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Tank 241-U-108 Tank Characterization Plan

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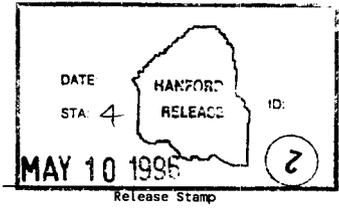
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Abstract: This document is a plan that identifies the information needed to address relevant issues concerning short-term and long-term storage and long-term management of single-shell tank 241-U-108.

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Tank 241-U-108 Tank Characterization Plan

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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-U-108 (U-108). It should be understood that the various needs and issues surrounding tank U-108 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 U-108. 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 U-108 was constructed between 1943 and 1944 and was put into service in January 1949. Initially tank U-108 received metal waste from the first quarter of 1949 until the fourth quarter of 1956. The tank was sluiced during the second quarter and third quarters and declared empty in the fourth quarter of 1956. The tank received coating waste from the first quarter of 1957 until the fourth quarter of 1968. During the first quarter of 1969 the tank began to receive evaporator bottoms. From the third quarter of 1972 until the second quarter of 1976, the tank underwent numerous transfers of many waste types. From the third quarter of 1976 until the first quarter of 1978, the tank contained evaporator feed, residual evaporator liquor and Hanford defense residual liquor (Brevick et al. 1994). From the second quarter of 1978 until the third quarter of 1979, the tank received partial neutralized feed waste. In the fourth quarter of 1980, the contents of the tank was classified as non-complexed (Anderson 1990). The tank is sound, was removed from service and designated inactive in 1979. Tank U-108 is passively ventilated and was partially isolated in December 1982. The tank is awaiting interim stabilization (Brevick et al. 1994).

This tank currently contains a total volume of 1,771 kL (468 gal), which is equivalent to 421 cm (166 in) of waste as measured from the baseline of the tank (Hanlon 1996).

This tank is on the Flammable Gas Watch list.

Near-term sampling and analysis activities are focused on 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-U-108

This section identifies the various program elements, and identifies which of these programs require characterization data from tank U-108.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Dukelew 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 not on the Ferrocyanide Watch List; therefore, no information needs are currently identified for this program element.

2.2.2 Organic

This tank is not on the Organic 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 total organic carbon (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 on the Flammable Gas Watch List. The applicable data quality objective (DQO) for this safety issue is *Flammable Gas Safety Program: Data Requirements for Core Sample Analysis Developed through the Data Quality Objectives Process* (McDuffie 1995). However, the DQO states that analysis of core sample from the single shell tanks that are part of the Flammable Gas Watch List is not planned at this time.

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 U-108 was vapor sampled in August 1995 in support of Osborne et al. (1995).

2.2.6 Criticality

No information separate from that for the general safety issue of tank U-108 are currently identified for this program element. However, if the general safety screening of tank U-108 identifies a potential criticality concern, analyses for fissile materials and neutron sorbers and poisons will be performed as identified in the safety screening DQO.

2.3 CONTINUING OPERATIONS

2.3.1 Compatibility/Stabilization

Tank U-108 waste was sampled to determine compatibility. Sampling and analysis requirements were performed per the *Data Quality Objectives for Tank Farms Waste Compatibility Program* (Fowler 1995). The analyses employed were for 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 U-108.

2.4 DOUBLE-SHELL TANK WASTE ANALYSIS PLAN

This section does not apply because tank U-108 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 U-108.

2.5.2 Pretreatment/Vitrification

Tank U-108 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 tank S-101 in *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995). The applicability of these analyses will be determined based on tank U-108 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

Vapor sampling was completed in August 1995. Grab sampling was completed in May 1995. Push mode core sampling was completed in May 1996 (Stanton 1996). Refer to Table 4-1 for current DQO requirements and planned sampling and analytical 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
Push Mode Core Sampling	-Safety Screening DQO -Organic DQO -Flammable Gas (See Section 2.2.4)	Core samples from 2 risers separated radially to the maximum extent possible Combustible gas measurement	Flammability, Energetics, Moisture, Total alpha activity, Density, TOC, Separable organics
Grab Sampling	-Compatibility DQO	Grab samples	Energetics, Moisture, Anions, Cations, Radionuclides, Specific gravity, TOC, Total inorganic carbon, pH, Separable organics, Percent solids

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

5.0 WHEN INFORMATION WILL BE AVAILABLE

Data for the rotary mode core sampling event for tank U-108 is expected in September 1996. Data are available for the August 1995 vapor sampling and the May 1995 grab sampling.

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