COMPLETE

ENGINEERING CHANGE NOTICE

1. ECN 621550

Proj. ECN

2. ECN Category (mark one) Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	3. Originator's Name, Organization, MSIN, and Telephone No. Clarence Homi, Data Assessment and Interpretation, R2-12, 373-1097	3a. USQ Required? [] Yes [X] No	4. Date 05/08/96
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12. Description of Change

Complete revision.

13a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

Changed to comply with new template and DOE-RL recommended modifications.

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

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1. ECN (use no. from pg. 1) ECN-631550

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

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. C.S. Homi	5/8/96	PE	
Cog. Mgr. J. Kristofzski	5/9/96	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other R.D. Schreiber	5/9/96	Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

Tank 241-BY-103 Tank Characterization Plan

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Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Abstract: This document is a plan that identifies the information needed to address relevant issues concerning short-term and long-term storage and long-term management of single-shell tank 241-BY-103.

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Tank 241-BY-103 Tank Characterization Plan

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Westinghouse Hanford Company

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1.0 INTRODUCTION

This Tank Characterization Plan (TCP) identifies the information needed to address relevant issues concerning short-term and long-term safe storage and long-term management of single-shell tank 241-BY-103 (BY-103). It should be understood that the various needs and issues surrounding tank BY-103 are evolving as new information about the tank is uncovered. As a result of this progression, this TCP addresses only the issues that, to this date, have been identified. It is expected that deviations from this plan may occur as additional issues or needs arise which impact the management of tank BY-103. As necessary, this TCP will be revised to reflect those changes or deviations. This plan reflects the best information available as of May 1996.

Tank BY-103 was constructed between 1948 and 1949 and was put into service in October 1950. From October 1950 to March 1951, tank BY-103 was filled with metal waste which cascaded from tank 241-BY-102. The tank contained metal waste until the first quarter of 1954. Sluicing was begun in the tank for uranium recovery in the second quarter of 1954 and the metal waste was sent to tanks 241-C-104, 241-C-105 and 241-BY-109. The tank was declared empty on June 3, 1954. From the first quarter of 1955 until the second quarter of 1957, the tank contained tributyl phosphate (TBP) waste from U plant. In the third quarter of 1957, the waste was scavenged and sent to the CR process vault, leaving a small amount of TBP waste remaining in the tank. In the fourth quarter of 1957, the tank began to receive plutonium uranium extraction (PUREX) high activity neutralized acid (P) waste. Tank BY-103 contained a combination of TBP and P waste until the second quarter of 1965, when it was used for in-tank solidification decanting. From the third quarter of 1965 until the third quarter of 1966, the tank received PUREX cladding waste and contained this waste until the fourth quarter of 1970. Tank BY-103 was used for in-tank solidification from 1967 to 1968. From the fourth quarter of 1968 until the fourth quarter of 1970, the tank received organic wash waste, and beginning in the second quarter of 1970 received evaporator bottoms waste. In the first quarter of 1971, the tank contained evaporator bottoms waste from the in-tank solidification unit number two process. In 1973, tank BY-103 was found to be leaking, with a leak volume of approximately 19 kL (5 kgal) in 1973, and was declared out of service in 1973. Tank BY-103 is passively ventilated, was partially isolated in December 1982 and is awaiting interim stabilization (Anderson 1990; Brevick et al. 1994).

Tank BY-103 currently contains non-complexed waste with a total waste volume of 1,514 kL (400 kgal), which is equivalent to approximately 389 cm (153 in) of waste as measured from the baseline of the tank (Hanlon 1996).

Tank BY-103 is on the Ferrocyanide Watch List.

Near-term sampling and analysis activities are focused on either verifying or changing the Watch List tank status, and identifying any new safety issues. Should any safety issues be identified, additional analysis will occur consistent with the identified issue.

In addition to the resolution of the safety issues, it is intended that all tank waste will be subject to pretreatment and retrieval to prepare for final

storage or disposal. Presently, these long-range plans have yet to be fully identified and are, therefore, not included in this document.

2.0 PROGRAM ELEMENTS REQUIRING INFORMATION FOR TANK 241-BY-103

This section identifies the various program elements, and identifies which of these programs require characterization data from tank BY-103.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995) describes the sampling and analytical requirements that are used to screen waste tanks for unidentified safety issues. Analytical requirements for the safety screening of a tank are energetics, total alpha activity, moisture content, density and flammable gas concentration.

2.2 SPECIFIC SAFETY ISSUES

2.2.1 Ferrocyanide

This tank is on the Ferrocyanide Watch List. Sampling and analysis requirements must be performed per *Data Requirements for the Ferrocyanide Safety Issue Developed through the Data Quality Objectives Process* (Meacham et al. 1995). The primary analyses employed will determine the total fuel concentration, nickel, total cyanide, and moisture content. Further analyses will be employed to obtain secondary data such as temperature (data will be obtained from tank thermocouples), and total organic carbon (TOC) (Meacham et al. 1995).

2.2.2 Organic

This tank is not on the Organics Watch List, but recent work by the Organic Safety Program revealed a question regarding organic complexant salts. A potential problem with regard to the complexed salts exists if all the drainable liquid is pumped from the tank (Webb et al. 1995). Sampling and analysis requirements must be performed per the *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 1995). The analyses employed will determine the TOC, energetics, presence of a free organic liquid phase, and moisture content.

2.2.3 High Heat

This tank is not on the High Heat Watch List; therefore, no information needs are currently identified for this program element.

2.2.4 Flammable Gas

This tank is not on the Flammable Gas Watch List; therefore, no information needs are currently identified for this program element.

2.2.5 Vapor

All 177 underground tanks must be vapor-sampled for organic solvent screening as per *Recommendation 93-5 Implementation Plan* (DOE-RL 1996). Some tanks may require additional vapor sampling due to other program needs. These tanks may be classified into four categories: (1) those tanks which are to be rotary mode core sampled (as a consequence of the rotary sampling system exhauster permit requirements); (2) tanks on the Organic or Ferrocyanide Watch Lists; (3) tanks in C farm; and (4) tank 241-BX-104, due to vapor exposure. Information needs must satisfy *Data Quality Objectives for Tank Hazardous Vapor Safety Screening* (Osborne and Buckley 1995), and, for rotary mode only, *Rotary Core Vapor Sampling Data Quality Objective* (Price 1994) and *Data Quality Objective for Regulatory Requirements for Hazardous and Radioactive Air Emissions Sampling and Analysis* (Mulkey and Markillie 1995) as amended by *Status of the Current Understanding of the Toxic Air Pollutants (TAPS) and Hanford Tank Farm Vapor Space Characterization; Recommended Path Forward and Justification for Continued RMCS Exhauster Operations* (Laws 1996).

Tank BY-103 was vapor sampled in November 1994 in support of Osborne et al (1994).

2.2.6 Criticality

No information separate from that for the general safety issue of tank BY-103 are currently identified for this program element. However, if the general safety screening of tank BY-103 identifies a potential criticality concern, analyses for fissile materials and neutron sorbers and poisons will be performed as identified in the safety screening data quality objective (DQO).

2.3 CONTINUING OPERATIONS

2.3.1 Compatibility/Stabilization

Tank BY-103 waste was sampled to determine compatibility. Sampling and analysis requirements were performed per the *Data Quality Objectives for Tank Farms Waste Compatibility Program* (Carothers 1994). The analyses employed were transuranics such as ^{239}Pu and ^{241}Am, TOC, and heat generation as determined by the amount of ^{90}Sr and ^{137}Cs.

2.3.2 Evaporator

This section does not apply to tank BY-103.

2.4 DOUBLE-SHELL TANK WASTE ANALYSIS PLAN

This section does not apply because tank BY-103 is a single-shell tank.

2.5 DISPOSAL

2.5.1 Retrieval

Current retrieval needs (Bloom and Nguyen 1995) do not call for test samples to be taken from tank BY-103.

2.5.2 Pretreatment/Vitrification

Tank BY-103 has not been identified as a bounding tank for pretreatment/disposal process development strategy (Kupfer et al. 1995). All tanks were prioritized using the pretreatment strategy in the *Tank Waste Characterization Basis* (Brown et al. 1995) document and a portion of archive sample material could be used for pretreatment testing if available. The strategy does not require any specific analyses to be done on the samples.

2.6 HISTORICAL MODEL EVALUATION

This tank is identified as an acceptable alternative for bounding tanks BY-104, BY-105, and BY-110 in *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995). The applicability of these analyses will be determined based on these tanks' sampling and analysis and will be documented in the tank specific sample and analysis plan.

3.0 HOW INFORMATION WILL BE OBTAINED

The number of samples required to characterize a tank is a function of waste heterogeneity and the desired confidence to make a correct decision. As directed by the safety screening DQO, if inadequate information exists to determine an appropriate number of samples, two vertical profiles will be obtained. These vertical profiles may be obtained using core, auger (for shallow tanks), or grab samples. If analysis of these profiles reveals that additional profiles are necessary to meet data needs, more sample profiles will be requested. Prior to rotary sampling it is necessary to vapor sample the tank per the requirements of *Rotary Core Vapor Sampling Data Quality Objective* (Price 1994).

4.0 PRIORITY OF INFORMATION REQUIREMENTS

The following sampling events have been completed for tank BY-103: vapor sampling in November 1994; auger sampling in March 1995; and grab sampling in March 1995. Rotary mode core sampling is scheduled to begin in December 1996 (Stanton 1996). Refer to Table 4-1 for the current DQO requirements and planned sampling and analysis requirements.

Table 4-1: Integrated DQO Requirements and Priorities

Sampling Event	Applicable Issues	Sampling Requirements*	Analytical Requirements*
Vapor Sampling	-Organic Solvent Layer 93-5 Vapor Issue -Rotary Mode Sampling DQO -Hazardous Vapor DQO	Steel canisters, Triple Sorbent Traps, Sorbent Trap Systems	Flammable Gas Organic Vapors Permanent Gases
Rotary Mode Core Sampling	-Safety Screening DQO -Ferrocyanide DQO -Organic DQO	Core samples from 2 risers separated radially to the maximum extent possible Combustible gas measurement	Flammability, Energetics, Moisture, Total alpha activity, Density, Cyanide, Total organic carbon, Nickel
Auger Sampling	-Safety Screening DQO	Two auger samples	Flammability, Energetics, Moisture, Total alpha activity, Density
Grab Sampling	-Compatibility DQO	3 grab samples	Energetics, Moisture, Anions, Cations, Radionuclides, specific gravity, pH, Separable Organics, TOC, Total inorganic carbon, Percent solids

* Consult each applicable DQO in force at the time for sampling and analytical requirements.

5.0 WHEN INFORMATION WILL BE AVAILABLE

According to Stanton (1996) data are expected to be available from the rotary mode core sampling event for tank BY-103 in April 1997. The vapor, auger, and grab sampling data are available. The rotary mode core time may be altered if the sampling schedule changes.

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