DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	T.S. Basra	Date 05/04/95
Project Title/Work Order		EDT No.
242-A EVAPORATOR QUALITY ASSURANCE PROJECT PLAN WHC-SD-WM-QAPP-009,REV. 2		ECN No. 622104

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
Central Files (2)	L8-04	X			
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J.A. Sheriff	B1-42	X			
R.R. True	S1-57	X			
L.W. Vance	H4-16	X			
B.H. Von Bargen	R1-43	X			

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ENGINEERING CHANGE NOTICE

Page 1 of 4

1. ECN Nº 622104

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [] Direct Revision [x] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	Tejpal S. Basra, Tank Farms Environmental Engineering, 7C420, R1-51, 373-5039		04/28/95
	5. Project Title/No./Work Order No. 242-A Evaporator Quality Assurance Project Plan (242-A QAPjP)	6. Bldg./Sys./Fac. No. 242-A	7. Impact Level Q
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-QAPP-009, REV. 1	9. Related ECN No(s). 704838,11/04/94	10. Related PO No. N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

The entire document, 242-A Quality Assurance Project Plan, WHC-SD-WM-QAPP-009, REV. 1, is being replaced with WHC-SD-QAPP-009, Rev. 2, ECN# 622104. Rev. 2 provides QA/QC guidance for Sampling and Analysis of candidate feed tank waste in accordance with EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA, 1994, WHC-SD-WM-DQO-014, Rev. 1, 242-A Evaporator Liquid Effluent Retention Facility Data Quality Objectives, Von Bargen, 1994, and WHC-SD-WM-EV-060, Rev. 5, 242-A Evaporator Waste Analysis Plan, Basra 1995. Synopsis of signficant changes is as follow:

1) Process condensate sampling requirements at time of discharge to /LERF waste, deleted.
2) Entire Section 2.2.2 Sample collection for process condensate, deleted
3) Entire Section 2.3.2 sample handling and custody requirements for LERF, deleted. liner compatibility, deleted.
4) Table 1 Process condensate stream sampling containers/volume, holding times, and preservation methods. deleted.
5) Table 3 Quality assurance objectives for process condensate steam compliance analytes, deleted

13a. Justification (mark one)							
Criteria Change	[X]	Design Improvement	[]	Environmental	[]		
As-Found	[]	Facilitate Const.	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

The revision of this document implements the deletion of RCRA sampling of process condensate while discharging into the LERF during evaporator operations. Rationale for deletion of process condensate sampling requirements is documented in the Evaporator Data Quality Objective, WHC-SD-WM-DQO-014, Rev. 1.

14. Distribution (include name, MSIN, and no. of copies)

See a attached distribution

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~~A-7900-013-2 (06/92) GEF095~~

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 622104

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional []	$	Additional []	$	Improvement []	N/A
[X] No	Savings [X]	$	Savings N/A []	$	Delay []	

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	N/A	[X]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
NA		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog Engineer * Tejpal S Basra Tejpal S. Basra	4/14/95	PE	
Cog. Mgr. * R.D. Gustavson R.D. Gustavson	5-4-95	QA	
QA *Roger True R.R. True	5-4-95	Safety	
Safety		Design	
Security		Environ.	
Environ. M.W. Bowman	5-3-95	Other	
Projects/Programs			
Tank Waste Remediation System			
Facilities Operations		DEPARTMENT OF ENERGY	
Restoration & Remediation		Signature or Letter No.	
Operations & Support Services			
IRM		ADDITIONAL	
Other			
Treatment System Plant Engineering * Brian Von Bargen Brian Von Bargen	4/26/95		

APPENDIX B

Unreviewed Safety Question Forms

Figure B-1. Unreviewed Safety Question Changes Screening Form. (1 Sheet)

REFERENCE ITEM # ECN #622104
TITLE 242-A Evaporator Quality Assurance Project Plan, WHC-SD-WM-EV-009, Rev. 2

Does the referenced item:

A. Make PROPOSED CHANGES to the facility or procedures which differ from conditions described in the AUTHORIZATION BASIS documentation?

N/A____ NO x Yes/Maybe____

Basis: ECN #622104 does not make proposed changes to the facility or procedures which differ from conditions described in WHC-SD-WM-SAR-023, "242-A Evaporator/Crystallizer Safety Analysis Report", Rev. 1-B, or WHC-SD-W105-SAR-001, Final Safety Analysis Report 242-A Evaporator Liquid Effluent Retention Facility", Rev. 0-C. This ECN implements changes to the Quality Assurance Project Plan which provides guidance necessary to meet QA/QC requirements for collection and analysis of candidate feed tank samples. Implementation of this document has no effect on the accidents described in Table 9-1, "Summary of Radiological Consequences".

B. Make PROPOSED CHANGES that represent conditions that have not been analyzed in the AUTHORIZATION BASIS?

N/A____ NO x Yes/Maybe____

Basis: ECN #622104 does not make proposed changes that represent conditions that have not been analyzed in WHC-SD-WM-SAR-023, "242-A Evaporator/Crystallizer Safety Analysis Report", Rev. 1-B, Chapter 9 or WHC-SD-W105-SAR-001, Final Safety Analysis Report 242-A Evaporator Liquid Effluent Retention Facility", Rev. 0-C. This ECN implements changes to the Quality Assurance Project Plan which provides guidance necessary to meet QA/QC requirements for collection and analysis of candidate feed tank samples. Implementation of this document has no effect on the accidents described in Table 9-1, "Summary of Radiological Consequences".

C. Describe tests or experiments which differ from those described in the AUTHORIZATION BASIS documentation?

N/A____ NO x Yes/Maybe____

Basis: ECN #622104 does not describe any tests of experiments at all. This ECN implements changes to the Quality Assurance Project Plan which provides guidance necessary to meet QA/QC requirements for collection and analysis of candidate feed tank samples. Implementation of this document has no effect on the accidents described in Table 9-1, "Summary of Radiological Consequences".

D. Is a change in a TSR, OSR, or compliance plan to OSR involved?

N/A___ NO x Yes/Maybe___

Basis: ECN #622104 does not change any TSR, OSR, or compliance plan to OSR as described in WHC-SD-WM-SAR-023, "242-A Evaporator/Crystallizer Safety Analysis Report", Rev. 1-B, Chapter 9 or WHC-SD-W105-SAR-001, Final Safety Analysis Report 242-A Evaporator Liquid Effluent Retention Facility", Rev. 0-C. This ECN implements changes to the Quality Assurance Project Plan which provides guidance necessary to meet QA/QC requirements for collection and analysis of candidate feed tank samples. Implementation of this document has no effect on the accidents described in Table 9-1, "Summary of Radiological Consequences".

USQE #1 Brian Von Bargen
Print Name

Brian VonBargen 4/13/95
Signature Date

USQE #2 Elvis Le
Print Name

Elvis Le 4/13/95
Signature Date

RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-QAPP-009, REV 2
Document Title:	242-A Evaporator Quality Assurance Plan
Release Date:	5/4/95

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz — May 4, 1995

5/4/95 KMB

SUPPORTING DOCUMENT

1. Total Pages 39 to 40

2. Title	3. Number	4. Rev No.
242-A Evaporator Quality Assurance Plan, WHC-SD-WM-QAPP-009, Rev. 2	**WHC-SD-WM-QAPP-009**	**Rev. 2**

5. Key Words

242-A Evaporator, Double Shell Tank, Waste Analysis, Quality Assurance, Data Quality Objectives, Waste Sampling and Characterization of candidate feed tank(s) at the Evaporator.

APPROVED FOR PUBLIC RELEASE

KMB 5/4/95

6. Author

Name: Tejpal S. Basra

Tejpal S. Basra 4/14/95
Signature

Organization/Charge Code 7C420/N1151

7. Abstract

This quality assurance project plan (QAPjP) provides planning, implementation, and assessment guidance according to the requirements in EPA Requirements for Quality Assurance Project Plans for Enviornmental Data Operations, EPA QA/R-5, January 1994 for compliance and non-compliance analytes in the candidate feed stream.

8. **PURPOSE AND USE OF DOCUMENT** - *This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed.*

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10. **RELEASE STAMP**

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DATE MAY 04 1995

9. Impact Level Q

RECORD OF REVISION	(1) Document Number WHC-SD-WM-QAPP-009	Page 1

(2) Title

242-A EVAPORATOR QUALITY ASSURANCE PROJECT PLAN

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog. Engr.	(6) Cog. Mgr.	Date
Rev. 1 RS	(7) Replace Rev. 0 with Rev. 1 ECN-704838	BJ Tucker	R.D. Gustavson	11/4/94
0	EDT-158775 4/26/93			
RS 2	Replace Rev. 1 (ECN 704838) with Rev. 2	C.M. Frank	R.D. Gustavson	5/4/95
	(ECN 622104)			

242-A EVAPORATOR
QUALITY ASSURANCE PROJECT PLAN
WHC-SD-WM-QAPP-009, REV.2

By

Tejpal S. Basra
WESTINGHOUSE HANFORD COMPANY

APRIL 28, 1995

DISCLAIMER

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LIST OF ACRONYMS AND TERMS

ACL	Analytical Chemistry Laboratories
ALARA	As Low As Reasonably Achievable
DST	Double-Shell Tank
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
EQL	Estimated Quantitation Limit
HATS	Hanford Action Tracking System
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Standard
MOU	Memorandum of Understanding
MS/MSD	Matrix Spike/Matrix Spike Duplicate
PIC	Person-in-Charge
PMI	Program Management and Integration
POP	Plant Operating Procedure
Project	242-A Evaporator Project
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SDLA	Sample Data Laboratory Administration
TC	Total Carbon
TCP	Tank Characterization Plan
TIC	Total Inorganic Carbon
TSPE	Treatment System Plant Engineering
TWRS	Tank Waste Remediation System
TFEE	Tank Farms Environmental Engineering
WAP	Waste Analysis Plan
WHC	Westinghouse Hanford Company

1.0 PROJECT MANAGEMENT

1.1 PROBLEM DEFINITION/BACKGROUND

The purpose of this quality assurance project plan (Plan) is to provide requirements for activities pertaining to sampling, shipping, and analytses. These requirements include, but are not limited to, sample receipt, handling and storage, analytical measurements, submittal of data deliverables, archiving selected portions of samples, returning unneeded sample material to Westinghouse Hanford Company (WHC), and/or sample disposal associated with candidate feed tank samples for the 242-A Evaporator project. If tasks are added or deleted later, or if the laboratory makes operating changes or procedural modifications pertinent to this scope, the work authorization document (see paragraph 3 of Section 1.3) may have to be modified.

This plan requires onsite and offsite laboratories to conform to the requirements contained in this document. Conformance to these requirements by the laboratory will help ensure that quality data is generated and that the 242-A Evaporator is operating in a safe and compliant manner.

The purpose of the 242-A Evaporator project is to reduce the volume of aqueous waste in the Double Shell Tank (DST) System and will result in considerable savings to the disposal of mixed waste. The 242-A Evaporator feed stream originates from DSTs identified as candidate feed tanks. The 242-A Evaporator reduces the volume of aqueous waste contained in DSTs by boiling off water and sending the condensate (called process condensate) to the Liquid Effluent Retention Facility (LERF) storage basin where it is stored prior to treatment in the Effluent Treatment Facility (ETF). The process condensate must conform to any waste acceptance criteria contained in the LERF/ETF WAP. After going through the 242-A Evaporator, the concentrated waste (slurry) is returned to the DST Sytem and must conform to waste acceptability criteria described in the latest revision of the Double Shell Tank Waste Analysis Plan (WAP) (Mulkey and Jones 1995). In addition to the process condensate, feed and slurry streams, utility streams such as cooling water and steam condensate are sampled per the process control plan. The requirements in this plan do not apply to process control sampling. A DQO document

(Von Bargen 1995), contains the rationale for sampling requirements, identifies how to determine the number of samples, the parameters to be measured, and the data quality requirements such as precision, accuracy, and practical quantitation limits.

The objective of this quality assurance project plan is to provide the planning, implementation, and assessment of sample collection and analysis, data issuance, and validation activities for the candidate feed tanks. Analytes for environmental compliance as well as for safety and process control sampling are included in this document. The RCRA compliance analytes are the same as those listed in Basra 1995 and Von Bargen 1995. Quality assurance requirements for the following streams which are associated with the Evaporator process are documented as follows:

- Feed, slurry, process condensate, steam condensate, and cooling water samples for process control purposes only -- current edition of *242-A Evaporator Sample Schedule*, FSS-T-630-00001.

- 242-A-81 Raw Water Sump Sampling for TEDF discharge requirements - *TEDF Quality Assurance Project Plan (Project W-049H)*, WHC-SD-LEF-QPP-002

1.2 PROJECT/TASK ORGANIZATION

The data obtained from analysis of candidate feed tanks, process, and effluent streams are used by Treatment Systems Plant Engineering (TSPE) and 242-A Evaporator Operations to:

- Determine if tank waste should be processed

- Adjust process conditions

- Prevent exceeding effluent emission limits

- Improve the accuracy of process models and thus our understanding of the operation.

TSPE is responsible for approving all safety and process control data. Along with Tank Farms Environmental Engineering (TFEE), both groups approve all compliance data.

evaluating all compliance sample data which is required by the latest revision of the 242-A WAP (Basra 1995). Together with TSPE, TFEE approves and accepts final products and deliverables relating to compliance streams. TFEE is responsible for ensuring that this Plan is kept up-to-date by incorporating applicable changes in regulations, laboratory capabilities, and DQO developments annually. TFEE interfaces with the laboratories and operations to ensure that there is a mutual understanding of analytical capabilities and program needs. TFEE also identifies problems in the sampling and analytical procedures, then works with TSPE and the laboratories to correct these problems. Procedures affected by changes to this Plan shall be updated.

Once a sample has been received, the laboratory providing analysis is responsible for sample and data management and data verification (Von Bargen 1995). For candidate feed tank sampling, the laboratory selection and QA/QC requirements provided in this document are presented in a contractual document, the Tank Characterization Plan (TCP) which is issued by the Tank Characterization Program.

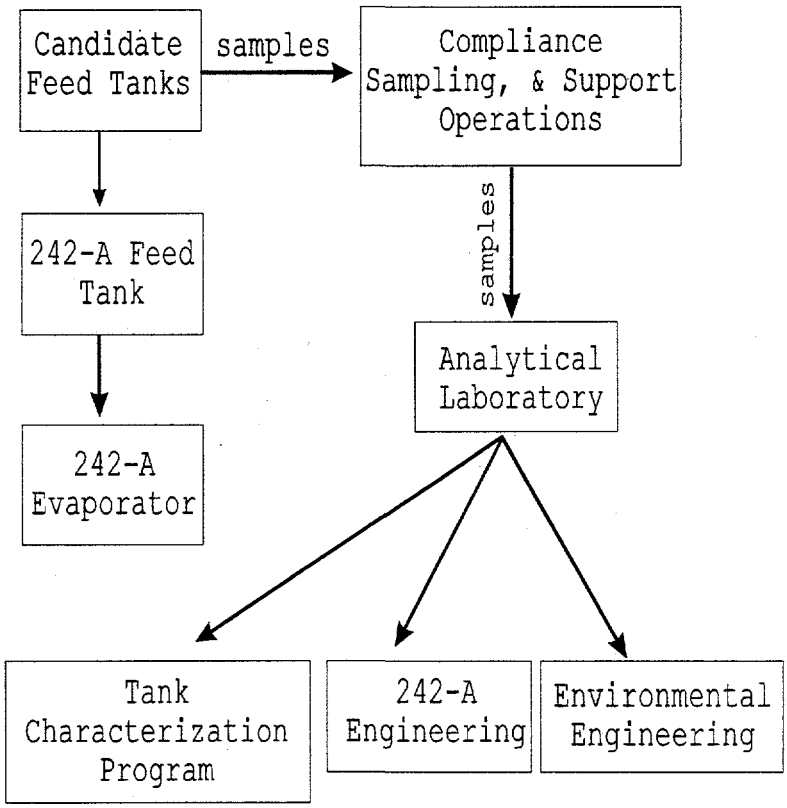
The Characterization Plans and Reports (CPR) organization writes the instructions (in the TCP) for the sampling groups and laboratories to collect and analyze tank samples based upon program needs. The CPR keep records of data packages for possible future program needs.

Tank Farm Operations is responsible for all field activities in preparation, collection, packaging, and shipment of the samples. Compliance, Sampling and Support Operations is a division of Tank Farm Operations that handles all field responsibilities of sampling and shipping candidate feed tank samples.

Assessment of laboratory performance is conducted internally by the laboratory or externally using a formal audit system (see Section 3.1 of this report).

Figure 1 is an organization chart displaying the interfaces among these groups regarding the generation and transfer of samples and data. A Memorandum of Understanding (MOU) (O'Rourke, 1994) clarified the interfaces among these groups. Note that this figure only includes the candidate feed tank sampling and analysis.

Figure 1. Logic for Candidate Feed Tank Sample Collection, Analysis, and Validation



1.3 PROJECT/TASK DESCRIPTION

This Plan sets forth the instructions and specifications for QA/QC analyses of 242-A Evaporator candidate feed tank samples which are taken to comply with requirements specified in the latest editions of the 242-A Evaporator WAP (Basra 1995) and the 242-A Evaporator DQO document (Von Bargen 1995). Requirements specified in EPA documents (EPA 1994), and Section IIE, Quality Assurance/Quality Control of the Hanford Site permit (Butler 1994) were used as the basis for these requirements.

Program Management Integration (PMI) serves as the initial point of contact for scheduling, and contractual communications associated with the laboratory operations described in this Plan. Only onsite laboratories analyze candidate feed samples due to the high level of radioactivity. The Office of Quality Assessment verifies that the laboratory is capable of fulfilling the quality assurance requirements stated in Von Bargen (1995), Basra (1995), and this Plan.

A work authorization document (TCP, MOU, or Work Order) must be used as a contractual device to direct onsite laboratories (222-S) in the performance of analytical work for the Evaporator Program. The work authorization document must include the work scope (i.e., number of samples, field blanks, sampling locations, expected date of arrival at the laboratory, etc.), QA/QC reference document(s), and reporting and deliverable requirements including dates, approval designators (see Section 12.7 of WHC-CM-3-5), and funding sources.

Any deviations from this Plan shall be evaluated and formally documented by letter or internal memorandum by PMI as part of its determination of the laboratories ability to provide satisfactory service.

According to the *Hanford Federal Facility and Consent Order,* (Ecology et al. 1990), Section 9.6.6, Data Delivery Schedules, "Laboratory analysis and QA documentation, including validation and transmittal to the regulators, shall be limited to the following schedule:

Transuranics and hot cell samples, 136 days annual average, not to exceed 176 days; Low level and mixed waste (up to 10 mR/hr), 111 days annual average, not to exceed 126 days."

Additional details on the content of the validated data package is provided in Section 1.4 of this Plan.

1.4 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

1.4.1 Uses of the Data

Data and statistical parameters calculated from the data will be used by several groups.

The cognizant process engineer of TSPE uses the candidate feed tank data to statistically determine if analyte concentrations within the process waste are expected to exceed action levels. The results of this determination are documented in a process control plan issued prior to each campaign. TSPE directs 242-A Operations on operating strategies based upon analytical results from candidate feed tank waste analyses.

Evaporator Operations uses the data as an aid for establishing operating parameters to run the plant safely and compliantly.

TFEE uses the data to ensure that the plant operates within environmental compliance requirements.

The Liquid Effluents program may use analytical data from the candidate feed tank to evaluate the impact, if any, that process condensate analytes will have on basin liner integrity, safety requirements, and Effluent Treatment Facility treatment needs.

1.4.2 Measurement Performance Criteria

Continuation of the 242-A Evaporator waste processing is contingent in part upon the ability of the analytical support laboratories and sampling organizations to show internal and external auditors and reviewers that the quality of their work is sufficient to support process control, safety, and compliance decisions (see Section 3.1 for more details). Several criteria are used to measure performance including precision, accuracy, detection limits, representativeness, and comparability.

Precision and accuracy are quantitatively expressed using the definitions given in Section 7.8.2 of Von Bargen (1995). For analytes that are not spiked, the relative percent difference

(RPD) of duplicate samples. Precision encompasses the variabilities associated with preparation, and analysis, including representativeness of collected samples and subsample aliquots, completeness of sample digestion or extraction, losses during digestion, extraction, and/or transfers, errors in sample or reagent weights and volumes, and instrument response fluctuation. The ability to meet precision criteria depends in part on the concentration level of the analyte and the heterogeneity of the samples.

Accuracy is also defined in Von Bargen (1995) and is a measure of the closeness of the measurement to the true value. The variabilities that characterize precision can also cause inaccurate measurements. However, matrix effects such as interferences can potentially cause large inaccuracies without adversely affecting precision.

Representativeness of candidate feed samples is determined by the sampling design through the use of appropriate subsampling and mixing methods and the use of consistent analytical methods. The sampling design and sampling processes have been reviewed for variability in the tank.

The Sample Exchange Evaluation program compares data generated by the 222-S and ACL on identical waste samples. It promotes consistency in sample preparation and analysis procedures by:

- Identifying significant differences and,
- Ensuring that the best procedures are utilized.

Additional details on comparability are provided in), Section 4.2 Meznarich (1995), and Section 14.4 and Appendix C of Kuhl-Klinger (1994).

1.5 CONFLICT WITH OTHER DOCUMENTS

The specifications contained in the 242-A Evaporator/Liquid Effluent Retention Facility Data Quality Objectives (Von Bargen 1995) will prevail in the event that there are conflicts between the 242-A Evaporator Waste Analysis Plan (Basra 1995), the 242-A Evaporator/Liquid Effluent Retention Facility Data Quality Objectives and this document. The latest revisions to the referenced documents must be used.

2.0 MEASUREMENT/DATA ACQUISITION

2.1 SAMPLING PROCESS DESIGN

Prior to an upcoming evaporator operational campaign, samples are collected from candidate feed tanks to assess the ability to process the waste. Feed tank sampling will be coordinated between the 242-A program office and the laboratory.

The strategy for determining the number of samples and sample locations for candidate feed tanks is described in Section 5.2, of Basra (1995), and in Section 7.1 of Von Bargen (1995). TSPE uses this strategy and tank liquid levels to specify the number of samples and their locations. For a given number of candidate feed tank samples, sample locations are chosen to provide the most representative sampling for that tank. The number and location of samples will be specified within the work authorization (e.g. TCP or work package) document for each candidate feed tank. If the variability of the samples results does not provide adequate confidence in the decision process, additional samples may have to be collected.

2.2 SAMPLE COLLECTION

Sample bottles must be certified to meet the standards (such as those in SW-846) for cleanliness required for regulatory samples. All sample bottles (including blanks) for volatile organics must have an open top with a volatile organics free septum. Candidate feed tank sample bottles for volatile organics are not required to meet zero headspace requirements due to As Low As Reasonably Achievable (ALARA) concerns.

For each Evaporator campaign, DSTs are selected based on the 242-A Evaporator's ability to process the waste, tank space needs, and program requirements. Samples are to be taken by Compliance Sampling and Support Operations in accordance with the latest revision of Plant Operating Procedure (POP) TO-080-065, *Supernatant or Sludge Sampling of Non-Aging, Non-Watchlist Waste Storage Tanks* (WHC 1994a). It includes safety precautions such as avoiding the area directly above the tank riser, sampling steps, chain-of-custody requirements, how to fill out sample identification forms, sample pickup, and weather conditions under which sampling shall not be conducted. Additional information on

documentation, labelling, and sample custody can be found in the Sample Handling and Custody Requirements section. No quality control (QC) verifications are required by this procedure. There are QC witness points (see WHC CM-4-2) where the QA manager may elect to witness the activity:

- When sample bottle serial number is confirmed to match serial number on Attachment 1 - Sampling Data Sheet
- When sample is taken at the correct tank depth
- When sample is placed in correct sample pig

The POP must be in place before the sampling event. A sampling event is defined as all samples collected from a single tank. Laboratories and sampling organizations shall strive to meet SW-846 holding times. However, adherence to SW-846 holding times is not strictly required if documented cases show that additional time was required to ship, process, and analyze radioactive samples (Morant, 1994). All waste is grab sampled ("bottle-on-a-string") with a sample bottle inserted in the sample bottle holder assembly (see Figure 1 of TO-080-065).

At all subsurface sampling locations, four 100 milliliter (ml) nominal dark glass bottles are drawn: two for organics (one for semivolatiles, one for volatiles), one for the boildown and mixing study, and one for inorganics and radionuclides analyses. Samples from one sampling location are used for preparing QC checks (matrix spike (MS) and matrix spike duplicate (MSD)). Duplicate samples are not collected because for most analytes, MS/MSDs are analyzed. The MS/MSDs provides precision information for analytical measurement. The latter can only be determined if analytes are present that have analytical uncertainty that is not too large a percentage of the overall uncertainty. MS and MSDs are used when contaminants may not be present and spiking samples with them allows an assessment of the precision. One surface grab sample is collected from each of the Evaporator feed tanks if data on separable organics is not available from compatibility sampling (Appendix 2A, Von Bargen 1995).

For each tank sampled, three field blanks and two trip blanks are collected. Both are prepared in a manner that simulates the sampling process as closely as possible except that a sample is not actually collected. A field blank provides an indication of

contamination from sample collection, transport, preparation or extraction, and analysis. A trip blank is similar to a field blank except it is not subjected to the sample collection process and is not opened in the field. Typically, it is expected that one set of blanks will be collected per sampling event. If sampling event duration exceeds four days, the program will consider collecting additional blanks.

Two field blanks are taken for organic analysis (two 100 ml bottles, one for semivolatiles, one for volatiles), and one for inorganic/radionuclide analysis (200 ml total), and the bottles are so marked. Field blank bottles are filled with reagent grade water at the laboratory prior to shipment to the sampling site. Similar to an actual sample, four bottles from the same batch of bottles used for tank waste samples are employed. Each one is installed in the sample holder, then the bottle screw cap is removed and a rubber stopper (part of the sample holder assembly) is inserted. The field blank bottle is lowered approximately one foot into the riser, then the rubber stopper is pulled out, the bottle is allowed to fill and the assembly is taken out of the riser. The bottle cap is then replaced.

Two trip blanks are used, one for volatile organics, the other for semivolatile organics and they are so marked. There is not an inorganic/radchem trip blank due to the extremely low probability of inorganic contamination in a trip blank. Trip blank bottles are filled with reagent grade water at the laboratory prior to shipment to the sampling site.

Decontamination instructions are included in TO-080-065. A new certified sample bottle and sample holder assembly is employed for each sample collected to avoid cross contamination. After the sample is collected and the bottle capped, the bottle and holder are lowered again into the vapor space and rinsed with deionized water. It is then lifted out and wiped off.

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Candidate feed tank samples are not preserved (including cooling) because of concerns with the additional radiation exposure which would result. It is not practical to cool the bulky sample pigs and shipping containers. Biological activity, which is generally the largest problem in environmental samples, is unlikely due to the high salt content, extreme pH, and high radioactivity of these tank waste samples. Chemical changes are typically low because of the low organic concentrations.

Candidate feed tank samples are loaded into sample pigs or casks and transported to an onsite laboratory according to the current revisions of TO-080-075, *Perform Transport of CSSO Samples in the Sample Truck* (WHC 1994c) or TO-080-090, *Load/Transport the Onsite Transfer Cask* (WHC 1994b). The forms and work sheets that are filled out by the Person in Charge, including the chain of custody form, are described in TO-080-065. The exact locations of sample collection are recorded on the Sampling Information Work Sheet. Samples are identified by a unique shipping number or sample number which is written on the shipping tag. Sample labels and/or sample tags must be filled out at the time of sampling and secured to each sample bottle. The labels and tags identify the sample number, collector's signature, date and time of collection, location of sampling point, and sample chain-of-custody procedures to be followed to track and document sample collection, shipment.

Upon arriving at the laboratory, pigs are logged and surveyed for radiological control. The sample logging information and any additional observations are recorded on the pigs and the chain of custody form, then placed into a holding area for storage before removal of the sample. Tank Farm Operations decontamination procedures for sample pigs and casks are contained in the current revisions of TO-080-075 and TO-080-090. Additional details on receipt and handling of samples by the laboratories is provided in Section 6.0 of Meznarich (1995) and Section 6.0 of Kuhl-Klinger (1994). Actual sample volumes may vary due to the manner in which samples are collected. There is often just enough volume to perform the required tests, leaving little room for error. If excess sample is available from one sample bottle, following removal of sample for the analyses that are designated to be performed from that sample bottle, it may be used to provide additional material for testing other analytes.

Interchangeability is permissible only for samples from the same group of four sample bottles.

2.4 ANALYTICAL METHODS REQUIREMENTS

The performance based extraction and analytical methods are listed in Table 7.2 of Von Bargen (1995) and Tables 2 through 5 of this Plan. Laboratories are required to maintain written procedures using these methods for detecting the applicable analytes. In cases where a procedure needs to be modified to attain a lower detection limit or because of low percent recoveries or high relative percent differences in QC samples, the procedure may be modified to make QC parameters acceptable. These changes will be documented in the case narrative and approved internally by the laboratory and project management. Additional approval is required by TFEE if the procedure modifications conflict with the methods specified in the latest edition of the 242-A Evaporator Waste Analysis Plan.

Section 5.4 of Basra (1995), Analytical Methods and QA/QC, explains why deviations from SW-846 protocol may be necessary due to the unique nature of candidate feed tank waste. If there is a problem in the analytical system, the laboratory employee who recognizes the problem is responsible for initiating appropriate corrective action.

Table 1. Quality Assurance Objectives for Candidate Feed Tank Stream Compliance Analytes

Analytical Category	Analyte of interest	Technology-based analytical methods	Estimated quantitation limit (matrix specific)	Precision (RPD between duplicate spikes), %	Accuracy (% recovery of matrix spike)	Action level[1]
Organics[2]	Acetone	Purge and trap and GC/MS or GC/FID (VOA)	28 mg/L	<25	40-110	>87 mg/L[3]
	1-butanol	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	20 mg/L	<25	30-110	>226 mg/L[3]
	2-butoxyethanol	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	30 mg/L	<25	30-110	>95.2 mg/L[3]
	2-butanone (methyl ethyl ketone)	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	18 mg/L	<25	40-110	>58 mg/L[3]
	2-hexanone	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	18 mg/L	<25	40-110	No specific limit
	methyl isobutyl ketone (MIBK)	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	20 mg/L	<25	40-110	No specific limit

Table 1. Quality Assurance Objectives for Candidate Feed Tank Stream Compliance Analytes

Analytical Category	Analyte of interest	Technology-based analytical methods	Estimated quantitation limit (matrix specific)	Precision (RPD between duplicate spikes), %	Accuracy (% recovery of matrix spike)	Action level[1]
Organics[2]	2-pentanone	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	24 mg/L	<25	40-110	No specific limit
	Tetrahydrofuran (THF)	Purge and trap GC/MS or GC/FID (semi-VOA or VOA)	20 mg/L	<25	30-110	No specific limit
	Tributyl phosphate (TBP)	Solvent Extraction GC/MS (Semi-VOA)	50 mg/L	<25	40-120	>1.015E+4 mg/L[3]
Inorganic	Ammonia (NH_3)	Kjeldahl distillation/ autotitration ion selective electrode	400 μg/ml	<20	75-125	>0.29 Molar (5,000 mg/L)
Other	Exotherm	Differential scanning calorimeter	none	<20[4]	NA	<335 °F absolute value of ratio of exotherm to endotherm >1

Table 1. Quality Assurance Objectives for Candidate Feed Tank Stream Compliance Analytes

Analytical Category	Analyte of interest	Technology-based analytical methods	Estimated quantitation limit (matrix specific)	Precision (RPD between duplicate spikes), %	Accuracy (% recovery of matrix spike)	Action level[1]
Other	Mixing and compatibility study	Lab specific	NA	NA	NA	Visual: unusual changes in color, temperature, clarity, etc.
	TC	TIC/TOC analyzer w/coulometric near IR detectors	25 ug/mL	<20	75-125	TC-TIC >87 ppm;
	TIC	TIC/TOC analyzer w/coulometric near IR detectors	25 ug/mL	<20	75-125	TC-TIC >87 ppm; required for modeling

1. In deriving the action levels, the ratio of feed flowrate to slurry flowrate (R) is assumed to be 2.
2. Methods technology shall be based on EPA 1992 (SW-846).
3. For individual organic species limits in the candidate feed tanks, the sum of the fractions rule applies(see Table 4A.1 of Von Bargen (1995) TC and TIC are not included in the summation of organics.
4. Precision is evaluated on the deviation between a sample (unspiked) and sample replicate.

Table 2. Quality Assurance Objectives for Evaporator's Candidate Feed Tank Stream Noncompliance Analytes

Analtical Category	Analyte of interest	Technology-based analytical methods[a]	Practical quantitation limits (matrix specific)	Precision (RPD between duplicatespikes), %	Accuracy (% rec. of matrix spike)	Action level
Inorganics	Aluminum (Al)	ICP/OES	25μg/L	< 20	75 - 125	No specific limit
	Sodium (Na)	ICP/OES	20μg/L	< 20	75 - 125	>8.0 M
Ions/ anions	Fluoride (F^-)	IC/conductivity or ISE	1μg/mL	< 20	75 - 125	No specific limit
	Hydroxide (OH^-)[b]	Titration	250μg/mL	< 20	N/A	[OH] < 0.01 M, [OH] > 5.0 M
	Phosphate (PO_4^{3-})	IC/conductivity	10μg/mL	< 20	75 - 125	>0.1 M
	Sulfate (SO_4^{2-})	IC/conductivity	10μg/mL	< 20	75 - 125	No specific limit
	Nitrite (NO_2^-)	IC/conductivity	10μg/mL	< 20	75 - 125	[NO_2] < 0.011 M, [NO_2] > 5.5 M
	Nitrate (NO_3^-)	IC/Conductivity	10μg/mL	< 20	75 - 125	[NO_3] > 5.5 M
Radionuclides	Total beta (β)	Proportional counter	4E-3 μCi/mL	< 25	70 - 130	NA
	^{241}Am	Ion exchange/ Solvent extraction/ AEA	2E-3 μCi/mL	< 20	70 - 130	> 1.0 μCi/mL
	^{134}Cs	GEA	3E-4 μCi/mL	< 25[c]	N/A	> 15 μCi/mL
	^{137}Cs	GEA	4E-4 μCi/mL	< 25[c]	N/A	> 800 μCi/mL
	$^{239/240}Pu$[b]	Ion exchange/ solvent extraction/ AEA	1E-3 μCi/mL	< 25	70 - 130	RST: >0.16 μCi/mL criticality: Pu-239/240 + 1.077E-10 X (U-gross) > 0.005 g/l

Table 2. Quality Assurance Objectives for Evaporator's Candidate Feed Tank Stream Noncompliance Analytes

Analtical Category	Analyte of interest	Technology-based analytical methods[a]	Practical quantitation limits (matrix specific)	Precision (RPD between duplicatespikes), %	Accuracy (% rec. of matrix spike)	Action level
Radionuclides	^{238}Pu[b]	Calculated or ion exchange/ solvent extraction/ AEA	2E-3 μCi/mL	< 25	NA	>1.3 E-3 μCi/mL
	^{241}Pu	Calculated no procedure	N/A	--	N/A	>15 μCi/mL
	^{106}Ru	GEA	3E-3 μCi/mL	< 25[c]	N/A	> 53 μCi/mL
	^{3}H	Lachat distillation/ liquid scintillations	2E-5 μCi/mL	< 25	70 - 130	PC-RST
	^{14}C	Persulfate oxide/liquid scintillation	1E-5 μCi/mL	< 25	70 - 130	> 0.26 μCi/mL
	^{60}Co	GEA	2E-4 μCi/mL	< 25[c]	N/A	> 1.2 μCi/mL
	^{79}Se	Anion-cation exchange/ distillation/liquid scintillation	3E-5 μCi/mL	< 25[c]	N/A	> 7.8E-2 μCi/mL
	^{90}Sr	Separation/ beta count-proportional counter	8E-5 μCi/mL	< 20	75 - 125	> 220 μCi/mL
	^{94}Nb	GEA	2E-4 μCi/mL	< 25[c]	N/A	> 9.8E-2 μCi/mL

Table 2. Quality Assurance Objectives for Evaporator's Candidate Feed Tank Stream Noncompliance Analytes

Analtical Category	Analyte of interest	Technology-based analytical methods[a]	Practical quantitation limits (matrix specific)	Precision (RPD between duplicatespikes), %	Accuracy (% rec. of matrix spike)	Action level
Radionuclides	^{99}Tc	Solvent extraction/ liquid scintillation or ion exchange/ beta proportional counting	2E-4 μCi/mL	< 20	75 - 125	> 2.0 μCi/mL
	^{129}I[b]	Extraction/ precipitation/ GEA	2E-4 μCi/mL	< 20	75 - 125	> 2.6E-3 μCi/mL
	^{144}Ce	GEA	1E-3 μCi/mL	< 25[c]	N/A	PC RST
	^{154}Eu	GEA	5E-4 μCi/mL	< 25[c]	N/A	> 5.0 μCi/mL
	^{155}Eu	GEA	5E-4 μCi/mL	< 25[c]	N/A	> 7.0 μCi/mL
	^{226}Ra[b]	Calculated or GEA	3E-3 μCi/mL	< 25[b]	N/A	> 3.3E-2 μCi/mL
	^{237}Np	Extraction/ alpha count-proportional counter	2E-4 μCi/mL	< 20	70-130	PC RST
	$^{238}U_{gross}$	Laser fluorimeter or laser induced kinetic phosphorescence	1E-1 μg/mL	< 20	70 - 130	Criticality Pu-239/240 + 1.077E-10 X (U-gross): > 0.005 g/l
	^{244}Cm[b]	Ion exchange/ solvent extraction/ AEA	2E-3 μCi/mL	< 20[c]	N/A	> 1.3E-2 μCi/mL
	Total alpha (AT)	Proportional counter	2E-5 μCi/mL	< 25[c]	70 - 130	Transuranics: AT > 100 nCi/g

Table 2. Quality Assurance Objectives for Evaporator's Candidate Feed Tank Stream Noncompliance Analytes

Analtical Category	Analyte of interest	Technology-based analytical methods[a]	Practical quantitation limits (matrix specific)	Precision (RPD between duplicatespikes), %	Accuracy (% rec. of matrix spike)	Action level
Others	Specific gravity	Lab specific	NA	< 20	NA	SpG > 1.41
	Appearance	Lab specific	NA	NA	NA	NA
	pH	Potentiometric Electrode	NA	<0.3 pH units[c]	NA	<8.0
	TOC of surface sample	Combustion/ coulometric autotitration	100 ug/mL	< 20	75 - 125	> 2600 mg/L
	Boildown study	Lab specific	NA	NA	NA	Visual: unusual changes in color, temperature, clarity, etc.

a. Methods technology shall be based on *Test Methods for Evaluating Solid Waste (SW 846)* (EPA 1986).

b. These analytes have practical quantitation limits that may pose a problem because they are close to, or exceed the action level. See Section 2.5 of this Plan for more details.

c. Precision is evaluated on the deviation between a sample (unspiked) and sample replicate.

Table 3. QC Samples and Acceptance Limits for Candidate Feed Tank Sample Analysis

Analysis	[1]Matrix spikes (MS)	[2]Matrix spike duplicate (MSD)	[3]Prep. blank or method blank	[6]Calib. check (spiked blank)
ORGANICS:				
Acetone	1/SE, % rec. 40-110	1/SE, RPD < 25	1/batch	1/batch
1-Butanol	1/SE, % rec. 30-110	1/SE, RPD < 25	1/batch	1/batch
2-Butoxyethanol	1/SE, % rec. 30-110	1/SE, RPD < 25	1/batch	1/batch
2-Butanone (Methyl Ethyl Ketone, MEK)	1/SE, % rec. 40-110	1/SE, RPD < 25	1/batch	1/batch
Tri-butylphosphate,(TBP)	1/SE, % rec. 40-120	1/SE, RPD < 25	1/batch	1/batch
2-Hexanone	1/SE, % rec. 40-110	1/SE, RPD < 25	1/batch	1/batch
Methyl isobutyl ketone,MIBK)	1/SE, % rec. 40-110	1/SE, RPD < 25	1/batch	1/batch
2-Pentanone	1/SE, % rec. 40-110	1/SE, RPD < 25	1/batch	1/batch
Tetrahydrofuran	1/SE, % rec. 30-110	1/SE, RPD < 25	1/batch	1/batch
ICP (Al and Na)	1/SE, % rec. 75-125	1/SE, RPD < 20	1/batch	1/batch
Total U (U-gross) (by Fluor.)	1/SE % rec. 70-130	1/SE RPD < 20	1/batch	1/batch

Table 3. QC Samples and Acceptance Limits for Candidate Feed Tank Sample Analysis

Analysis	[1]Matrix spikes (MS)	[2]Matrix spike duplicate (MSD)	[3]Prep. blank or method blank	[6]Calib. check (spiked blank)
Ion Chrom. Anions ($F, NO_2, NO_3, SO_4, PO_4$)	1/SE % rec. 75-125	1/SE RPD < 20	1/batch	1/batch except F; F % rec. 70-110
pH	N/R	1 sample dup/SE RPD < 0.3 pH units duplicate not MSD	N/R	1/batch
OH	N/R	1 sample dup/SE RPD < 20 duplicate not MSD	1/batch	1/batch
NH_3	1/SE % rec. 75-125	1/SE RPD < 20	1/batch	1/batch
DSC	[4]N/R	1 sample dup/SE RPD < 20	N/R	1/batch
TC/TIC/TOC	1/SE % rec. 75-125	1/SE RPD < 20	1/batch	1/batch
SpG	N/R	1 sample dup/SE RPD < 20	N/R	N/R
*Am^{241}	1/SE % rec. 70-130	1/SE RPD < 20	1/batch	1/batch

Table 3. QC Samples and Acceptance Limits for Candidate Feed Tank Sample Analysis

Analysis	[1]Matrix spikes (MS)	[2]Matrix spike duplicate (MSD)	[3]Prep. blank or method blank	[6]Calib. check (spiked blank)
H^3	1/SE % rec. 70-130	1/SE RPD < 25	1/batch	1/batch
C^{14}	1/SE % rec. 70-130	1 /SE RPD < 25	1/batch	1/batch
*Cm^{244}	N/R	1 sample dup/batch RPD < 20	1/batch	N/R
*I^{129}	1/SE % rec. 75-125	1 /SE RPD < 20	1/batch	1/batch
Np^{237}	1/SE % rec. 70-130	1 /SE RPD < 20	1/batch	1/batch
*Pu^{238}	N/R	1 sample dup/SE RPD < 25	1/batch	N/R
*Se^{79}	N/R	1 sample dup/SE RPD < 25	1/batch	N/R
*Sr^{90}	1 /SE % rec. 75-125	1 /SE RPD < 20	1/batch	1/batch
Tc^{99}	1/SE % rec. 75-125	1 sample dup/SE RPD < 20	1/batch	1/batch
*GEA (Co^{60}, Nb^{94}, Ru^{106}, Cs^{134}, Cs^{137}, Ce^{144}, Eu^{154}, Eu^{155}, Ra^{226})	[4]N/R	1 sample dup/SE RPD < 25	1/batch	1/batch for Co^{60}, Cs^{137} only

Table 3. QC Samples and Acceptance Limits for Candidate Feed Tank Sample Analysis

Analysis	[1]Matrix spikes (MS)	[2]Matrix spike duplicate (MSD)	[3]Prep. blank or method blank	[6]Calib. check (spiked blank)
*$Pu^{239/240}$	1/SE % rec. 70-130	1 Sample Dup/SE RPD < 25	1/batch	1/batch
*Total alpha	1/SE % rec. 70-130	1/SE RPD < 25	1/batch	1/batch
*Total beta	1/SE % rec. 70-130	1/SE RPD < 25	1/batch	1/batch

[1]The Matrix Spike (MS) shall be valid only when the spike concentration is more than 125% of the unspiked sample value.

[2]The RPD shall be calculated and reported only when both the sample and the dup[licate are >10X the product of the instrument detection limit (IDL)times the dilution factor.

[3]The Blank value shall not exceed either 1) EQL or 2) 5% value of action level limit, or 3) 5% value of the mean sample concentration or whichever is higher.

[4]Not Required (N/R)

[5]One sample duplicate per sampling event or whenever an exotherm is observed

[6]Control limits will be no greater than either those shown on the standard manufacturer's certificate (i.e. vendor supplied values), or ±3 standard deviations of the average concentration for that standard's historical performances as measured from an active data base.

%Rec. = Percent Recovery SE = Sampling Event

Batch = A group of related samples that are analyzed together.

*MS is not possible - Requires either use of carrier or a tracer.

2.5 QUALITY CONTROL REQUIREMENTS

QC checks are made to assess the precision and accuracy of a test measurement. QC checks permit comparison of sample results with acceptable ranges defined in Von Bargen (1995) and provide precision and accuracy estimates to evaluate the confidence of decisions.

Basra (1995) contains a list of the RCRA compliance parameters of interest in Table 5-2 for candidate feed tanks. This table is recreated in Table 1 of this Plan along with the precision, accuracy, and estimated quantitation limits (EQL) given in Tables 7.2 and 7.4 of Von Bargen (1995). In addition, the QA parameters for noncompliance parameters of interest for candidate feed tanks, from Tables 7.2 and 7.4 of Von Bargen (1995), are given in Table 4 of this Plan. Von Bargen (1995) determined that the compliance, process control, and safety parameters listed in these tables shall be quantified to assure a safe, controlled, and environmentally compliant operation. Analyses must meet the requirements given in Tables 1 through 3.

Section 7.8 of Von Bargen (1995) expresses precision as the relative percent difference (RPD) between matrix spike and matrix spike duplicate results and accuracy by the percent recovery (%R) of the spike and gives precision and accuracy acceptance criteria in Table 7.4. These requirements were developed to ensure the production of data of sufficiently good quality that correct decisions can be made to comply with process control, safety, and environmental compliance limits stated in Von Bargen (1995). These decisions must occur before the processing of waste can be made. It also gives EQLs that are typically a factor of five greater than the instrument detection limit, where the instrument detection limit is defined in Section 12.4.1.2 of(Mezanarich 1995). For radionuclides, the minimum detectable activity is determined at 222-S using the latest revision of WHC procedure LA-508002, *Detection Levels for Radioisotopic Counting* and at ACL using Section 10.4.3 of Kuhl-Klinger (1994).

EQLs are recommended administrative limits, not strict requirements. They reflect normal laboratory performance capability. EQLs may be exceeded for samples with high ionic strength or interfering analytes. Section 7.8.6 of Von Bargen (1995) identifies analytes whose EQLs may be cause for concern. This would occur when the EQL is greater than the action level, or when the EQL is less than the action level, but the upper 90% confidence level of the analyte mean exceeds the action level.

If the laboratory suspects that analyte EQLs will not be met, it must report the discrepancy to the program, who will work with the laboratories to determine what analytical options should be pursued to best meet the needs of the program. The applicability of these EQLs will be evaluated as more campaign data are collected and new EQLs are generated from new data. Von Bargen (1995) also gives guidelines on the use of and control limits for blank spikes, rerun criteria if a blank spike does not meet QC criteria, how blanks are used to estimate the degree of sample contamination, and special

QC considerations for organics and radionuclides.

Matrix spikes and matrix spike duplicates containing the analytes listed in Table 7.3 of Von Bargen (1995) are added to one sample per sampling event as chosen by the laboratory, after the samples have been collected and shipped to them. MS/MSDs provide a measure of sample preparation and analysis variability and accuracy.

Field duplicate samples are not collected because the sampling variability obtained from analysis of field duplicates is believed to be small relative to tank spatial variability. Laboratory duplicate samples are prepared instead of MS/MSDs for analytes which are not amenable to spiked duplicate analyses (see Von Bargen (1995), Section 7.8.5.2). The spikes are approved standards and are added by a technician overseen by a chemist according to laboratory procedures. The laboratory attempts to spike samples to a level at least 1.25 times the concentration of each analyte in order to reduce the relative error associated with the difference between the sample and sample plus spike results. Spiking at 1.25 times the sample concentration may not be possible when an analyte is present at a high concentration (> 0.1%). Under this condition a sample dilution shall be performed. The relative percent difference between the expected (calculated) concentration of the diluted sample and its observed concentration must not exceed 5 percent. Criteria for spike recovery are not applicable if the spike concentration is too low. Spiked and nonspiked analytes are listed in Table 7.3 of Von Bargen (1995). RPD criteria for radiochemical analysis only can be acheived when the analyte activity has a less than 20% analytical uncertainty. When uncertainty (e.g. counting uncertainty) exceeds 20%, the duplicate results shall be evaluated based on statistical comparability. Re-analysis to decrease uncertainty, is at the discretion of the laboratory with consideration of RPD of other analytes, sample size, and counting time. Table 3 lists the required frequency of MS/MSD, preparation blank, and blank spike analyses forcandidate feed analytes. It also gives percent recovery requirements for MS and spiked blanks and RPDs between MS/MSD. Table 3 should be used with Tables 1 and 2 to determine whether a given analyte is spiked into a candidate feed tank sample. Table 3 is consistent with Table 7.4 of Von Bargen (1995).

Each sample for organic analysis should have a minimum of four surrogate compounds added as an accuracy check (two for volatiles and two for semi-volatiles). Surrogate compounds are chemically similar to certain groups of target compounds, but have a unique mass because they are labeled with isotopes. They are therefore distinguishable by the mass spectrometer detector used in organic analysis. Surrogate compounds for volatile organic analytes typically used in environmental protocol analyses are 1,2 - Dichloroethane - d_4 and Bromofluorobenzene with percent recovery QC criteria of 76 to 114 and 86 to 115, respectively. Similarly, surrogate compounds for semi-volatile analytes are typically Nitrobenzene - d_5 and Terphenyl - d_{14} with percent recovery QC criteria of 35 to 114 and 33 to 141, respectively. The laboratory may choose other surrogates if the analytes of

concern are different than those found on environmental protocol analyte lists.

Initial calibrations are used to establish the baseline response of an analytical instrument. Continuing calibration checks or instrument calibration verifications are used to verify that instrument response has not fluctuated significantly. These calibrations are procedure specific. Additional details on calibrations, including standards specifications, can be found in Sections 8.2, 8.3, and 8.4 of Kuhl-Klinger, Section 7.0 of Meznarich (1995).

A blank spike is simply reagent grade water that is spiked with a known amount of standard organic material, then prepared and analyzed in the same manner as a normal sample. It is analyzed once per batch of samples (a group of samples prepared and analyzed during the same period of time) that indicates whether the method is still "in control"; i.e., if the entire method (preparation and measurement) is performing within acceptable limits. It provides another measurement of procedure performance (accuracy/precision) on standard materials.

Analysis of blanks will be the same as for waste samples except for radionuclides. For these, total alpha and total beta screening tests will be run initially as per Appendix 3A of Von Bargen (1995). Field blank contamination shall be evaluated by comparison to a reagent blank or preparation blank run at the same time. The field blank is acceptable if the concentration of each contaminant analyte is less than or equal to:

- 5% of the action level,
- 5% of the average sample result per tank for candidate feed, or per campaign for process condensate blanks, or
- The EQL, whichever is higher.

Trip blanks will only be analyzed if contamination, as defined above, is detected in the field blank, and only for those contaminating analytes detected in the field blank. This strategy implies that trip blank analyses, if required, may exceed holding times. If holding times are exceeded for trip blanks, the quality of the data should not be impacted. Preparation blanks are laboratory generated blanks that go through the entire sample preparation. They are typically employed for procedures using an extraction, dissolution, or digestion. A reagent blank does not go through the preparation process, and is typically the matrix of the analytical standards. It may be used to subtract from the sample signal during the detection step.

Contamination of the blanks is indicated when any analyte exceeds 20% of the lowest sample concentration in that batch. This criterion is not valid when the sample concentration is less than 10 times the detection limit for an

analyte.

Section 7.8.4 of Von Bargen (1995), Rerun Criteria, discusses how to proceed if blank spikes, reagent, or preparation blanks analyses do not meet QC criteria.

If the "over the top" (5 inches above open pit) dose rate is > 2 rem/hour or 25 rad/hour, samples will be processed within a hot cell and the potential for contamination during sample processing in the hot cells will be determined by a hot cell blank for each sampling event. This will consist of a reagent water rinse of the equipment after it has undergone a standard clean-up performed between samples in the hot cell. The degree to which analytes specified in this project plan appear in the hot cell blank indicates the level of cross contamination from the sample breakdown equipment. The determination of contamination of the hot cell blank is described in Section 7.8.3 of Von Bargen (1995).

Laboratory QC requirements shall be described in QA Plans Meznarich (1995) for WHC and Kuhl-Klinger (1994) for ACL, and may also be described in individual laboratory procedures.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Acceptance testing or calibrations of computer controlled instruments and small equipment, sometimes involving the use of QC standards and reference materials, must be performed as described in Section 7.0 and 11.0 of Meznarich (1995), and Section 8.4 of Kuhl-Klinger (1994) unless stated otherwise in this Plan. Calibrations must be documented according to the guidelines provided within the applicable procedure.

The final acceptance of the suitability of equipment for operation is determined by the passing of annual internal audits and periodic external audits by Environmental Services Quality Assurance (for WHC) and by Analytical Services (for ACL). (See Section 3.0 of this Plan for additional details.) Resolution of equipment deficiencies is discussed in Section 4.2 of this Plan.

Field sampling groups must implement a program that will assure the needed availability of sampling equipment. The preventive maintenance program for laboratory instrumentation described in Section 14.8 of Meznarich (1995), and Section 16.0 of Kuhl-Klinger (1994) discusses the preventive maintenance schedule, critical facility equipment (such as fume hoods, electrical, and heating and ventilation), vendor service contracts, keeping of critical spare parts lists, and recording in maintenance logs. Minor maintenance activities are typically listed in the analytical method and/or recommended by the manufacturer.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

Section 7.0 of Meznarich and section 8.4 of Kuhl-Klinger (1994) summarize the required frequency and calibration method for each analytical technique. The analyst is responsible for confirming that calibrations are satisfactory prior to performing analysis. The laboratory QA plans also cover the preparation, storage, and traceability of standards used to calibrate instruments. Balance calibrations are discussed in Section 7.4 of Meznarich (1995) and Sections 8.1 and 8.2 of Kuhl-Klinger (1994).

3.0 ASSESSMENT/OVERSIGHT

3.1 ASSESSMENTS AND RESPONSE ACTIONS

A QA program can only be effective if systems are in place to continuously monitor or assess the laboratory or sampling group's ability to conform to program requirements. The goals and responsibilities of the laboratory QA programs are contained in Meznarich (1995), and Kuhl-Klinger (1994). General information on assessment activities at the laboratories are located in the following sections of the laboratory quality assurance plans as shown in Table 4.

Surveillances and audits of the 222S laboratory are conducted monthly by WHC Analytical Services Quality Assurance and cover every aspect of laboratory work, including conduct of operations, safety, data validation, and chain of custody (sample control) (see WHC-CM-4-2). The 222-S laboratory is audited by WHC-QA Compliance Assurance Group and assessed by the WHC-AS Office of Quality Assessment. The manager of WHC-AS Operations Assurance and Support reviews all audits, assessments and surveillances. The findings are entered into the HATS database for tracking of the non-compliant issues. Reports are issued to the responsible managers who shall address the corrective action and report back to the Operations Assurance and Support Manager with information on action taken.

The ACL's internal auditing program is deemed adequate at this time, and will always be subject to review by TWRS Quality Assurance. Presently, surveillances are conducted at least quarterly and sometimes monthly. ACL surveillance conditions and corrective actions are coordinated through ACL's Quality Operations and Standard Laboratory. More detail on the conduct of external and internal audits/assessments and performance evaluations are contained in the procedures and/or policy manuals.

3.2 REPORTS TO MANAGEMENT

The results of audits, surveillances, performance evaluations, and data quality assessments of site laboratories and sampling groups generated by internal laboratory and external quality assurance organizations shall be available to 242-A Evaporator operations management, Tank Farms Environmental Engineering, and TWRS Quality Assurance as applicable to the program.

Status reports to the program will not be required for this project. The laboratory will develop a schedule dealing with all aspects from sample receipt through delivery of the data package. The schedule will be reviewed weekly for progress versus targeted dates. Final data package content will be dictated by the work authorization documents described in Section 1.3 of this Plan.

Resolution of significant quality assurance problems identified in these reports is addressed in Section 4.2 of this Plan.

Table 4. Laboratory QA Plan Sections Describing Various Assessment Activities

Assessment Activity	Laboratory Quality Assurance Plan Section	
	Meznarich (1995)	Kuhl-Klinger (1994)
Peer review[1]	8.0 & 9.0	12.0
Management systems review[1]	13.013.0	14.1
Readiness review[2]	NA	NA
Technical systems audit/surveillance	13.2	14.1, 14.2
Performance evaluation	13.3	14.5 & Appendix C
Audit of data quality	13.4	14.4
Data quality assessment	12.0 & 13.4	12.0 & 14.4

[1]Peer review and management reviews of data, instrument performance, quality of standards, and safety regulations are conducted frequently and are considered an essential component of laboratory operations.

[2]Readiness reviews are only performed for a new facility, a major modification to an existing facility, or a change in the safety envelope (see WHC-CM-1-3). For example, proposed construction of new hot cells in the 222-S laboratory has prompted a readiness review.

4.0 DATA REVIEW VERIFICATION AND USEABILITY

4.1 DATA DELIVERABLES, REVIEW, AND VERIFICATION REQUIREMENTS

Laboratory data management practices are described in Sections 10.1 through 10.5, Section 12.0, and Section 13.0 of Kuhl-Klinger (1994) and Sections 4.0, 9.0, and 10.0 of Meznarich (1995). Data management practices include data reduction and review, report preparation and review, and data transfer and storage.

The data deliverables will be preliminary data (not yet verified) and completed data (laboratory verified). A complete data package is required for Evaporator compliance sampling of candidate feed tanks. Preliminary data must be provided based on program needs and schedule. It will typically be used to support the development of the process control plan or to achieve useable data with lower detection limits. The preliminary data package will consist of summary data spreadsheets and any other information mutually agreed upon as necessary by systems engineering and the laboratory.

The 242-A Evaporator candidate feed tank compliance data, for analytes in Table 1 of this Plan, will be verified by the Laboratory under contract with the Evaporator program. This type of data package verification was chosen because it is appropriate for an intermediate treatment facility such as the Evaporator (Geier 1995). The following information must be included in the review:

- Chain of custody
- Requested versus reported analysis
- Holding times
- Analytical blanks
- Matrix spikes
- Matrix spike duplicates
- LCS and surrogate recovery.

The data report must be sent to TSPE. A tabulated quantitative data summary for the applicable items in the above list shall be included in the report. All parameters that do not meet the quality assurance objectives in Section 2.5 of this Plan must be flagged in the report. All data packages will be converted into supporting documents for efficient retrieval.

TSPE will use the data for critical analytes identified in Von Bargen (1995) to construct new individual and composite power curves for that campaign and all campaigns, respectively. Power curves are a tool to assist the program in selecting the number of samples to be collected in subsequent campaigns.

4.2 CORRECTIVE ACTION

Corrective action must be followed in accordance with the guidelines presented in Section 15.0 of Meznarich (1995), Section (16.0) of Kuhl-Klinger (1994), Morant (1994) and WHC-CM-4-2.

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