER

NORTH OR UP

FIELD SKETCH

FIELD NOTES

SAMPLER'S NAME (Print) SAMPLER'S SIGNATURE

SAMPLER'S NAME (Print) SAMPLER'S SIGNATURE

SAMPLER'S NAME (Print) SAMPLER'S SIGNATURE

SAMPLER'S NAME (Print) SAMPLER'S SIGNATURE

Field Logbook (Part 1)

001-04

FERMCO

FIELD LOGBOOK INDEX

DATE | TIME START | TIME FINISH | PG ___ of ___ | [illegible] FORM NUMBER

SAMPLE PLAN NUMBER | FIELD LOG RECORDER

CUSTOMER NUMBER	SAMPLE POINT	TYPE CODE	MATERIAL CODE	COLLECTION METHOD	SAMPLE DEPTH	TIME	CONTAINER TYPE	NUMBER VOLUME	ANL CODE	PRES. CODE	UNIT CODE

TYPE CODES: S=Sample R=Resample D=Duplicate F=Field Blank T=Trip Blank R=Rinsate EB=Equipment Blank

FIELD SCREENING INSTRUMENT TYPE	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION METHOD	CALIBRATION READING

Field Logbook (Part 2)

000110

FERNALD SITE
SITE SERVICES ANALYTICAL

Form Number ____ - ____ - ___ - ___

SITE-WIDE ANALYSIS REQUEST/CUSTODY RECORD

Page ____ of

PROJECT

☐ PLAN NO. OR ☐ PROJECT NO.:

PROJECT MANAGER/ENGINEER:

FOR SAMPLE RELATED PROBLEMS, CONTACT:

ORGANIZATION:

NAME: PHONE:

SAMPLER: PHONE:

SAMPLER REMARKS:

CHARGE NUMBER

LOT MARKING CODE:

SAMPLER SIGNATURE(S):

SEND RESULTS TO:

CHECK FOR: ☐ S R LAB ☐ BIO LAB ☐ WTP LAB

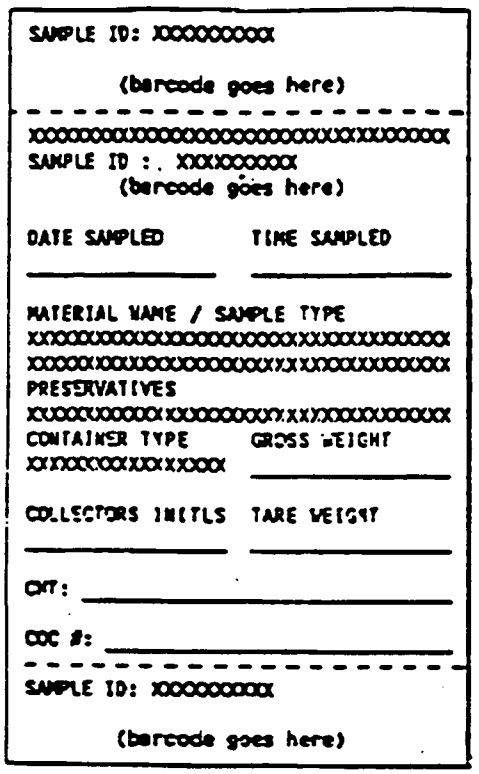
SAMPLE SOURCE, DESCRIPTION/IDENTIFICATION, ANALYSIS REQUIRED

	SAMPLE NUMBER	CUSTOMER NUMBER	SAMPLE POINT	MATRIX CODE	COLLECTED DATE	COLLECTED TIME	CONTAINER/ VOLUME	COMPOSITE	GRAB	NO OF CONTAINERS	ANALYTES CODE - (UNITS CODE)	REMARKS
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

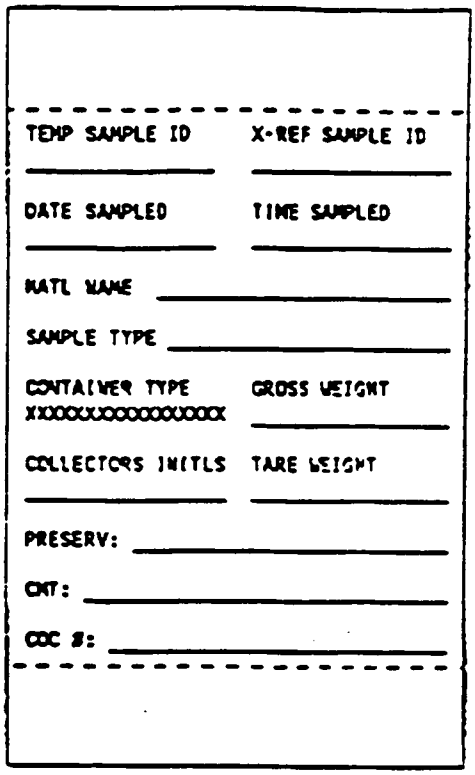
ITEM/REASON	RELINQUISHED BY	RECEIVED BY	DATE	TIME	ITEM/REASON	RELINQUISHED BY	RECEIVED BY	DATE	TIME

NO	INSTRUCTIONS OR CODES
1	LABORATORY
2	REQUESTER
3	SAMPLER

Sitewide Analysis Request/Custody Record

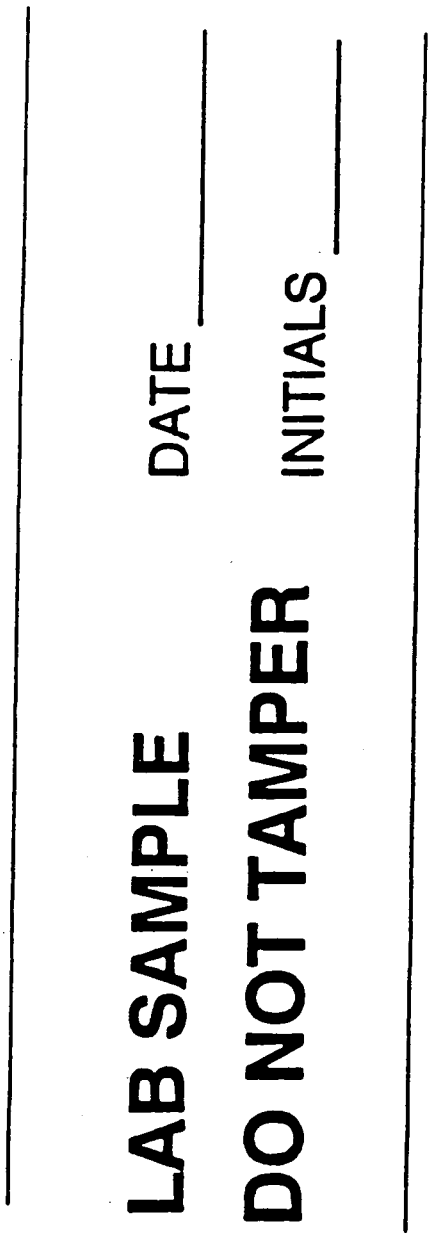


Label A



Label B

Sample Label



Custody Seal

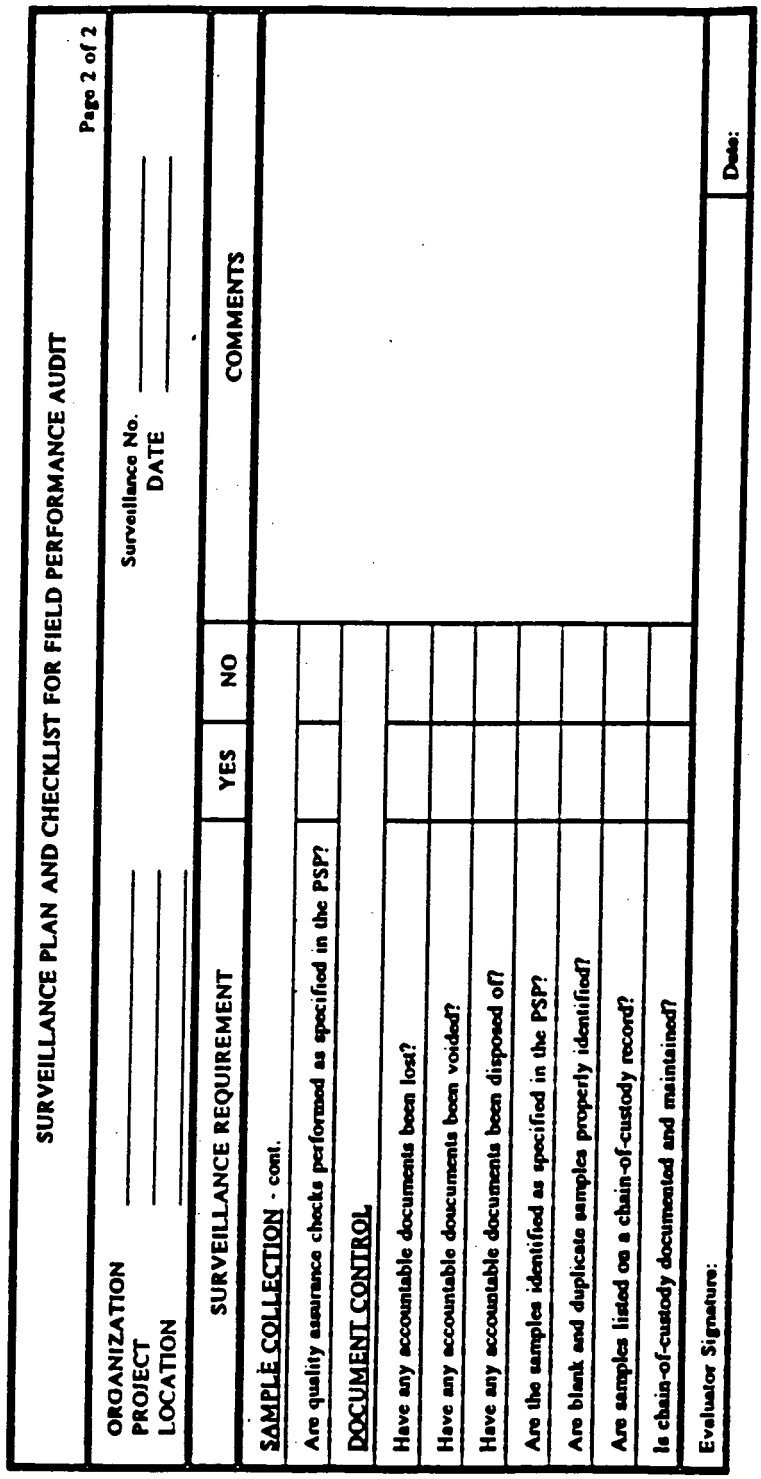
SURVEILLANCE PLAN AND CHECKLIST FOR FIELD PERFORMANCE AUDIT Page 1 of 2

ORGANIZATION _____
PROJECT _____
LOCATION _____

Surveillance No. _____
DATE _____

SURVEILLANCE REQUIREMENT	YES	NO	COMMENTS
PROJECT RESPONSIBILITIES			
Was the PSP prepared?			
Was a briefing held for project participants?			
Were additional instructions given to project participants?			
SAMPLE COLLECTION			
Is there a written list of sampling locations and descriptions?			
Are samples collected as stated in the PSP?			
Are samples collected in the type of containers specified in the PSP?			
Is sample equipment available, calibrated, and in proper working order?			
Are samples preserved as specified in the PSP?			
Are the number, frequency, and type of samples collected as specified in the PSP?			

Example Surveillance Plan/Checklist for Field Performance Audit (Page 1)



SURVEILLANCE PLAN AND CHECKLIST FOR FIELD PERFORMANCE AUDIT

Page 2 of 2

ORGANIZATION _____
PROJECT _____
LOCATION _____

Surveillance No. _____
DATE _____

SURVEILLANCE REQUIREMENT	YES	NO	COMMENTS
SAMPLE COLLECTION - cont.			
Are quality assurance checks performed as specified in the PSP?			
DOCUMENT CONTROL			
Have any accountable documents been lost?			
Have any accountable documents been voided?			
Have any accountable documents been disposed of?			
Are the samples identified as specified in the PSP?			
Are blank and duplicate samples properly identified?			
Are samples listed on a chain-of-custody record?			
Is chain-of-custody documented and maintained?			

Evaluator Signature: _____ Date: _____

Example Surveillance Plan/Checklist for Field Performance Audit (Page 2)

VR No. _____

VARIANCE REQUEST

Page _ of _

Date _____

VARIANCE (Include Justification)

Variance:

Justification:

REQUESTED BY: _____ **Date:** _____

APPROVED BY: _____ **Date:** _____
Project Manager

_____
Quality Assurance

_____
SCQ Implementation

APPLICABLE DOCUMENT(S) AND SECTION NUMBER(S)

Variance Request Form

Appendix E Glossary

Characterization (EPA 600/R-92/033): The determination of the physical, chemical, radiological, and biological properties of a pure substance, compound, or mixture to the extent necessary to support informed decision making.

Confidence Coefficient (EPA 600/R-92/033): The probability statement that accompanies a confidence interval and is equal to unity minus the associated type I error rate (false positive rate). A confidence coefficient of 0.90 implies that 90% of the intervals resulting from repeated sampling of a population will include the unknown (true) population parameter.

Confidence Interval (EPA 600/R-92/033): The numerical interval constructed around a point estimate of a population parameter, combined with the probability statement (the confidence coefficient) linking the interval to the population's true parameter value.

Disposal (EPA 600/R-92/033): The systematic and orderly placement, storage, distribution, or transformation of wastes.

Disposal (NVO-325, Rev. 1): The emplacement of low-level wastes or radioactive mixed wastes in a manner which is considered permanent in that routine recovery is not provided for.

Facility - RCRA (EPA 40 CFR 260.10): All contiguous land, and structures, other appurtenances and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

Facility - Waste (EPA 40 CFR 260.10): All contiguous land, and structures, other appurtenances and improvements on the land used for treating, storing, or disposing of waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

Hazardous Waste (DOT 49 CFR 171.8): Any material that is subject to the Hazardous Waste Manifest Requirements of the Environmental Protection Agency specified in 40 CFR Part 262.

Hazardous Waste (DOE EH-231-003/0191): A solid waste that must be treated, stored, or transported, and disposed of in accordance with applicable requirements under Subtitle C of RCRA.

Low-Level Waste (NVO-325, Rev. 1): All radioactive waste not classified as high-level waste, spent nuclear fuel, transuranic waste, uranium mill tailings, mixed waste, or 11e(2) by-product material as defined in DOE Order 5820.2a. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentrations of transuranics is less than 100 nanocuries (nCi/g).

Mixed Waste (NVO-325, Rev. 1): Waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the RCRA, respectively. Mixed waste must meet the Land Disposal Restrictions (LDR) as listed in 40 CFR 268.

Operable Unit (EPA 40 CFR 300.6) A discrete part of the entire response action that decreases a release, threat of release, or pathway of exposure.

Radioactive Waste (NVO-325 Rev. 1): Solid, liquid, or gaseous material that contains radioactive nuclides regulated under the Atomic Energy Act of 1954, as amended, and of negligible economic value considering costs of recovery.

Radioactive Waste (DOE 5480.2): Solid or fluid materials of no value containing radioactivity; discarded items such as clothing, containers, equipment, rubble, residues, or soils contaminated with radioactivity; or soils, rubble, equipment or other items containing induced radioactivity such that the levels exceed safe limits for unconditional release.

Solid Waste (NVO-325, Rev. 1): Waste material that is an essentially dry, solid form. The waste stream may include well-drained containers or liquids which have been entrapped or otherwise solidified so that they will retain their solid form without the presence of free liquids during handling, transportation, storage, or disposal. Viscous material is determined to be a solid by testing in accordance with American Society for testing Materials Standard D 4359, "Standard Test Method for Determining Whether a Material is a Liquid or a Solid."

Solid Waste (EPA 40 CFR 260.10, 261.2): Garbage, refuse, and other discarded solid materials, including solid waste materials resulting from industrial, commercial, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants. It generally does not include mining, agricultural, and industrial solid wastes; hazardous wastes; sludges; construction and demolition wastes; and infectious wastes.

Glossary

Sub-Waste Stream: A group of containers that contain similar material based on process knowledge and are labeled with the same Material Type and Source Code as part of the FEMP's Lot Marking System Number.

Waste Stream (NVO-325 Rev. 1): The categorization of waste defined by the ability or method of characterization and certification. Examples are (1) by matrix; e.g., compactible trash, metal, wood, sludge, filter cakes, glass; and (2) by process; e.g., controlled experiments, decommissioning activities as described in DOE Order 5820.2A, Section V.

Appendix F List of Supporting Documents

EM-EXM-91-018 (Rev. 1), "Site Media Sampling Extraction Methodology for Obtaining Soil Samples from Metal Overpack Containers," Oct. 1991.

EP-SMS-001 (Rev. 0), "Field Logbook Procedure", Dec. 1993.

EP-SMS-002 (Rev. 0), "Field Quality Control Procedure", Dec. 1993.

EP-SMS-003 (Rev. 0), "Equipment Decontamination Procedure," Dec. 1993.

EP-SMS-004 (Rev. 0), "Conduct and Coordination of Field Operations," Dec 1993.

EPA/230-02-89-042, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I, Soils and Solid Media, Feb. 1989.

EPA/600/R-92/033, Characterizing Heterogeneous Wastes: Methods and Recommendations, Feb. 1993.

EPA SW-846, Test Methods for Evaluating Solid Wastes, Volume II, Field Manual, Physical/Chemical Methods.

FEMP SCQ, Fernald Environmental Management Project Sitewide CERCLA Quality Assurance Project Plan, Sept. 1992

FEMP-SOP 20-C-805, "Sampling Drummed Waste for Hazard Identification," Apr. 1992.

FEMP-SSOP-0018, "Processing the Sitewide Analysis Request/Custody Record for Sample Control," May 1992.

FEMP-SSOP-1004, "FEMP Data Validation Procedure", Draft, Nov. 1993.

FEMP Waste Characterization Plan (draft version)

NVO-325 (Rev. 1), Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements, June 1992.

Signature Page

The following individual(s) have reviewed and understand the requirements presented in this SAP:

Name (Printed)	Signature	Badge #	Date

Signature Page

The following individual(s) have reviewed and understand the requirements presented in this SAP:

Name (Printed)	Signature	Badge #	Date

SECTION G

All production activities at the facility have ended. Current activities include waste management operations, remedial investigation, environmental response actions, nuclear materials disposition, and miscellaneous operations such as wastewater treatment. More specifically, waste storage operations are allocated as follows:

HWMU No.19 (CP Storage Warehouse/Bldg 56)
Location: B Street - North of 2nd Street
Maximum Capacity: 116,160 gallons / 2,112 drums
Waste Types: Various hazard classes EXCEPT ignitables.

HWMU No.20 (Plant 1 Pad)
Location: North of 2nd Street; West of B Street
Maximum Capacity: 11,222,200 gallons / 198,000 drums
Waste Types: Various hazard classes;

HWMU No.29 (Plant 8 Warehouse/Bldg 80)
Location: Corner of A Street and 1st Street
Maximum Capacity: 139,260 gallons / 2532 drums
Waste Types: Combustible solids

HWMU No.33 (Pilot Plant Warehouse/Bldg 68)
Location: Southwest corner of production area
Maximum Capacity: 13,200 gallons / 240 drums
Waste Types: Ignitable dry wastes, metals, metal salts and oxides

HWMU No.34 (KC-2 Warehouse/Bldg 63)
Location: B Street - North of 2nd Street
Maximum Capacity: 200,640 gallons / 3,648 drums
Waste Types: Combustible and flammable liquids

HWMU No.35 (Plant 9 Warehouse/Bldg 81)
Location: D Street - North of 2nd Street
Maximum Capacity: 86,240 gallons / 1,568 drums
Waste Types: Combustible liquids and solids, corrosives, PCBs

HWMU No.37 (Plant 6 Warehouse/Bldg 79)
Location: E Street between 1st and 2nd Street
Maximum Capacity: 230,780 gallons / 4,196 drums
Waste Types: Combustible and flammable liquids, solids, trash

The FEMP site and mailing addresses are:

Fernald Environmental Management Project - Site Address
7400 Willey Road
Fernald, Ohio 45030
(513) ~~738-6200~~ 648-3000

Fernald Office - Mailing Address
U. S. Department of Energy
P.O. Box 538705
Cincinnati, Ohio 45253-8705
(513) ~~738-6200~~ 648-3000

Operation missions and program direction are administered through the U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management (EM). The name, address, and telephone number of this office are:

U. S. Department of Energy
Office of Environmental Restoration and Waste Management
1000 Independence Avenue Southwest
Washington, D. C. 20585
(202) 586-5000

This plan describes the actions facility personnel must take in response to a hazardous waste event or emergency such as fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. This plan applies to all areas of the facility where hazardous waste is being handled or stored. Therefore, in addition to the seven storage units the FEMP is seeking to permit, all hazardous waste management units are discussed in this plan. The location of the active hazardous waste management units (HWMUs) which the FEMP is seeking to permit as RCRA storage facilities are shown in Figure G-1. A copy of this contingency plan is located at each such unit. The location of all other HWMUs is shown within Attachment G-1 on the inserted map "Evacuation Routes", located between pages 9 and 10; specific route maps are posted at these units. Since a potential incident could occur at any HWMU, Attachment G-1 describes evacuation routes and fire and safety equipment available for all HWMUs.

G-1a Emergency Organization

The Emergency Coordinator may request support and allocate resources under the responsibilities of any or all of the Emergency Response Support Organizations discussed in this section. Table G-2 provides a roster of the FEMP Emergency Organization. Figure G-2 provides an organizational chart of the FEMP Emergency Response Organization.

Fernald Environmental Management Project

Emergency Management
The Emergency Director (the operating contractor President or his designee) has designated an Assistant Emergency Duty Officer (AEDO) who is responsible for emergency responses at the FEMP. The AEDO is the primary Emergency Coordinator.

The Emergency Coordinator (AEDO) manages and controls the response to any event at the FEMP. A minimum of one Emergency Coordinator (AEDO) is

The Emergency Duty Officer may be reached through the 24-hour-staffed FEMP Communications Center by:

- personal digital display pager;
- personal portable cellular telephone; or
- conventional telephone service.

In addition to the training listed in Table G-3.1 and Section H, the job description for the Emergency Duty Officer requires a BS degree in a related field plus eight years of related experience that includes three years of management responsibilities.

Emergency Chief (EC)
The Emergency Chief directs the Emergency Response Team's remedial activities. The Emergency Chief reports directly to the Emergency Coordinator (AEDO). The Emergency Chief is the Safety and Fire Inspector on shift. At least one Safety and Fire Inspector is on site at all times.

The Safety and Fire Inspector on duty may be reached in the following ways:

- via radio through the 24-hour-staffed FEMP Communications Center 513-~~738-6295~~ 648-4444
- office 513-~~738-6235~~ 648-4298
- mobile vehicle cellular telephone 513-535-1367
- by personal digital display pager

In addition to the training listed in table G-3.1 and in Section H, the job description for the Safety and Fire Inspector requires two years of post high school studies in a related field plus three years of related experience in fire inspection/code enforcement.

Release Evaluator
A Release Evaluator evaluates regulatory requirements for reporting hazardous waste releases. The Release Evaluator is on call on a 24-hour basis through a personal digital pager and assists the Emergency Coordinator (AEDO) and Emergency Duty Officer in determining the need for regulatory reporting and notifications.

G-3 IMPLEMENTATION

The first step taken during any incident involves its observance by employees and supervisors on the scene. Actions to be taken in reporting an explosion, fire, or release are described in Attachment G-1. The Emergency Coordinator (AEDO) categorizes the event according to increasing levels of severity as defined in Figure G-5.1:

1) LOGGABLE EVENT
2) OFF-NORMAL EVENT
3) UNUSUAL OCCURRENCE
4) EMERGENCY

The following HWMUs are units for which a permit is not being sought. They are included here to present a complete picture of all HWMUs, as discussed on page G-3. Existing fire and safety equipment is listed as available but may not be applicable to each HWMU due to the lack of hazardous waste currently in the area:

- HWMU No. 1 - Fire Training Facility
- ~~HWMU No. 2 - Parts Cleaner in Welding Shop (Maintenance Bldg 12)~~(Removed)
- HWMU No. 3 - Waste Oil Storage in Garage
- HWMU No. 4 - Drum Storage Area Near Loading Dock (Lab Bldg)
- HWMU No. 5 - Drum Storage Area South of W-26 (Lab Bldg)
- ~~HWMU No. 6 - Drummed HF Residue/Associated Storage Areas Inside Plant 4~~ (Closed)
- HWMU No. 7 - Drummed HF Residue/Associated Storage Areas Northwest of Plant 4
- ~~HWMU No. 8 - Drummed HF Residue/Associated Storage Areas S. of Cooling Towers~~ (Closed under "Generator Closure Protocol")
- ~~HWMU No. 9 - Nitric Acid Rail Car and Area~~ (Closed)
- HWMU No. 10 - NAR System Components
- HWMU No. 11 - Tank Farm Sump
- ~~HWMU No. 12 - Wheelabrator (Building 66)~~ (Removed)
- HWMU No. 13 - Wheelabrator Dust Collector (Building 66)
- HWMU No. 14 - Box Furnace
- HWMU No. 15 - Oxidation Furnace #1
- HWMU No. 16 - Primary Calciner
- HWMU No. 17 - Plant 8 East Drum Storage Pad
- HWMU No. 18 - Plant 8 West Drum Storage Pad
- HWMU No. 21 - Hilco Oil Recovery
- HWMU No. 22 - Abandoned Sump West of Pilot Plant
- ~~HWMU No. 23 - Well Drilling Storage Area~~ (Removed)
- ~~HWMU No. 24 - Equipment Storage Area~~ (Removed)
- HWMU No. 25 - Plant 1 Storage Building (Building 67)
- HWMU No. 26 - Detrex Still
- HWMU No. 27 - Waste Pit No. 4

- HWMU No. 28 - Trane Thermal Liquid Incinerator
- ~~HWMU No. 30 - Barium Chloride Salt Treatment Facility~~ (Closed)
- HWMU No. 31 - Tank for Bulk Storage Solvents, T-5
- HWMU No. 32 - Tank for Bulk Storage Solvents, T-6
- HWMU No. 36 - Storage Pad North of Plant 6
- HWMU No. 38 - HF Tank Car
- ~~HWMU No. 39 - Clearwell~~ (Removed)
- ~~HWMU No. 40 - Bio Surge Lagoon~~ (Removed)
- HWMU No. 41 - Sludge Drying Beds
- HWMU No. 42 - Waste Pit No. 5
- ~~HWMU No. 43 - Lime Sludge Ponds~~ (Removed)
- ~~HWMU No. 44 - Coal Pile Runoff Basin~~ (Removed)
- ~~HWMU No. 45 - UST No. 5~~ (Removed)
- HWMU No. 46 - Uranyl Nitrate Tanks (NFS Storage Area)
- HWMU No. 47 - Uranyl Nitrate Tanks (North of Plant 2)
- HWMU No. 48 - Uranyl Nitrate Tanks (Southeast of Plant 2)
- HWMU No. 49 - Uranyl Nitrate Tanks (Digestion Area)
- HWMU No. 50 - Uranyl Nitrate Tanks (Raffinate Building)
- HWMU No. 51 - Experimental Treatment Facility (ETF)
- HWMU No. 52 - North and South Solvent Tanks (Pilot Plant)
- ~~HWMU No. 53 - Safe Geometry Digestion Sump (Plant 1)~~ (Closed)
- HWMU No. 54 - Thorium Nitrate Storage Tank, T-2

General Information

Hazardous Waste Management Unit (HWMU) and the 90-Day Storage Area emergency procedures are described specifically in this section. Responses to an event are identical for each HWMU and the 90-Day Storage Area and the details are given for the response to the three types of events:

1) an explosion;
2) a fire; or
3) a spill of hazardous waste

90 DAY STORAGE AREA

The 90 Day Storage Area is a temporary container storage area. This area has been moved to Bay 3 of the KC-2 Warehouse (Building 63). Refer to HWMU No. 34 - KC-2 Warehouse for additional information. ~~in Building 64 (between columns 2 and 5).~~

~~Personnel should evacuate to Rally Point No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Streets. Movement is south on "D" Street to 2nd Street, then west on 2nd Street to the intersection of "C" Street.~~

~~The Alternate Rally Point is No. 5. Rally Point No. 5 is located at the intersection of 1st Street and "D" Streets. Movement to Rally Point No. 5 is south on "D" Street to the intersection with 1st Street.~~

~~The following is a list of safety equipment assigned to this area.~~

- ~~Manual Fire Alarms~~
  1) ~~On outside South wall of Building~~

- ~~Fire Extinguishers~~
  1) ~~10# ABC On outside East wall~~

- ~~Spill Cleanup Equipment~~
  1) ~~At inside East wall of building~~

- ~~Respirator Cabinet~~
  1) ~~At East side of building~~
  2) ~~In Building 64 at north end of building~~

- ~~Eye Wash / Safety Shower~~
  1) ~~Southwest corner of 90 day holding area, near truck entrance~~

HWMU No. 6 - DRUMMED HF RESIDUE/ASSOCIATED STORAGE AREAS INSIDE PLANT 4

This unit is located in the North section of Plant 4 near the elevator.

Personnel should evacuate to Rally Point No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Streets. Movement is west to "B" Street, north on "B" Street, and east on 2nd Street to the intersection of "C" Street. Closed in accordance with OEPA letter of April 28, 1995.

~~The Alternate Rally Point is No. 8. Rally Point No. 8 is located at the corner of 1st Street and "B" Street. Movement to Rally Point No. 8 is south on "B" Street to the corner of 1st Street.~~

~~The following is a list of safety equipment assigned to this unit:~~

- ~~Manual Fire Alarm~~
  - ~~1) First floor at column E-2~~

- ~~Fire Extinguishers~~
  - ~~1) 15# CO_2 First floor North wall next to elevator~~
  - ~~2) 10# ABC First floor next to Northeast door~~

- ~~Eye Wash/Safety Shower Station~~
  - ~~1) At column D-6~~

HWMU No. 8 - DRUMMED HF RESIDUE/ASSOCIATED STORAGE AREAS S. OF COOLING TOWERS

This unit is located in a graveled area South of the Cooling Towers. This unit has been closed under the "generator closure" protocol as discussed in the OEPA correspondence to DOE-FN dated April 13, 1995.

~~Personnel should evacuate to Rally Point No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Street. Movement is southeast to "D" Street north of Building 12, south on "D" Street to 2nd Street and west on 2nd Street to the intersection of "C" Street.~~

~~The Alternate Rally Point is No. 8. Rally Point No. 8 is located at the intersection of 1st Street and "B" Streets. Movement to Rally Point No. 8 is west to "B" Street, then south on "B" Street to the intersection of 1st Street.~~

~~There is no safety equipment assigned to this unit. Those personnel desiring access to this unit are required to have a two way radio for emergency notification purposes.~~

HWMU No. 9 - NITRIC ACID RAIL CAR AND AREA

The Nitric Acid Rail Car Area is located near the end of track #2, due East of Building 63 (KC-2 Warehouse). The tank car contained 50 to 100 gallons of waste nitric acid. The acid has been removed and treated and the tank car has been cut into small pieces for scrap. Closed in accordance with OEPA letter of April 25, 1995.

~~Personnel should evacuate to Rally Point No. 7. Rally Point No. 7 is located on "B" Street at the Northeast corner of Plant 1 Pad. Movement is west to "B" Street and south on "B" Street to the Northeast corner of Plant 1 Pad.~~

~~The Alternate Rally Point is No. 3. Rally Point No. 3 is located at the corner of 2nd Street and "C" Street. Movement is east to "D" Street, south on "D" Street to 2nd Street, then west on 2nd Street to the intersection at "C" Street.~~

~~The following is a list of safety equipment assigned to this unit:~~

- ~~Manual Fire Alarm~~
  1) ~~Outside on South wall of Building 63 (KC-2 Warehouse)~~

- ~~Fire Extinguisher~~
  1) ~~20# ABC on South wall of Building 63 outside Bay 7~~

- ~~Eye Wash/Safety Shower Stations~~
  1) ~~Use portable eye washes at Bays 5, 6, and 7 of Building 63~~

~~The spill cleanup equipment has been removed since the Rail Car has been removed and emptied.~~

- ~~Respirator Cabinets~~
  1) ~~Use respirators in cabinets in Bays 5, 6, and 7 of Building 63~~

~~Access to equipment inside Building 63 can be gained only by personnel having a key to Bays 5, 6, or 7. Those personnel desiring access to this unit are required to have a two-way radio to facilitate emergency notification purposes.~~

HWMU No. 10 - NAR SYSTEM COMPONENTS

This unit is located in the NAR Tank Farm and in the Denitrification Area which converted uranyl nitrate to uranium oxide.

Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located North of the Water Tower. Movement can be north out of Building 2A to 2nd Street then west to the Waste Pit Area access gate. Movement can also be south out of the building to 102nd Street, west to "A" Street, north on "A" Street to 2nd Street then west to the Waste Pit Area access gate.

The Alternate Rally Point is No. 8. Rally Point No. 8 is located at the intersection of 1st Street and "B" Street. Movement is east to "B" Street, and south on "B" Street to the intersection of 1st Street.

The following is a list of safety equipment assigned to this unit:

- Manual Fire Alarms
  1) West side of North personnel door in the Denitrification Area
  2) West wall of Extraction Area by Column B-8

- Fire Extinguishers
  1) 10# ABC First floor Denitrification Area by Column B-14
  2) 10# ABC First floor Denitrification Area by Column D-16
  3) 10# ABC Inside door of Supervisor's Office
  4) ABC First floor Denitrification Area by Column A-17
  5) ABC First floor Denitrification Area by Column C-20
  6) ABC Second floor Denitrification Area by Column A-17
  7) ABC Second floor, lower level, by Column A-20
  8) ABC Second floor, lower level, by Column C-15
  9) BC Third floor by Column C-20

- Eye Wash/Safety Shower Stations
  ~~1) First floor Denitrification Area by Column C-17~~
  ~~2) Second floor Denitrification Area West of Column D-18~~
  ~~3) Inside South wall of NAR Tank Farm~~
  ~~4) First floor Extraction Area by Column B-13~~
  ~~5) Second floor Extraction Area by Column C-17~~
  ~~6) First floor Denitrification Area, East of Column D-15~~
  1) Secondary containment area (Tanks F1-23 and F1-24) located outside and south of Plant 2/3

- Portable Eyewash/Safety Showers
  Portable eyewash/safety showers are to be placed in areas where hazardous work is occurring. Areas of concerns within HWMU 10 include the denitrification area, and the secondary containment area located outside and south of Plant 2/3.

- Mounted Heated Eyewashes
  1) First floor, Denitrification area, by Column C-16

- Spill Cleanup Equipment
  1) First Floor Denitrification Area East of Column B-17
  2) First Floor Denitrification Area East of Column C-19

Those personnel desiring access to this unit are required to have a two-way radio to facilitate emergency notification purposes.

HWMU No. 12 - WHEELABRATOR (BUILDING 66)

The Wheelabrator was used in the second stage of drum reconditioning to remove paint from old empty drums by an abrasive blasting method using steel shot. This has been removed from the HWMU list.

~~Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located north of the West Water Tower at the Waste Pit Area access gate. Movement is south on "A" Street to the intersection of 2nd Street, then west on 2nd Street to the Waste Pit Area access gate.~~

~~The Alternate Rally Point is No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Street. Movement is south past the east side of Building 1A to 2nd Street, and east on 2nd Street to the Point.~~

~~The following is a list of safety equipment assigned to this unit:~~

- ~~Manual Fire Alarm~~
  - ~~1) Outside near Northeast corner of Building 1A~~
  - ~~2) Outside Northeast of Building 66~~

- ~~Fire Extinguishers~~
  - ~~1) 20# ABC on East side of Drum Dryer~~
  - ~~2) 15# CO_2 outside on South end of Building 66 by Wheelabrator~~

- ~~Eye Wash/Safety Shower Station~~
  - ~~1) Inside Building 66 on East side of Drum Dryer~~

- ~~Spill Cleanup Equipment~~
  - ~~1) Behind the fence Northeast of the Building 66~~

- ~~Respirator Cabinets~~
  - ~~1) Inside Building 1A, in Primary Satellite Clothing Area~~
  - ~~2) Inside Building 71, in the Northeast corner~~

- Portable Eyewash/Safety Showers

  Portable eyewash/safety showers are to be placed in areas at HWMU 28 where hazardous work is occurring

HWMU No. 28 - TRANE THERMAL LIQUID INCINERATOR

The Trane Liquid Thermal Incinerator was used to incinerate liquid waste contaminated with radionuclides and liquid hazardous wastes. In addition to the incinerator, it consists of an oil-water separator (Building 39B), Feed Tank F3E-406 located near the Plant 2/3 Combined Raffinate pad, and the Plant 2/3 West Storage Pad.

Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located North of the West Water Tower, at the Waste Pit Area access gate. Movement is west to "A" Street and north on "A" Street to 2nd Street and then west to the Waste Pit Area access gate.

The Alternate Rally Point is No. 8. Rally Point No. 8 is located at the intersection of 1st Street and "B" Street. Movement is west to "A" Street, then south on "A" Street and east on 1st Street to the intersection of "B" Street.

The following is a list of safety equipment assigned to this unit:

- Manual Fire Alarm
  1) Outside at Southwest corner of Building 39A

- Fire Extinguishers
  1) 10# ABC First Floor Incinerator Bldg. (39A) North wall
  2) 10# ABC First Floor Incinerator Bldg. (39A) Southwest corner
  3) ABC Outside, located at shelter southwest of trough Building 39B

- Eye Wash Station and Safety Shower
  ~~1) Off Northeast corner of Incinerator Bldg. (39A) in Combined Raffinate Pad area~~

HWMU No. 34 - KC-2 WAREHOUSE (BLDG. 63)

The KC-2 Warehouse (Bldg 63) is a pre-engineered, ribbed, unheated building covered by metal roofing. The warehouse is divided into eight bays. Each bay is constructed as a separate containment storage unit. The warehouse is used to store hazardous waste with and without free liquids. The 90 Day Storage Area, which is used as a temporary container storage area, is located in Bay 3.

Personnel should evacuate to Rally Point No. 7. Rally Point No. 7 is located on "B" Street at the Northeast corner of Plant 1 Pad. Movement is west to "B" Street and south on "B" Street to the Northeast corner of Plant 1 Pad.

The Alternate Rally Point is No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Street. Movement is east to "D" Street, south on "D" Street to 2nd Street, then west on 2nd Street until the intersection at "C" Street.

The following is a list of safety equipment assigned to this unit:

- Manual Fire Alarm
  1) Outside South wall center of building

- Fire Extinguishers
  1) 20# ABC inside by West door of Bay 1
  2) 20# ABC outside South door of Bay 2
  3) 15# CO_2 at the riser between Bays 3 and 4
  4) 20# ABC between Bays 4 and 5
  5) 20# ABC between Bays 5 and 6
  6) 20# ABC East of Bay 8 door
  7)-13) 20# ABC inside North end of Bays 2,3,4,5,6,7,8
  14) 20# ABC east of Bay 8 door

HWMU No. 34 - KC-2 WAREHOUSE (BLDG. 63)

- Eye Wash/Safety Shower Stations

  ~~Five (5)~~ Six (6) portable, all in Bay 1 during winter months; ~~four~~ five are moved to Bays 3,5,6,7 and 8 during summer, and when personnel are working in those bays.

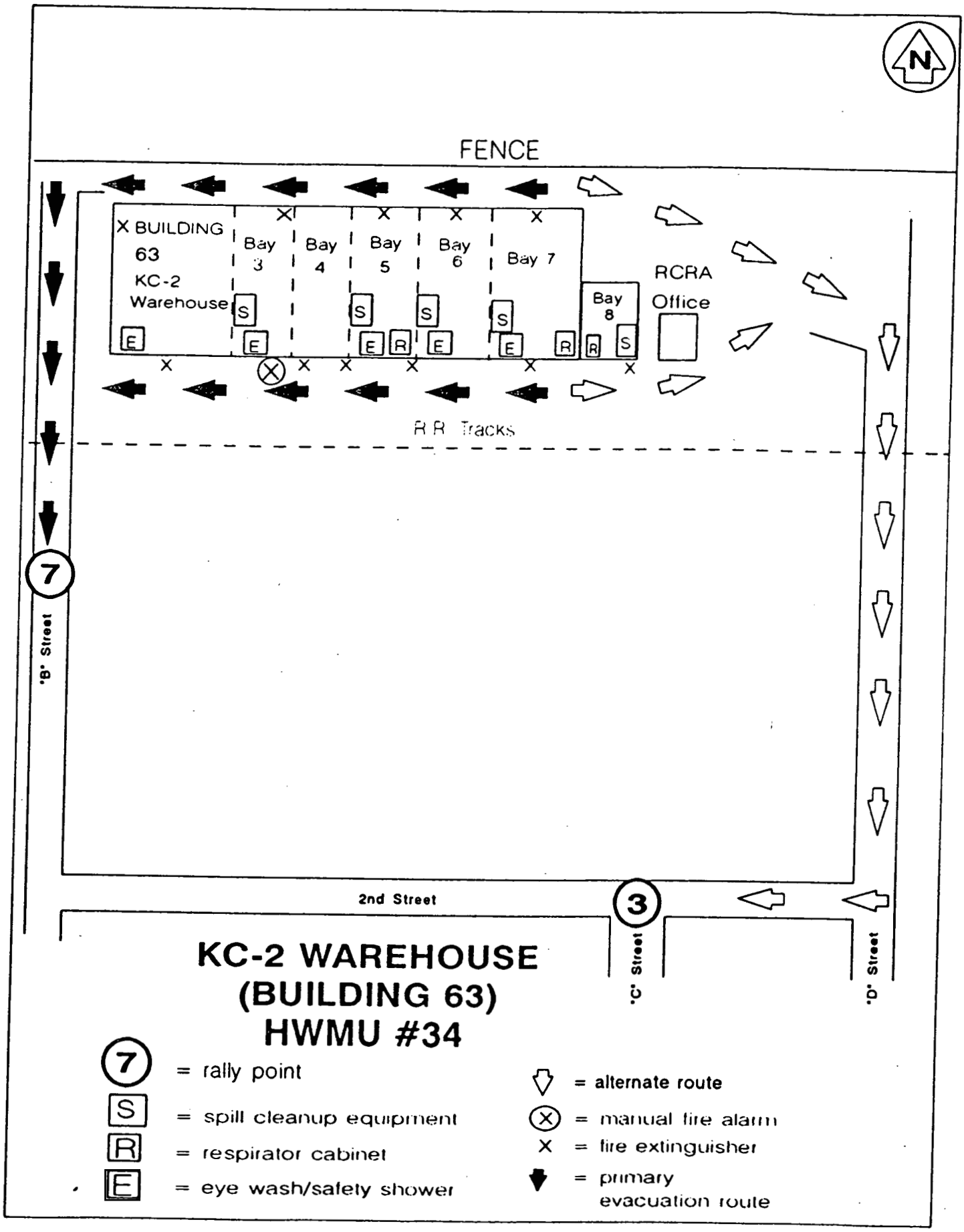
- Spill Cleanup Equipment

  1) Inside Bay 5
  2) Inside Bay 6
  3) Inside Bay 7
  4) Inside Bay 1
  ~~5) Inside Bay 8~~
  6) Inside Bay 3

- Respirator Cabinets

  1) Inside Bay 1
  2) Inside Bay 8

Access to equipment inside Building 63 can be gained only by personnel having a key to Bays 1, 5, 6, 7, or 8. Those personnel desiring access to this unit are required to have a two-way radio to facilitate emergency notification.


N
FENCE
BUILDING 63
KC-2 Warehouse
Bay 3
Bay 4
Bay 5
Bay 6
Bay 7
Bay 8
RCRA Office
R R Tracks
7
'B' Street
2nd Street
3
'C' Street
'D' Street
KC-2 WAREHOUSE
(BUILDING 63)
HWMU #34
7 = rally point
S = spill cleanup equipment
R = respirator cabinet
E = eye wash/safety shower
= alternate route
= manual fire alarm
X = fire extinguisher
= primary evacuation route

HWMU No. 38 - HF TANK CAR

The HF Tank Car HWMU is located on the railroad spur immediately off the Northwest corner of Building 12A. The HF Tank Car (# OROX177501) has been moved from that location to the spur west of the Tank Farm in order to provide a secondary containment sump. Currently this tank car contains waste dilute hydrofluoric acid (DHF).

Personnel should evacuate to Rally Point No. 3. Rally Point is located at the intersection of 2nd Street and "C" Street. Movement is south to 2nd Street and east on 2nd Street to the intersection of "C" Street.

The Alternate Rally Point is No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is south to 2nd Street then west to the rally point.

The following is a list of safety equipment assigned to this unit:

- Eye Wash/Safety Shower Station
  1) Yellow painted walk-in unit between track and Tank Farm

Those personnel desiring access to this HWMU are required to have a two-day radio for emergency notification purposes.

- Spill Cleanup Equipment
  1) At the south end of Tank Farm secondary containment.

HWMU No. 40 - BIO-SURGE LAGOON

This unit is a surface impoundment located west of the Production Area and was constructed in September 1986. This has been removed from the HWMU list.

~~Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is southeast to 2nd Street and then east to the Waste Pit Area access gate.~~

~~The Alternate Rally Point is No. 7. Rally Point No. 7 is located on "B" Street, west of the Boiler Plant. Movement is north past Pits 2, 4, & 6 on the access road, then east to "B" Street, south on "B" Street to the Point.~~

~~Those personnel desiring access to this HWMU are required to have a two way radio for emergency notification purposes.~~

~~The following is a list of safety equipment assigned to this unit:~~

- ~~Fire Extinguishers~~
  - ~~1) 10# ABC by the Methanol Tank at Southeast corner of Lagoon~~
  - ~~2) 15# CO_2 by the Methanol Tank at Southeast corner of Lagoon~~

- ~~Row Boat and Life Preserver~~
  - ~~1) At Southeast corner of Lagoon~~
  - ~~2) Life Preserver at Northwest corner of Lagoon (Life Preservers are required within 5 feet of Lagoon.)~~

HWMU No. 46 - URANYL NITRATE TANKS (NFS STORAGE AREA)

This unit consists of five above ground UNH Tanks which contain corrosive material.

Personnel should evacuate to Rally Point 6. Rally Point 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is west on Second Street to the Waste Pit access gate.

The Alternate Rally Point is No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Street. Movement is east on 2nd Street to the Point.

Those personnel desiring access to this HWMU are required to have a two-way radio for emergency notification purposes.

The following is a list of safety equipment assigned to this HWMU:

- Fire Extinguisher
  1) 10# ABC outside, on South side of Pump House 2E

- Eye Wash/Safety Shower Stations
  1) Outside, on South side of Pump House 2E

- Spill Cleanup Equipment
  1) Outside, by South side of Pump House 2E

- Portable Eyewash/Safety Showers
  Portable eyewash/safety showers are to be placed in areas at HWMU 46 where hazardous work is occurring.

HWMU No. 47 - URANYL NITRATE TANKS (NORTH OF PLANT 2)

This unit consists of three above ground UNH Tanks which contain corrosive material.

Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is west on Second Street to the Waste Pit access gate.

The Alternate Rally Point is No. 3. Rally Point No. 3 is located just east of the intersection of 2nd Street and "B" Street. Movement is east on 2nd Street to the Rally Point.

Those personnel desiring access to this HWMU are required to have a two-way radio for emergency notification purposes.

The following is a list of safety equipment assigned to this HWMU:

- Fire Extinguisher
  1) 10# ABC on post, just north of (outside) containment area

- Eye Wash/Safety Shower Station
  ~~1) In containment area of HWMU~~
  ~~2) At northeast corner of Building 2D~~

- Heated Eyewash, Mounted
  1) North of HWMU 47, outside secondary containment

- Spill Cleanup Materials
  ~~1) Outside, by North wall of Building 2D~~
  1) North of HWMU 47, outside secondary containment

- Portable Eyewash/Safety Showers

  Portable eyewash/safety showers are to be placed in areas at HWMU 47 where hazardous work is occurring.

HWMU No. 48 - URANYL NITRATE TANKS (SOUTHEAST OF PLANT 2)

This unit is near the southeast corner of Plant 2 and consists of one above ground storage tank containing corrosive material.

Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is west on 102nd Street to "A" Street, North on "A" Street to 2nd Street,then west on 2nd Street to the Waste Pit Area access gate.

The Alternate Rally Point is No. 3. Rally Point No. 3 is located just east of the intersection of 2nd Street and "B" Street. Movement is east to "B" Street, north on "B" Street to 2nd Street, and east on 2nd Street to the Rally Point.

The following is a list of safety equipment assigned to this HWMU:

- Manual Fire Alarm
  1) At East end of Building 2A between pedestrian door and roll up door

- Fire Extinguisher
  1) BC Outside Building 2A on South wall, west of ~~near~~ HWMU 48

- Eye Wash/Safety Shower Station
  ~~1) Center of Tank Containment Area~~

- Heated Eyewash, Mounted
  1) South of HWMU 48, Outside secondary containment

- Portable Eyewash/Safety Showers
  Portable eyewash/safety showers are to be placed in areas at HWMU 48 where hazardous work is occurring.

- Spill Cleanup Material

~~1) Located South of the Storage Tank Area~~

~~2) First Floor Denitrification Area, Column A-17~~

1) South of HWMU 48, Outside secondary containment

- Respirator Cabinet

~~1) At Control Point Entrance near Column C9 inside Building 2A~~

1) At change out cabinet in nearby trailer

HWMU No. 49 - URANYL NITRATE TANKS (DIGESTION AREA)

This unit consists of eight above ground steel tanks located within Plant 2 at the western end in the Digestion Area.

Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is west out of Plant 2 to "A" Street, north on "A" Street to 2nd Street and then west on 2nd Street to the Waste Pit Area access gate.

The alternate rally point is No. 3. It is located just east of the intersection of 2nd Street and "B" Street. Movement is north to 2nd Street, and east on 2nd Street to the Rally Point.

This area is restricted from entry unless personnel are wearing protective clothing due to asbestos contamination. Use safety equipment in adjacent Extraction Area east of this HWMU. Fire Extinguishers and Safety Showers are maintained in the Digestion Area.

The following is a list of safety equipment assigned to this unit:

- Manual Fire Alarms
  1) On East wall between Digestion and Extraction Areas
  2) At West end of ~~Extraction~~ Digestion Area

- Fire Extinguishers
  1) 10# ABC First Floor, west end of Digestion Area, by Column B1
  2) 10# ABC First Floor, in Digestion Area, by Column C1
  3) 10# ABC First Floor in Digestion Area east of Column C7
  4) 10# ABC First Floor in Extraction Area near Column C8
  5) 10# ABC Second Floor by Column ~~B8~~ B6
  6) ABC Second Floor, west of Digestion Area, near Column C27
  7) ABC Second Floor, east of Digestion Area

HWMU No. 50 - URANYL NITRATE TANKS (RAFFINATE BUILDING)

This unit consists of four storage tanks located on the Eastern bay and South central area of Building 3E.

Personnel should evacuate to Rally Point No. 8. Rally Point No. 8 is located at the intersection of 1st and "B" Street. Movement is east on 101st Street to "B" Street then south on "B" Street to the intersection of 1st Street.

The Alternate Rally Point is No. 6. Rally Point No. 6 is located North of the West Water Tower. Movement is west to "A" Street, north on "A" Street to 2nd Street, then west to the point.

The following is a list of safety equipment assigned to this unit:

- Manual Fire Alarm
  1) North wall by entrance

- Fire Extinguishers
  1) 15# CO_2 on entrance wall to East bay near tanks F1-301, 302, and 303

- Eyewash/Safety Shower Stations
  ~~1) Near tank F1 303~~
  ~~2) Near tank F1 308~~

- Heated Eyewash
  1) Near the center of building, fastened to column

- Portable Eyewash/Safety Showers
  Portable eyewash/safety showers are to be placed in areas at HWMU 50 where hazardous work is occurring.

- Spill Cleanup Equipment
  1) Outside by entrance door

- Respirator Cabinet
  ~~1) At entrance by Control Point~~
  1) At change out cabinet in nearby trailer

Those personnel desiring access to this HWMU are required to have a two-way radio for emergency notification purposes.

HWMU No. 53 - SAFE GEOMETRY DIGESTION SUMP

The Safe Geometry Digestion Sump is located on the second floor of Plant 1 in Building 1A. Closed in accordance with meeting with OEPA on March 2, 1995.

~~Personnel should evacuate to Rally Point No. 6. Rally Point No. 6 is located North of the West Water Tower, at the Waste Pit Area access gate. Movement is south past the west side of Plant 1 to 2nd Street and west to the Waste Pit Area access gate.~~

~~The Alternate Rally Point is No. 3. Rally Point No. 3 is located at the intersection of 2nd Street and "C" Street. Movement is south past the east side of Plant 1 to 2nd Street, and east on 2nd Street to the Point.~~

~~The following is a list of equipment assigned to this unit.~~

- ~~Manual Fire Alarm~~
  - ~~1) First Floor, west of column 7C~~

- ~~Fire Extinguishers~~
  - ~~1) 10# ABC Second Floor, south of Safe Geometry Digester Sump~~
  - ~~2) 10# ABC First Floor at column 7C~~

- ~~Eye Wash Station~~
  - ~~1) On East wall, south of column 5B near the Sump~~
  - ~~2) On center of wall next to the Safe Geometry Digestion Sump~~

- ~~Spill Cleanup Equipment~~
  - ~~1) First Floor at column 8C~~

- ~~Respirator Cabinet~~
  - ~~1) Inside Building 1A Satellite Clothing Area~~
  - ~~2) Inside Northeast corner of Building 71~~

HWMU No. 54 - TANK FOR BULK STORAGE OF THORIUM NITRATE SOLUTION, T-2

This unit is an above ground storage tank located West of the Pilot Plant.

Personnel should evacuate to Rally Point No. 8. Rally Point No. 8 is located at the intersection of 1st and "B" Street. Movement is north to 1st Street, then east to "B" Street.

The Alternate Rally Point is No. 6. Rally Point No. 6 is located north of the West Water Tower, at the Waste Pit Area access gate. Movement is north on "A" Street to 2nd Street, then west on 2nd Street to the rally point.

The following is a list of safety equipment assigned to this unit.

- Manual Fire Alarms
  1) Outside on South wall of Pilot Plant near center of building
  2) Outside at South end of East wall of Building 13B

- Fire Extinguishers
  1) 10# ABC at West Solvent Tanks Berm

- Eye Wash/Safety Shower Station
  1) On ~~outside South wall of Pilot Plant near West end of building~~ Two portable units inside the Sump House (Building 13C)

- Safety Shower Station
  1) ~~On outside West wall of Pilot Plant~~

- Spill Cleanup Equipment
  1) East of Building 13C

Those personnel desiring access to this HWMU are required to have a two-way radio to facilitate emergency notification.