DISTRIBUTION SHEET

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Distribution	Characterization Support	Date 2-21-95
Project Title/Work Order		EDT No. 610034
Tank 241-TY-106 Tank Characterization Plan (WHC-SD-WM-TP-~~309~~ 312 RDS 2/22/95), Revision 0		ECN No.

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Page 1 of 1

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16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
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RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-TP-312, REV 0
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SUPPORTING DOCUMENT

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7. Abstract

This document is a plan which serves as the contractual agreement between the Characterization Program, Sampling Operations, and WHC 222-S Laboratory. The scope of this plan is to provide guidance for the sampling and analysis of samples for tank 241-TY-106.

8. RELEASE STAMP

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WHC-SD-WM-TP-312
Revision 0

Tank 241-TY-106
Tank Characterization Plan

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Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

by

Los Alamos Technical Associates
8633 Gage Boulevard
Kennewick, Washington 99336

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DQO	Data Quality Objective
DST	Double Shell Tank
HEPA	High-Efficiency Particulate Air Filter
RCRA	*Resource Conservation and Recovery Act of 1976*
SST	Single Shell Tank
TBP	tributyl phosphate
TCP	Tank Characterization Plan
TPA	Federal Facility Agreement and Consent Order (Tri-Party Agreement)
TWRS	Tank Waste Remediation System
TY-106	Tank 241-TY-106
WHC	Westinghouse Hanford Company

1.0 INTRODUCTION

The Defense Nuclear Facilities Safety Board (DNFSB) has advised the U.S. Department of Energy (DOE) to concentrate the near term sampling and analysis activities on identification and resolution of safety issues (Conway 1993). The data quality objective (DQO) process was chosen as a tool to identify sampling and analytical needs for the resolution of safety issues. As a result, a revision in the Federal Facility Agreement and Consent Order (Tri-Party Agreement or TPA) milestone M-44 has been made, which states that "A Tank Characterization Plan (TCP) will be developed for each double shell tank (DST) and single shell tank (SST) using the DQO process ... Development of TCPs by the DQO process is intended to allow users (e.g., Hanford Facility user groups, regulators) to ensure their needs will be met and that resources are devoted to gaining only necessary information" (Ecology et al. 1994). This document satisfies that requirement for the tank 241-TY-106 (TY-106) sampling activities.

2.0 DATA QUALITY OBJECTIVES APPLICABLE TO TANK 241-TY-106

The sampling and analytical needs associated with the Hanford Site underground storage tanks on one or more of the four Watch Lists (ferrocyanide, organic, flammable gas, and high heat) and the safety screening of all 177 tanks have been identified through the DQO process. A DQO identifies the information needed by a program group concerned with safety issues, regulatory requirements, tank waste processing, or the transport of tank waste. As of January 1995, tank TY-106 was classified as a non-Watch List tank, so the only DQO applicable to this tank is the safety screening DQO.

2.1 SAFETY SCREENING DATA QUALITY OBJECTIVES

The *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994) describes the sampling and analytical requirements that are used to screen waste tanks for unidentified safety issues. Both Watch List and non Watch List tanks will be sampled and evaluated to classify the waste tanks into one of three categories (SAFE, CONDITIONALLY SAFE, or UNSAFE) following the guidelines for the four Watch List classifications and other safety issues. A tank can be removed from a Watch List if it is classified as SAFE. The safety screening DQO identifies the guidelines to determine to which classification a tank belongs based on analyses that indicate if certain measurements are within established parameters. The primary analytical requirements for the safety screening of a tank are energetics, total alpha activity, moisture content, and flammable gas concentration. If a specified parameter is exceeded, further analysis of a secondary set of measurements, resulting in a possible change in tank classification, is required.

This DQO requires that a vertical profile of the tank waste be obtained from at least two widely spaced risers. This vertical profile may be obtained using core, auger, or grab samples. The safety screening analyses shall be applied to all core samples, DST Resource Conservation and Recovery Act (RCRA) samples, and auger samples, except those taken exclusively to assess the flammable gas crust burn issue.

3.0 TANK HISTORICAL INFORMATION

This section summarizes the available historical information on tank TY-106. Included are the age of the tank, process history, and the expected contents of the tank based on the latest information. The fill history information is available in *A History of the 200 Area Tank Farms* (Anderson 1990).

3.1 JANUARY 1995 TANK STATUS

Tank TY-106 was classified as an assumed leaker in 1959. The tank is passively ventilated and was isolated and stabilized in 1977. Primary stabilization and partial interim isolation was completed in 1978. Stabilization was accomplished by the addition of diatomaceous earth to the tank. Approximately 64 kL (17 kgals) of sludge are contained in the tank. This volume of waste corresponds to 36 centimeters (14 inches) of waste. The latest photograph shows mainly sludge. The highest temperature as of July 1994 is 17°C (62°F) (Hanlon 1994).

3.2 TANK CONFIGURATION

Single shell tank TY-106 was constructed between 1950 and 1951 and is located in the 200 West Area. Tank TY-106 is 23 meters (75 feet) in diameter and has a design capacity of 2,870 kL (758 kgals), but safety considerations require a maximum operating capacity of 2,800 kL (750 kgals). The tank is second in a cascade flow series with tank 241-TY-105. A cascade system consists of tanks connected in series by pipes. When the primary tank in the system became full, the waste would then flow to the secondary tank(s) in the system.

3.3 TANK HISTORY

Tank TY-106 began service in the third quarter of 1953 when it received tributyl phosphate (TBP) waste as part of a cascade system. Upon discovery of leaking in 1959, the waste was pumped to tanks 241-TY-101 and 241-TY-103. Diatomaceous earth was added to the tank for stabilization in 1972. Figure 3-1 summarizes the influx and effluent history of tank TY-106.

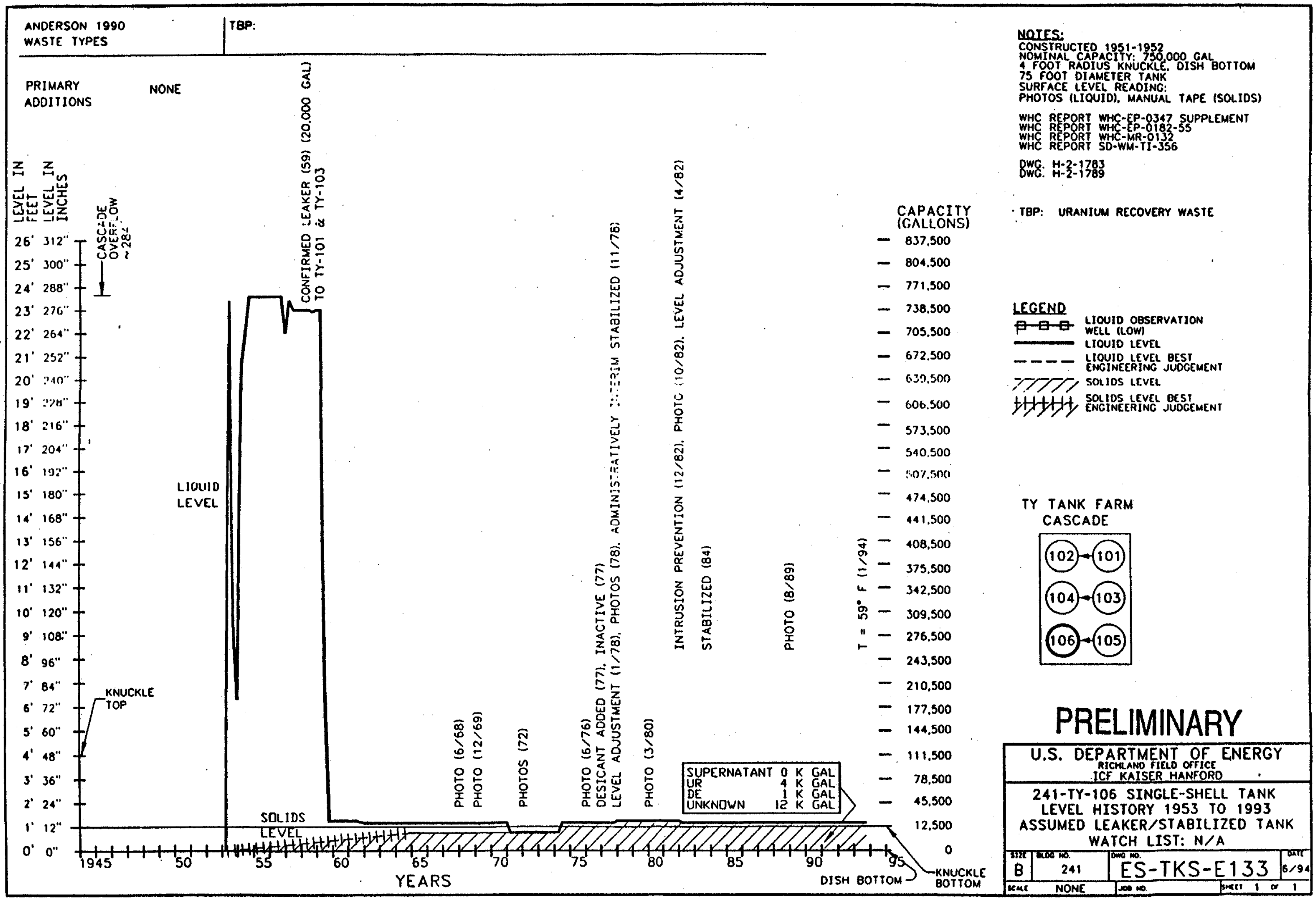
3.4 EXPECTED TANK CONTENTS

Tank TY-106 contents are expected to be sludge consisting of non complex waste and diatomaceous earth with no remaining liquid capable of being pumped. Table 3-1 summarizes the expected tank contents from a sludge sample analysis done in 1985 (Van Vleet 1993).

Table 3-1: Tank TY-106 Expected Contents

Physical Data	Value	
Total Solid Waste	92,020 kg (17,000 gallons)	
Density	1.43 g/ml	
Weight % Water	33.10	
TOC	2,090 ug/g	
Constituents	**µg/g**	**µg/ml**
Ag^{+1}	6.35	9.1
Al^{+3}	10,600	15,150
Ba^{+2}	212	303
Bi^{+5}	246	351.8
Cd^{+2}	17.2	24.6
Cr^{+3}	78.5	112.3
Fe^{+3}	51,700	73,930
Mn^{+4}	609	870.9
Na^{+}	76,800	109,820
Ni^{+2}	61.6	88.1
Pb^{+2}	375	536.25
Si^{+4}	112,000	160,160
Zr^{+4}	432	617.8
U	6,000	8580
Pu	0.0212	0.03
P	13,700	19,590
OH^{-}	0.0356	0.05
NO^{-3}	128,000	183,000

Figure 3-1: Fill History of Tank 241-TY-106



4.0 TANK TY-106 SCHEDULED SAMPLING EVENTS

Only one sampling event for tank TY-106 is currently scheduled: an auger sample in February 1995. No other sampling is scheduled through Fiscal Year 1997 (Stanton 1994). The auger sampling shall be conducted in accordance with the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). Sampling and analytical requirements from this DQO are identified in Table 4-1. A more complete list of analytical requirements is given, as Appendix A to this Tank Characterization Plan.

Table 4-1: Integrated DQO Requirements

Sampling Event	**Applicable DQO**	**Sampling Requirements**	**Analytical Requirements**
Auger	Tank Safety Screening	Samples from 2 risers separated radially to the maximum extent possible	▪Energetics ▪Moisture Content ▪Total Alpha ▪Gas Composition

5.0 REFERENCES

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APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR FISCAL YEAR 1995 AUGER SAMPLING

TABLE OF CONTENTS FOR APPENDIX A

LIST OF TABLES FOR APPENDIX A

LIST OF FIGURES FOR APPENDIX A

LIST OF ABBREVIATIONS FOR APPENDIX A

ACL	Analytical Chemistry Laboratory
DOE	Department of Energy
DQO	data quality objective
DSC	differential scanning calorimetry
DST	double shell tank
GEA	gamma energy analysis
HPGE/MCA	high purity germanium - multi channel analysis
IC	ion chromatography
ICP	inductively coupled plasma
NCPLX	non complex waste
PNL	Battelle Pacific Northwest Laboratory
RCRA	*Resource Conservation and Recovery Act of 1976*
RSST	reactive system screening tool - adiabatic calorimetry
SST	single shell tank
TCP	Tank Characterization Plan
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TOC	total organic carbon
TWRS	Tank Waste Remediation System
TY-106	Tank 241-TY-106
USQ	unreviewed safety question
WHC	Westinghouse Hanford Company

A1.0 SPECIFIC TANK CHARACTERIZATION OBJECTIVES

This Sampling and Analysis Plan will identify characterization objectives for sample collection, hot cell sample breakdown, and laboratory analytical requirements following the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994).

The sampling criteria for safety screening require that "a vertical profile of the waste be obtained from at least two widely-spaced risers ... assuming the quality of the data obtained supports appropriate safety classifications of the tank. Such sampling can be done by core sampling, by auger sampling (for shallow waste depths), or by obtaining liquid grab samples at several levels (Babad and Redus 1994). Tank TY-106 shall be sampled for safety screening purposes using the auger sampling method. Samples shall be taken from two existing risers that are separated radially to the maximum extent possible (Section A2.0).

The requirements for the safety screening of a tank specify the analyses to be performed on half segments and includes the identification of the content of a common set of primary analytes and waste characteristics. These analyses are energetics, total alpha, percent moisture, and flammable gas concentrations. If notification limits are exceeded for these analyses, further analysis of a second set of properties and a possible Watch List classification would be warranted. This Sampling and Analysis Plan identifies procedures and requirements, following the safety screening DQO and the Characterization Program, for collecting and characterizing samples from tank TY-106 by the auger sampling method.

A2.0 TANK STATUS AND SAMPLING INFORMATION

A2.1 TANK STATUS

Tank TY-106 was classified as an assumed leaker in 1959. The tank is passively ventilated and was isolated and stabilized in 1977. Primary stabilization and partial interim isolation was completed in 1978. Stabilization was accomplished by the addition of diatomaceous earth to the tank. Approximately 64 kL (17 kgals) of sludge are contained in the tank. This volume of waste corresponds to 36 centimeters (14 inches) of waste. The latest photograph shows mainly sludge. The highest temperature as of July 1994 is 17C (62F) (Hanlon 1994). Tank TY-106 is 23 meters (75 feet) in diameter and has a design capacity of 2,870 kL (758 kgals), but safety considerations require a maximum operating capacity of 2,800 kL (750 kgals). The tank is second in a cascade flow series with tank 241-TY-105. A cascade system consists of tanks connected in series by pipes. When the primary tank in the system became full, the waste would then flow to the secondary tank(s) in the system. Tank TY-106 is not on any Watch List and there are no unreviewed safety questions (USQ) associated with the tank at this time.

A2.2 SAMPLING INFORMATION

Tank TY-106 is currently scheduled to be sampled by the auger sampling method. Samples are expected to be taken from risers 4 and 6. If a different riser is necessary to meet sampling and analysis requirements, this change must be recorded and approved by the cognizant engineer before sampling. The risers used may be recorded on a permanent data sheet or recorded directly in the work package.

Sampling shall be conducted following procedures and documentation included in tank TY-106 work package WS-95-00020. If the sampling depth is within ±5 inches of the current depth information, one 20 inch auger bit will be used for the sampling of each riser. In the event that the current depth information is incorrect, a different sized auger bit may be used. Any changes to the work package would subsequently be documented by a revision to the work package. The objective of the sampling event is to reach the bottom of the waste and the number of samples might change depending on the depth of the waste.

A3.0 LABORATORY SAMPLE RECEIPT AND ANALYSIS INSTRUCTIONS

A3.1 TANK-SPECIFIC ANALYTICAL PROCEDURES

A flow chart depicting the general safety screening sample breakdown and analysis scheme is presented in Figures A-1, A-2, and A-3. These steps are described in detail to provide the hot cell and laboratory chemists with guidance for the breakdown of the samples and may be altered as appropriate by the performing laboratory. As noted, several analyses listed in Table A-1 require a 45 day reporting time. The 45 day reporting format, Format III, is explained in Section A7.3.

As a precautionary measure, the Safety and Analysis Report for Packaging (SARP) has been reviewed for any safety issues involved with transportation of tank TY-106 auger samples. **For TY-106 auger samples, the transport sample casks <u>must</u> be vented every fifteen days to release any accumulated gas.**

Any decisions, observations, or deviations and justifications made to this work plan or during the sample breakdown shall be documented in writing. These decisions and observations shall also be reported in the data report. The reporting formats for analyses are contained in Table A-1.

Step 1 Receive auger samples at the laboratory following approved procedures.

Step 2 Conduct the following on the sample material from each isolated auger sample:

- Perform a visual examination of the sample(s)
- Record observations. This may include a sketch of the isolated auger sample in addition to written documentation of pertinent descriptive information such as color, texture, homogeneity, and consistency.
- Note the color and clarity of any drainable liquids.
- Report sample recovery results to the Safety Program within one working day of sample breakdown.
- Take color photographs or a color videotape to visually document the isolated auger samples.

Step 3 Does the sample contain drainable liquids?

Yes: Proceed to Step 4A
No: Proceed to Step 5A

Step 4A Separate any drainable liquids from the solids. Measure and record the volume. Retain drainable liquids for further processing.

Step 4B Is the sample 100% drainable liquids?

No: Proceed to Step 5A
Yes: Proceed to Step 11

SOLIDS PATH

Step 5A Is there a hard, dry layer on the top of the auger sample?

Yes: Proceed to Step 5B
No: Proceed to Step 5C

Step 5B Separate the hard, dry layer and retain for analysis.

Step 5C Divide each auger sample into two subsegments (i.e., half segments).

Step 6 Homogenize each subsample using the appropriate approved procedure.

Step 7 Will a homogenization test be performed?

Yes: Proceed to Step 8
No: Proceed to Step 9

NOTE: One subsample per core, at a minimum, should be used if a homogenization test is to be performed. Additional tests may be performed at the laboratory's discretion.

Step 8 Conduct the homogenization test by taking 1 to 2 g aliquot from widely separated locations of the homogenized subsample. Conduct the homogenization test following Bell (1993).

Step 9 Collect sufficient aliquots from each homogenized subsample to perform the appropriate preparations and analyses listed in Table A-1 in duplicate.

NOTE: If there is an insufficient amount of sample available in any subsample to perform all required analyses on the half segment, notify the Characterization Program within one business day and follow the prioritization of analyses given in Section A3.3.

Step 10 Remove at least 20 ml and up to 40 ml of each homogenized subsample for the archive sample (Bratzel 1994).

LIQUIDS PATH

Step 11 Closely inspect the liquid sample for the presence and approximate volume of any potential organic layers. Does the sample contain any immiscible (potentially organic) layers?

Yes: Proceed to Step 12A
No: Proceed to Step 13

Step 12A Report any visually observed immiscible (potential organic) layer immediately by the early notification system (Section A7.2).

Step 12B Separate and retain the potential organic layer for possible future analysis.

NOTE: Steps 13 through 17 shall be performed on the remaining (probable aqueous) liquid layer only.

Step 13 Filter the remaining liquid sample through a 0.45 micron filter.

Step 14 Is there greater than 1 gram of solid on the filter?

Yes: Proceed to Step 15
No: Proceed to Step 16

Step 15 Archive the solids for possible future analysis (Bratzel 1994).

Step 16 Remove sufficient aliquots from the liquid sample to perform the appropriate analyses listed in Table A-1 in duplicate.

Step 17 Archive at least 20 ml and up to 40 ml of the drainable liquids as the liquid archive (Bratzel 1994).

PRIMARY ANALYSIS PATH

Step 18 Perform primary analyses as listed in Table A-1.

Step 19 Compare the primary analysis data with notification limits.

Step 20A Do the results exceed the notification limits (Table A-1)?

Yes: Proceed to Step 20B.
No: Proceed to Step 23.

Step 20B Report results exceeding the notification limits using Format I reporting deliverable requirements as listed in Section A7.2.

SECONDARY ANALYSIS PATH

Step 21 Perform secondary analyses following Table A-1.

Step 22A Do the secondary analyses exceed the notification limits?

Yes: Proceed to Step 22B
No: Proceed to Step 23

Step 22B Report results exceeding the notification limits using Format I reporting deliverable requirements as listed in Section A7.2.

Step 23 Report results as listed in Section A7.0.

A3.2 INSUFFICIENT SEGMENT RECOVERY

If the amount of material recovered from the auger samples taken from tank TY-106 is insufficient to perform the analyses requested and permit a minimum 10 mL archive per sample, the laboratory shall notify the Tank Cognizant Engineer and the manager of Analytical Services, Program Management and Integration within one working day (See Table A-2). The priorities of the analyses requested in this document is given in Section A3.3. Any analyses prescribed by this document, but not performed, shall be identified in the appropriate data report with justification for non-performance.

A3.3 PRIORITIES OF REQUESTED ANALYSES

Confirmation of the priority levels or revision of sample breakdown procedures may be provided to the laboratory based upon the sample recovery, readily observable physical properties within the sample, and the requested sample breakdown procedures provided in Section A3.1. The priority of an analysis is specified by its designation as a primary or secondary analysis. Further prioritization will be determined by the program on a DQO basis.

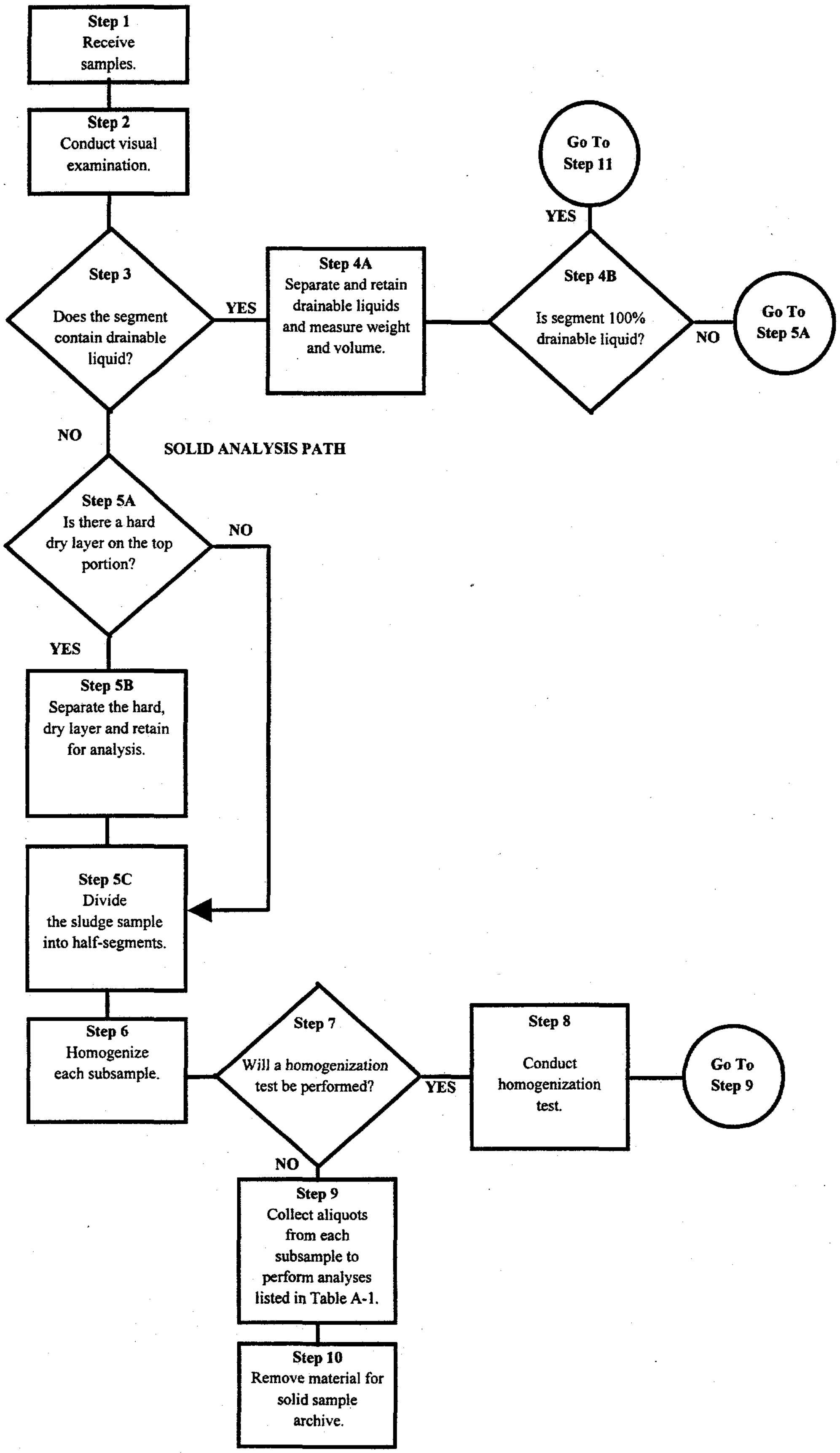

Figure A-1: Solid Analysis Flow Chart

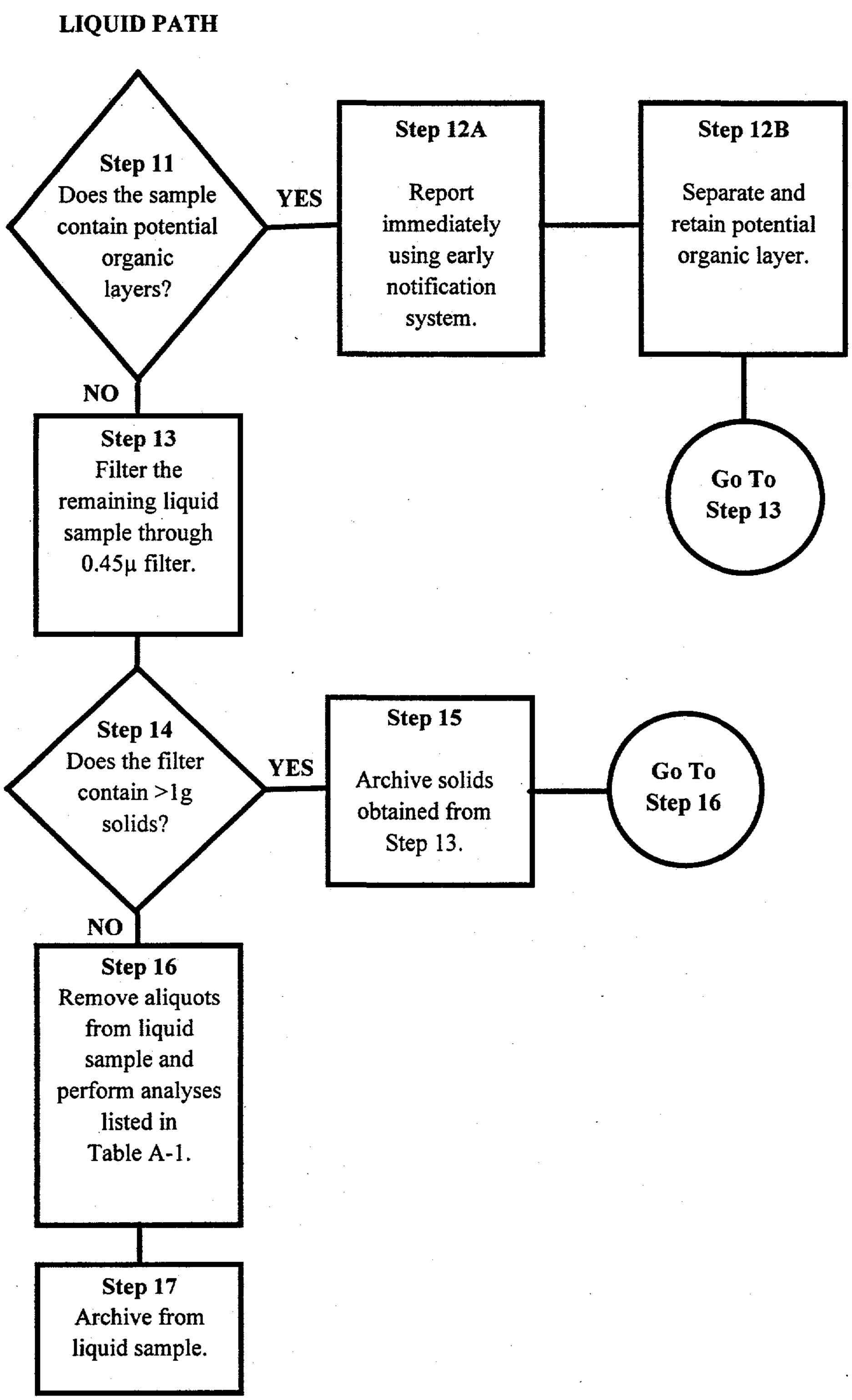

Figure A-2: Liquid Analysis Flow Chart

ANALYSIS AND REPORTING PATH

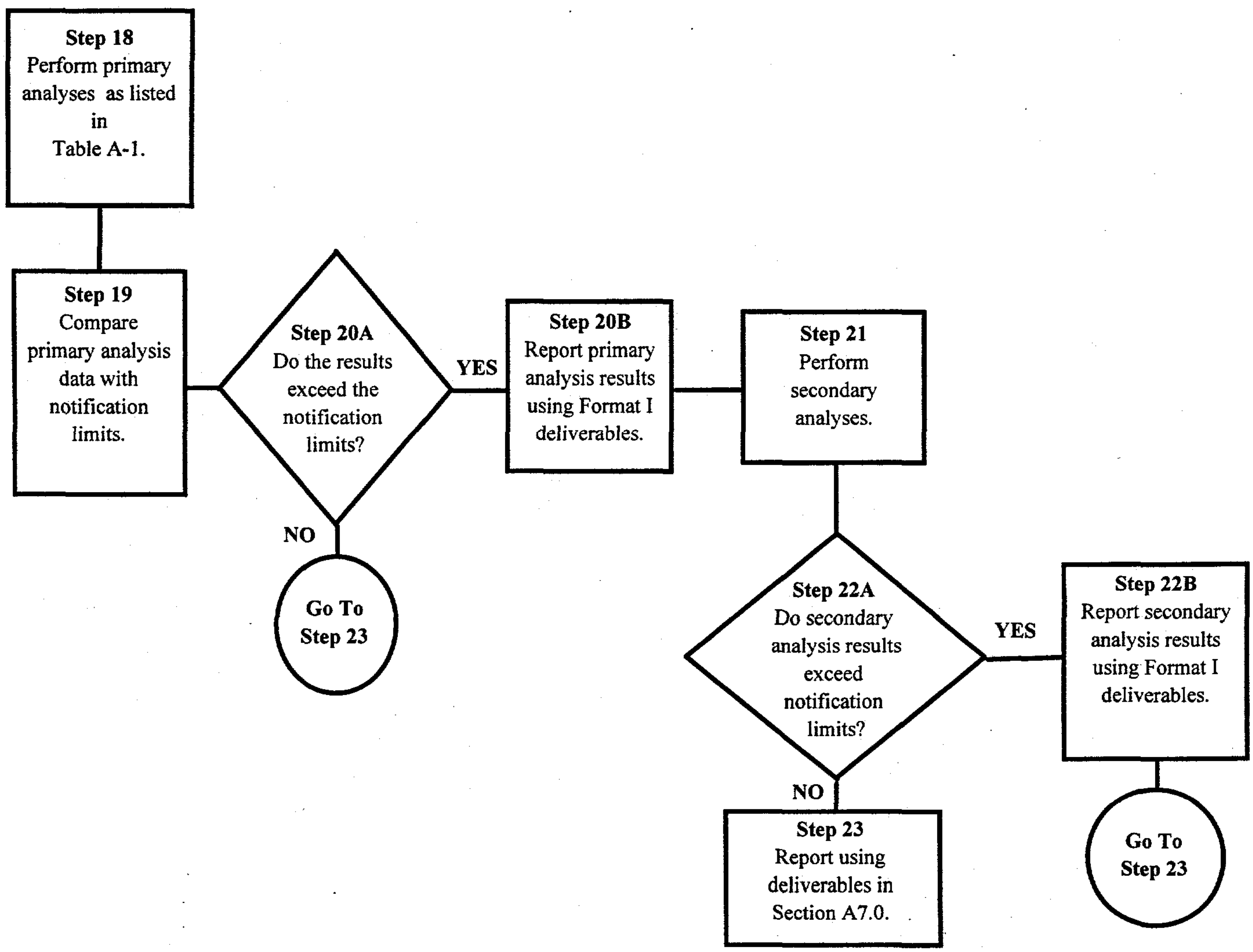

Figure A-3: Sample Analysis and Reporting Flow Chart

A4.0 SPECIFIC ANALYTE, QUALITY ASSURANCE, AND DATA CRITERIA

A4.1 SPECIFIC METHODS AND ANALYSES

The analyses in Table A-1 to be performed on tank TY-106 auger samples are based on the safety screening DQO referenced in Section A1.1.2. The laboratory procedure numbers, which shall be used for the analyses, are included in the table.

A4.2 QUALITY ASSURANCE

A4.2.1 Laboratory Operations

The 222-S Laboratory has a quality assurance program plan (Meznarich 1994) and a quality assurance project plan (Taylor 1993) that shall provide the primary direction for quality assurance when analyzing the waste tank auger samples at the 222-S Laboratory. Additionally, the *Hanford Analytical Services Quality Assurance Plan* (DOE 1994), when implemented (August 31, 1995), shall be used for quality assurance guidance.

Method specific quality control such as calibrations and blanks are also found in the analytical procedures. Sample quality control (duplicates, spikes, standards) are identified in Table A-1. If no criteria are provided in Table A-1, the performing laboratory shall perform to its quality assurance plan(s).

A4.2.2 Sample Collection

Two auger samples are to be taken from tank TY-106 and shipped to the performing laboratory by Sampling Operations following work package WS-95-00020. That work package shall also initiate the chain-of-custody for the samples. Approved auger sampling procedure TO-080-008 and procedure TO-080-090 ("Load/Transport Sample Cask(s)") are to be used during the sampling event. Samples shall be identified by a unique number before being shipped to the performing laboratory. The sampling team is responsible for documenting any problems and procedural changes affecting the validity of the sample in a field notebook. Sampling Operations shall enter this information in the comment section of the chain-of-custody form for addition to the data reports.

Sampling Operations should transport each sample collected to the performing laboratory within one working day of removing the sample from the tank, but must transport each sample within three calendar days. Sampling Operations is responsible for verbally notifying the 222-S Laboratory (373-2435) at least 24 hours in advance of an expected shipment.

A4.2.3 Sample Custody

The chain-of-custody form is initiated by the sampling team as described in work package WS-95-00020. Auger samples are shipped in a cask and sealed with a Waste Tank Sample Seal.

WASTE TANK SAMPLE SEAL	
Supervisor:	Sample No.:
Date of Sampling:	Time of Sampling:
Shipment No.:	Serial No.:

The sealed and labeled samples are shipped to the laboratory along with the chain-of-custody form. The receipt and control of samples in the WHC 222-S Laboratory are described in laboratory procedure LO-090-101.

Table A-1: TY-106 Chemical, Radiological and Physical Analytical Requirements

SOLID ANALYSES						
Project Name	TY-106 Auger Sample		COMMENTS		REPORTING LEVELS	
Plan Number	WHC-SD-WM-TP-312, REV. 0		Homogenization Test - Per Laboratory Discretion		FORMAT I	Early Notify
			Field Blank - Not Required		FORMAT II	Process Control
PROGRAM	PROGRAM CONTACTS		Hot Cell Blank - Per Laboratory Discretion		FORMAT III	Safety Screen
A. Safety Screening	Safety Screening	H. Babad			FORMAT IV	Waste Management
	TWRS	R. D. Schreiber	TANK	#AUGERS	FORMAT V	RCRA Compliance
	222-S Laboratory	J. G. Kristofzski	TY-106	2	FORMAT VI	Special

PROGRAM	PRIMARY ANALYSES			SAMPLE[1]		PREP[2]	QUALITY CONTROL[3]						CRITERIA			FOR-MAT
	METHOD	ANAL.	WHC PROCEDURE	½ SEG SLDG	½ SEG SC		DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT[4]	EXPECTED RANGE[4]	
A	DSC	Energy	LA-514-113	X	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	J/g[5]	> 481	unknown	I, III
A	TGA	% H_2O	LA-560-112	X	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	wt%	< 17	33.1	I, III
A	Alpha	Total Alpha	LA-508-101	X		f or a	ea smpl	1/mtrx	ea PB	ea AB	±10	90-110	µCi/g	> 41	unknown	I, III
PROGRAM	SECONDARY ANALYSES			SAMPLE[1]		PREP[2]	QUALITY CONTROL[3]						CRITERIA			FOR-MAT
	METHOD	ANAL.	WHC PROCEDURE	½ SEG SLDG	½ SEG SC		DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT[4]	EXPECTED RANGE[4]	
A	RSST[10]	Energy	see 10 below	X	X	d	N/A	N/A	N/A	ea AB	±10	90-110	J/g	> 481	unknown	I, III
A	Distillation[10]	CN	LA-695-102	X	X	d	ea smpl	1/mtrx	ea AB	ea AB	±10	90-110	µg/g	> 39,000	unknown	I, III
A	Hot Persulfate[10]	TOC	LA-342-100	X	X	d	ea smpl	1/mtrx	ea AB	ea AB	±10	90-110	µg C/g	> 30,000	2,090	I, III
A	Sep. & α counting[11]	Pu-239/240	LA-503-156	X		f	ea smpl	1/mtrx[8]	ea PB	ea AB	±10	90-110	µCi/g	> 41	unknown	I, III
A	ICP[11]	Fe Mn U	LA-505-151	X		f or a	ea smpl	see[9]	ea PB	ea AB	±10	90-110	µg/g	none none none	51,700 609 6,000	III III III

[1]½ SEG SLDG-½ segment, sludge; ½ SEG SC-½ segment, saltcake

[2]d-direct, f-fusion dissolution, a-acid dissolution, w-water dissolution

[3]PR-precision, AC-accuracy, ea-each, smpl-sample, DUP-duplicate, SPK/MSD-spike and matrix spike duplicate, AB-analytical batch, PB-preparation blank, N/A-not applicable, mtrx-matrix

[4]Units for notification limits and expected range are those listed in the "units" column.

[5]Dry weight basis.

[6]Direct liquid samples may be diluted in acid or water to adjust to proper sample size and/or pH.

[8]Tracer or carrier may be used in place of a spike and results corrected for recovery.

[9]Either serial dilutions or matrix spikes will be performed.

[10]This analysis required if DSC exceeds notification limits. The RSST method, yet to be proceduralized, may be found in WHC-SD-WM-TP-104.

[11]Performed only if total alpha exceeds notification limit.

Table A-1: TY-106 Chemical, Radiological and Physical Analytical Requirements

LIQUID ANALYSES

Project Name	TY-106 Auger Sample		COMMENTS		REPORTING LEVELS	
Plan Number	WHC-SD-WM-TP-312, REV. 0		Homogenization Test - Per Laboratory Discretion		FORMAT I	Early Notify
			Field Blank - Not Required		FORMAT II	Process Control
PROGRAM	PROGRAM CONTACTS		Hot Cell Blank - Per Laboratory Discretion		FORMAT III	Safety Screen
A. Safety Screening	Safety Screening	H. Babad			FORMAT IV	Waste Management
	TWRS	R. D. Schreiber	TANK	#AUGERS	FORMAT V	RCRA Compliance
	222-S Laboratory	J. G. Kristofzski	TY-106	2	FORMAT VI	Special

PROGRAM	PRIMARY ANALYSES			SAMPLE[1]	PREP[2]	QUALITY CONTROL[3]						CRITERIA			FOR-MAT
	METHOD	ANAL.	WHC PROCEDURE	LIQUID		DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT[4]	EXPECTED RANGE[4]	
A	DSC	Energy	LA-514-113	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	J/g[5]	> 481	unknown	I, III
A	TGA	% H_2O	LA-560-112	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	wt%	< 17	unknown	I, III
A	Visual	Organic Layer	LA-519-151	X	d	N/A	N/A	N/A	N/A	N/A	N/A	none	presence	unknown	I, III
PROGRAM	SECONDARY ANALYSES			SAMPLE[1]	PREP[2]	QUALITY CONTROL[3]						CRITERIA			FOR-MAT
	METHOD	ANAL.	WHC PROCEDURE	LIQUID		DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT[4]	EXPECTED RANGE[4]	
A	RSST[10]	Energy	see 10 below	X	d	N/A	N/A	N/A	ea AB	±10	90-110	J/g[5]	> 481	unknown	I, III
A	Distillation[10]	CN	LA-695-102	X	d[6]	ea smpl	1/mtrx	ea AB	ea AB	±10	90-110	µg/mL	> 39,000[7]	unknown	I, III
A	Hot Persulfate[10]	TOC	LA-342-100	X	d[6]	ea smpl	1/mtrx	ea AB	ea AB	±10	90-110	µg C/mL	> 30,000[7]	unknown	I, III

[2]d-direct, f-fusion dissolution, a-acid dissolution, w-water dissolution

[3]PR-precision, AC-accuracy, ea-each, smpl-sample, DUP-duplicate, SPK/MSD-spike and matrix spike duplicate, AB-analytical batch, PB-preparation blank, N/A-not applicable, mtrx-matrix

[4]Units for notification limits and expected range are those listed in the "units" column.

[5]Dry weight basis.

[6]Direct liquid samples may be diluted in acid or water to adjust to proper sample size and/or pH.

[7]Converted from weight basis to a volumetric basis assuming a liquid density of 1.0 g/mL.

[8]Tracer or carrier may be used in place of a spike and results corrected for recovery.

[9]Either serial dilutions or matrix spikes will be performed.

[10]This analysis required if DSC exceeds notification limits. The RSST method, yet to be proceduralized, may be found in WHC-SD-WM-TP-104.

A5.0 ORGANIZATION

The organization and responsibility of key personnel involved with this tank TY-106 characterization project are listed in Table A-2.

Table A-2: Tank TY-106 Project Key Personnel List

Individual	Organization	Responsibility
J. G. Kristofzski	222-S Analytical Operations	Program Support Manager of Analytical Operations
R. D. Schreiber	TWRS Characterization Support	Tank TY-106 Tank Characterization Plan Cognizant Engineer
H. Babad	Characterization Program	Safety Screening Point of Contact
J. L. Deichman	Analytical Services	Manager of Analytical Services Program Management and Integration
West Area Shift Operations Manager	Tank Farm Operations	West Tank Farm Point of Contact if Notification Limit is Exceeded (373-3475)

A6.0 EXCEPTIONS, CLARIFICATIONS AND ASSUMPTIONS

A6.1 EXCEPTIONS TO DQO REQUIREMENTS

It is specified in the safety screening DQO (Babad and Redus 1994) that cyanide analyses are to be run on a quarter-segment level and that the notification limit for the DSC analysis is 125 cal/g. The revised ferrocyanide DQO (Meacham et al. 1994) has changed the requirements such that the cyanide analysis is now to be run on a half segment level and the DSC notification limit is 115 cal/g (dry weight basis). This change will be incorporated in the next revision to the safety screening DQO. Therefore, although this Sampling and Analysis Plan uses the current safety screening DQO, it specifies that cyanide analysis will be run on a half segment level and that notification shall be made if the DSC value exceeds 481 J/g dry weight basis (115 cal/g).

A6.2 CLARIFICATIONS AND ASSUMPTIONS

A number of clarifications and assumptions relating to the notification limits or decision thresholds identified in the applicable DQO efforts need to be made with respect to the analyses in Table A-1. Each of these issues are discussed below.

- Any exothermic reaction (in cal/g or J/g) determined by differential scanning calorimetry (DSC) must be reported on a dry weight basis as shown in equation (1) using the weight percent water determined from Thermogravimetric Analysis.

$$Exotherm\ (dry\ wt) = \frac{[exotherm\ (wet\ wt) \times 100]}{(100 - \%\ water)} \quad (1)$$

NOTE: A large error in the DSC value may result when converting samples containing greater than 90% water to a dry weight basis. However, this conversion is still required.

- The safety screening DQO (Babad and Redus 1994) requires that additional analyses be performed if total alpha activity is greater than 1 g/L. Total alpha is measured in μCi/g rather than g/L. To convert the notification limit for total alpha into a number more readily usable by the laboratory, it was assumed that all alpha decay originates from Pu-239. The notification limit may then be calculated as shown in equation (2):

$$\left(\frac{1\ g}{L}\right)\left(\frac{1\ L}{10^3\ mL}\right)\left(\frac{1}{density}\frac{mL}{g}\right)\left(\frac{0.062\ Ci}{1\ g}\right)\left(\frac{10^6\ \mu Ci}{1\ Ci}\right) = \frac{61.5}{density}\ \frac{\mu Ci}{g} \quad (2)$$

NOTE: If a density of 1.5 g/ml is assumed for solid material, the notification limit becomes 41 μCi/g.

- The safety screening DQO, upon which the analyses in Table A-1 are based, does not sufficiently address the analysis of any drainable liquids present. To adequately characterize the tank, all analyses performed on the solids for the safety screening DQO, with the exception of total alpha analyses, shall also be performed on any drainable liquids.

A7.0 DELIVERABLES

All analyses of tank TY-106 waste material shall be reported as Formats I and/or III as indicated in Table A-1. Additional information regarding reporting formats is given in Schreiber (1994a).

A7.1 PROGRESS REPORTS

Each laboratory performing analyses on tank TY-106 waste material from this sampling project shall provide monthly status reports to the Characterization Program. This report shall contain 1) a summary of the activities on the analysis of tank TY-106, 2) preliminary results to the program, and 3) schedule and cost information on a DQO basis.

Monthly and accumulative costs will be compared to the base as part of the progress report. Monthly variances greater than 10% and $10,000, and accumulative variances greater than $50,000 from the estimated costs or schedule must be explained in the report. Cost reporting shall consist of the following:

1. budgeted cost of work scheduled
2. monthly cost (actual cost of work performed)
3. year-to-date costs (actual cost of work performed)

Schedule reporting shall consist of the following:

1. monthly schedule
2. year-to-date schedule

A7.2 FORMAT I REPORTING

Table A-1 contains the notification limits for each analyte. Any results that exceed the notification limits defined in the DQO processes shall be reported by calling the West Tank Farm Operations Shift Manager at 373-3475 and the Characterization Program Office (Schreiber 1994b). This verbal notification must be followed within one working day by written communication to Analytical Services, Characterization Support, the Characterization Program Office, the Safety Screening Representative, and Waste Tanks Process Engineering, documenting the observations. Additional analyses for verification purposes may be contracted between the performing laboratory and the contacts above either by a revision to this document or by a letter of instruction.

A7.3 FORMAT III REPORTING

A Format III report, reporting the results of the primary safety screen analyses, shall be issued to the Safety Screening Representative, Characterization Support, Waste Tanks Process Engineering, the Characterization Program Office, Los Alamos Technical Associates, the Tank Characterization Resource Center, and the Tank Characterization Database representative (Schreiber 1994c) within 45 days of receipt of the last sample at the laboratory loading dock. The DSC and TGA scans have been requested due to the interpretive nature of the analysis. If analyses for the safety screening secondary analytes are required, these results shall be provided within 90 days of receipt of the last sample at the laboratory loading dock. No calibration data are requested for these reports. Detailed information regarding the contents of this reporting format are given in (Schreiber 1994a).

A8.0 CHANGE CONTROL

Under certain circumstances, it may become necessary for the performing laboratory to make decisions concerning a sample without review of the data by the customer or the Characterization Program. These changes shall be documented through the use of internal characterization change notices or analytical deviation reports for minor low impact changes and documented in applicable laboratory notebooks. All significant changes (such as changes in scope) shall be documented by Characterization Support via an Engineering Change Notice to this Tank Characterization Plan. All changes shall also be clearly documented in the final data report.

At the request of the Characterization Program, additional analysis of sample material from this characterization project shall be performed following a revision of this Tank Characterization Plan.

A9.0 REFERENCES

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