SUPPORTING DOCUMENT

1. Total Pages 36

2. Title
Plutonium Finishing Plant Aqueous Waste Disposal Facility Tank System Integrity Assessment Plan

3. Number
WHC-SD-CP-WP-011

4. Rev. No.
0

5. Key Words
Plutonium Finsihing Plant, Tank System Integrity Assessment

6. Author
Ana R. Sherwood
Name (Type or Print)
Ana R. Sherwood
Signature
81140 / KE828
Organization/Charge Code

7. Abstract

This integrity assessment plan summarizes the information pertinent to the PFP dangerous waste tank systems and ancillary equipment integrity assessment.

FEB 1992
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V. Birkland 9/26/91

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Plutonium Finishing Plant
Aqueous Waste Disposal Facility
TANK SYSTEM INTEGRITY ASSESSMENT PLAN

Prepared By: 9/23/91
A. R. Sherwood, Senior Engineer Date
Facility Compliance

Approved By: 9/23/91
L. A. Garner, Manager Date
PFP Environmental Compliance

Approved By: 9/23/91
E. C. Vogt, Manager Date
Manager Plutonium Finishing Plant

INDEPENDENT, QUALIFIED
REGISTERED PROFESSIONAL ENGINEER
(IQRPE)

APPROVAL OF

PLUTONIUM FINISHING PLANT
AQUEOUS WASTE DISPOSAL FACILITY
TANK SYSTEM INTEGRITY ASSESSMENT PLAN

I have reviewed this document and believe the inspections, tests and analyses described herein to be sufficient for the assessment of the integrity of the tank systems. This review and belief is contingent upon review of individual testing plans for each component that will be developed as a portion of this plan. I understand the integrity assessment will be performed in accordance to this Integrity Assessment Plan and that as the designated IQRPE I will be asked to certify the reports generated by this assessment in accordance with the certification statement in this document. I also understand that the inspections, tests and analyses described herein are based on currently available information and are subject to change during the performance of this assessment.

ROY F. WESTON, INC.

Frank Monahan 19945 — 9/24/91

Washington State PE Registration # — Date

C. Paul Warbington — 9/24/91

Concurred: C. Paul Warbington P.E. — Date

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LIST OF TERMS

ANN	aluminum nitrate nonahydrate
CAM	continuous air monitor
CCTV	closed-circuit television
DOE	U.S. Department of Energy
HF	hydrofluoric
HSW	high salt waste
IAP	Integrity Assessment Plan
IAR	Integrity Assessment Report
IQRPE	Independent, Qualified, Registered Professional Engineer
KOH	potassium hydroxide
LSW	low salt waste
PFP	Plutonium Finishing Plant
PFP EL	Plutonium Finishing Plant Engineering Laboratory
PPSL	Plutonium Process Support Laboratory
PRF	Plutonium Reclamation Facility
QA	Quality Assurance
RMC	Remote Mechanical "C" (Line)
TBP	tributyl phosphate
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

METRIC CONVERSION CHART		
1 inch	=	2.54 centimeters
1 gallon	=	3.79 liters

$$1\ ^\circ F = \left(\frac{9}{5}\ ^\circ C\right) + 32$$

PLUTONIUM FINISHING PLANT
AQUEOUS WASTE DISPOSAL FACILITY
TANK SYSTEM INTEGRITY ASSESSMENT PLAN

1.0 INTRODUCTION

The Westinghouse Hanford Company (Westinghouse Hanford) manages tank systems for the U.S. Department of Energy (DOE) Field Office, Richland, that contain dangerous waste constituents as defined by the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-040 (WAC 1990). Chapter 173-303-640(2) of the WAC requires the performance of integrity assessments for each existing tank system that stores dangerous waste.

This Integrity Assessment Plan (IAP) identifies all tasks that will be performed during integrity assessment of the Plutonium Finishing Plant (PFP) dangerous waste tank systems.

2.0 SCOPE

2.1 OBJECTIVES

This IAP describes the inspections, tests, and analyses required to assess the integrity of the PFP dangerous waste tank systems and provides sufficient information for adequate budgeting and control of the integrity assessment program. The inspections, tests, and analyses described in this IAP provide the necessary information to permit the Independent, Qualified, Registered Professional Engineer (IQRPE) to certify the integrity assessment results.

2.1.1 Items to be Subjected to Integrity Assessment

The tank systems to be included in this assessment are as follows:

Tank system description	Specific tank systems
Plutonium Reclamation Facility Canyon Tank System (236-Z Building): dangerous waste tanks, ancillary equipment (see Table 1 for scope boundaries upstream of tanks) and secondary containment	TK-19, TK-39, TK-40, and TK-WM-1, D-5 and D-6

Tank system description	Specific tank systems
234-5Z Facility Waste Piping: ancillary equipment (from the first floor to the main tunnels) and secondary containment (tunnels only)	D-3, D-4, D-5, D-6, and D-8
Waste Piping from the 234-5Z Facility to the 241-Z Facility: ancillary equipment (located in underground trench)	D-4, D-5, D-6, and D-8
241-Z Waste Retention Facility: dangerous waste tanks and ancillary equipment (within facility only)	TK-D-4, TK-D-5, TK-D-7, TK-D-8, and Overflow Tank

2.1.2 Items not Included in This Integrity Assessment Plan

The items listed below do not conform to current design requirements. Engineering studies or construction projects are being coordinated for eventual system replacement or upgrade. It is anticipated that these system replacements or upgrades will not be completed by the time the PFP integrity assessment is performed. Therefore, this IAP does not address the assessment of the items listed below.

- Secondary containment of the process drains on the first floor of the 234-5Z Building--Portions of these lines are located in gloveboxes. However, other sections of this piping have no secondary containment. There is no leak detection available for these lines; a leak would have to be observed visually or trigger a continuous air monitor (CAM) alarms in order to be detected.

- Secondary containment of the direct buried process drains beneath the 234-5Z Building--Drawings indicate that portions of the pipelines may also lack secondary containment at the point where they exit from the first floor and enter the basement piping trenches (in this area short sections of the pipelines may extend beyond the boundaries of the trenches).

- The 234-5Z Building pipe trenches--The concrete trenches were originally painted; but, can no longer be said to have chemically impervious coatings. No evidence has been found to indicate that the trenches are sloped. Due to past contamination, some trenches have been sealed with stainless steel doors and have viewing windows built in, so only limited viewing is possible as a result. A few of the trenches have been completely filled with concrete.

  There is no leak detection present in the pipe trenches; a release of radioactive materials from a pipe in one of the open trenches would have to be observed visually in the main tunnels or trigger the CAM alarms located in the main tunnels in order to be detected. A pipe leak within a trench that is filled with concrete or has a

stainless steel barrier in place is not likely to trigger a monitor alarm. Such a leak would have to be observed visually through one of the viewing ports.

- The underground trench from 234-5Z to 241-Z--The trench consists of concrete which had been coated with a chemical-resistant coating during installation. Due to its age and a leak of waste solutions during the 1960s, the trench coating is assumed to be in poor condition. This trench is due to be replaced with an encased piping system in 1995.

- The 8-in. spare D-6 pipeline within the underground trench from 234-5Z to 241-Z--This spare pipeline will not be included in the assessment since it is due to be replaced with an encased piping system in 1995.

- The 241-Z Facility's tank vaults--The tank vaults are made of concrete that was coated with a chemical-resistant material when construction took place. The present condition of this coating and the concrete itself is believed to be poor based on photographs that have been taken of the upper walls of the structure. The vaults are due for an upgrade in 1995.

- The 241-Z Facility's dangerous waste D-6 tank--This tank had received hydrofluoric acid. During 1972, TK-D-6 was found to be leaking and removed from service.

- The 2736-ZB Building dangerous waste piping--This transfer line (and its feed line from the 232-Z Building) is no longer in use and has been deactivated.

2.2 DELIVERABLES

The PFP dangerous waste tank system Integrity Assessment Report (IAR) will be produced as a result of implementing this IAP. The IAR will document the results of the integrity assessment and will contain analyses of the following items:

- Suitability of tank system design compared to current standards

- Waste characteristics with respect to materials compatibility and corrosion

- Inspections and tests conducted to verify the integrity of the tanks and ancillary equipment.

Based on the analyses, the date for the next integrity assessment will be selected.

Information will be provided to the IQRPE during the integrity assessment work. The IQRPE will comment on the methodologies chosen and all inspection and test plans before their use to perform the integrity assessment work, and will evaluate the adequacy of the results.

3.0 SYSTEM DESCRIPTION

3.1 GENERAL

Dangerous waste is generated in the Plutonium Reclamation Facility (PRF) (236-Z Building) and in the 234-5Z Facility. It is then transferred to the 241-Z Waste Retention Facility before being transferred to tank farms.

The 236-Z Building is connected to the south side of the 234-5Z Building by the 242-Z Waste Treatment Facility (Figure 1). Within the building are located various process and waste vessels that are used in the plutonium extraction process. Waste tanks TK-19, TK-39, TK-40, and TK-WM-1 are drained to the 241-Z Facility via a piping system that proceeds through the 242-Z Facility to an exterior underground trench at the south end of the 234-5Z Building. At this location the dangerous waste piping from the 236-Z Building merges with piping from the 234-5Z Building and both systems continue on to the 241-Z Facility (Figure 2).

Numerous drains on the first floor of the 234-5Z Building remove waste liquids from the Remote Mechanical "C" (RMC) Line, the PFP Engineering Laboratory (PFP EL), and the Plutonium Process Support Laboratory (PPSL). These drains penetrate the concrete on the first floor and proceed into the basement pipe trenches and tunnels. This piping then joins the PRF piping (mentioned above) on the south side of the 234-5Z Building and proceeds to the 241-Z Facility through an underground concrete trench.

The 241-Z facility is a buried structure with its top approximately at grade level consisting of five separate enclosures (including the D-6 vault), each containing a 4,200-gal dangerous waste tank. These tanks are used for intermediate storage and neutralization of the liquid wastes generated in the 236-Z and 234-5Z Buildings. Vault D-7 also houses a second tank, the facility's overflow tank. The buried structure is covered by a pre-engineered corrugated metal building that houses the ventilation filter enclosures and instrument racks.

3.2 PLUTONIUM RECLAMATION FACILITY CANYON TANKS (236-Z BUILDING)

The PRF dangerous waste tanks, TK-19, TK-39, TK-40, and TK-WM-1, are located within the PRF canyon. The canyon, a 3-story room in the center of the 236-Z Building, is furnished with a stainless steel floor liner that extends approximately 8 in. up the wall. The dangerous waste tanks are a four-barrel assembly (Drawing H-2-28418) of long, narrow, upright, metal tanks that are used in the plutonium extraction process. These tanks and their ancillary equipment are viewable through the canyon windows and gloveboxes.

Small diameter, low-volume tanks are used throughout this area to avoid approaching criticality. A side benefit is that any failure of a tank system component would result in a relatively low volume of spilled material that would be adequately contained and not be released into the uncontrolled environment outside the facility.

Figure 1. Plutonium Finishing Plant Complex.

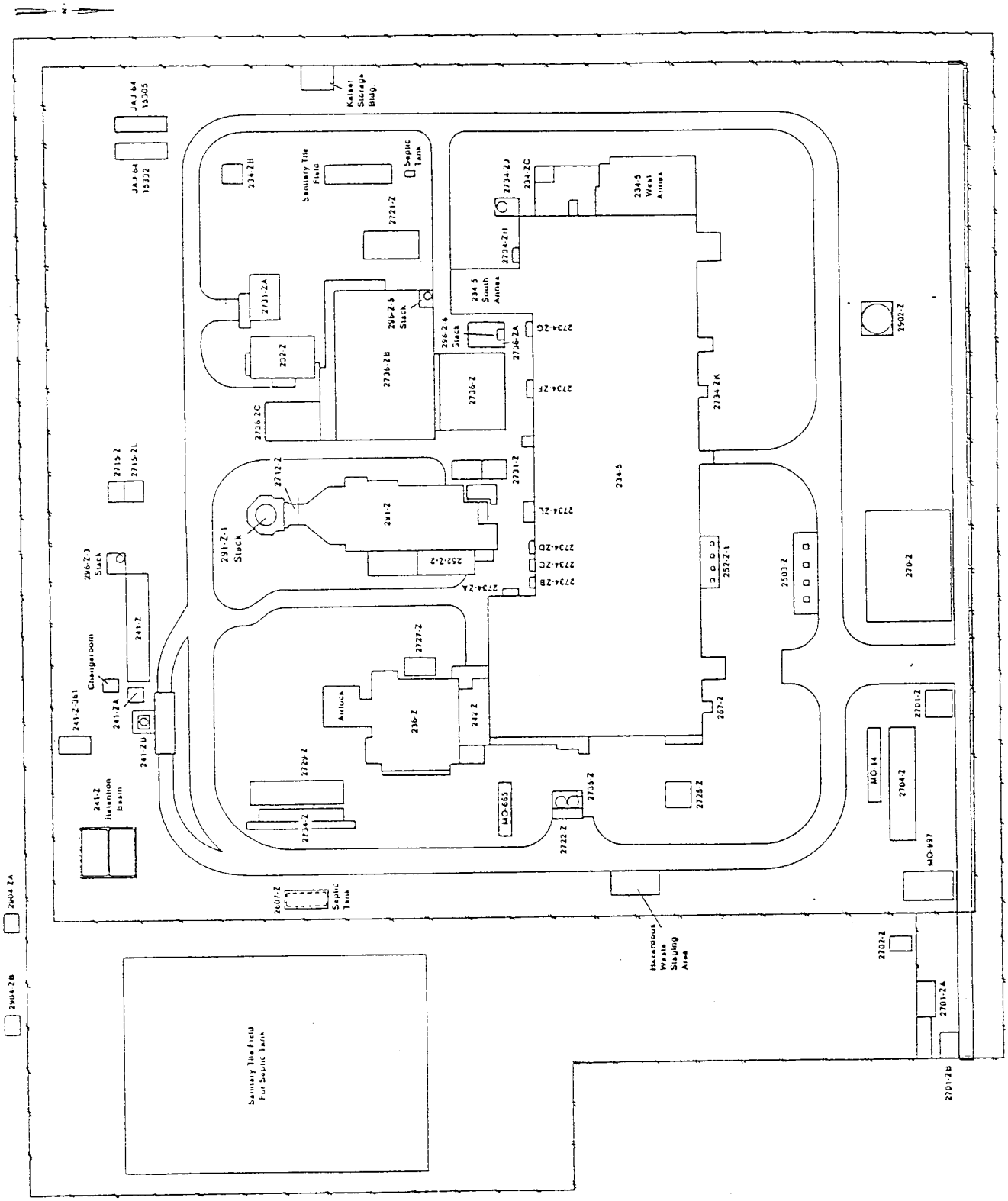
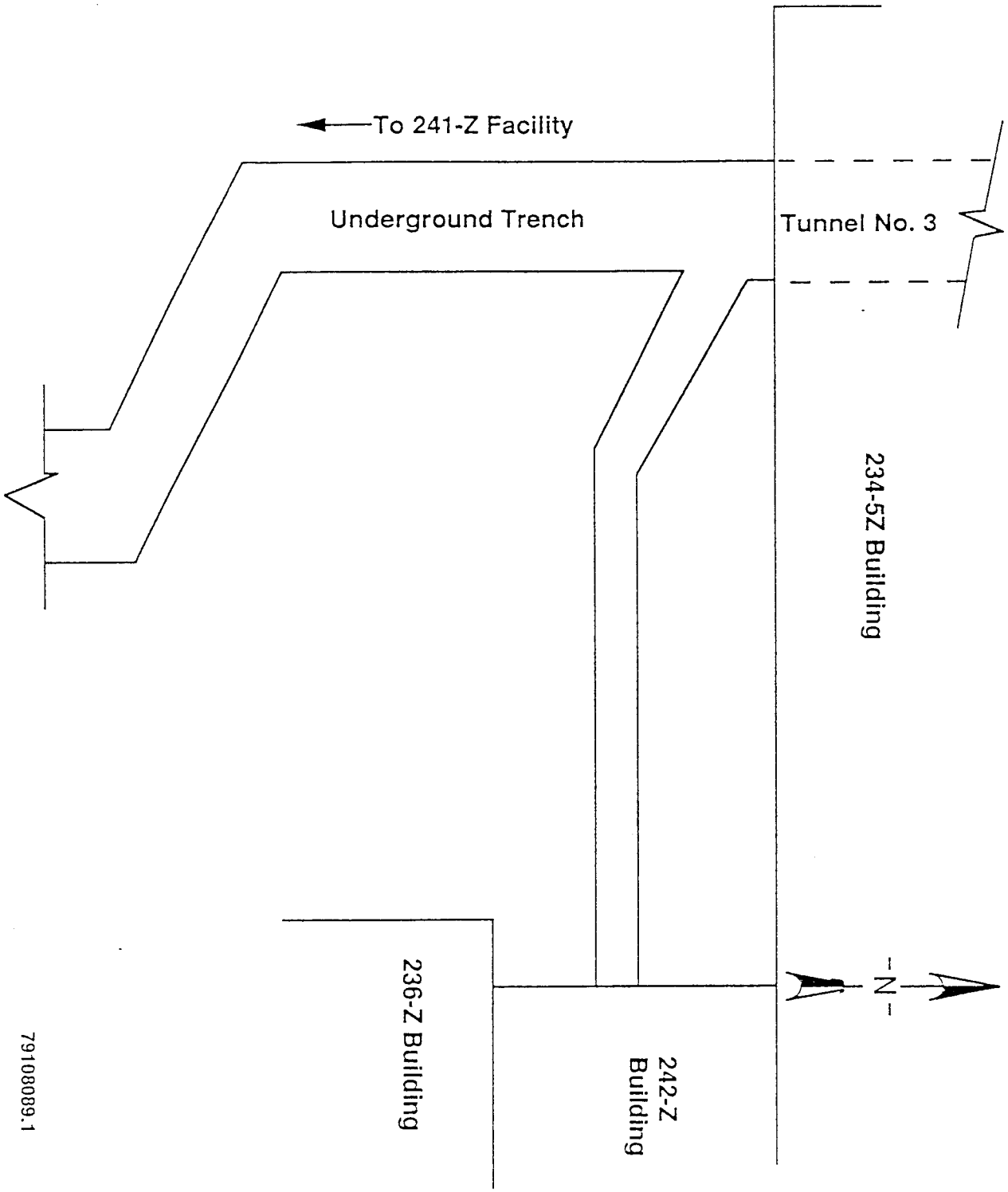


Figure 2. Underground Trench.



Ancillary equipment, upon leaving the gloveboxes, feeds into pipelines D-5 and D-6 and proceeds through the 242-Z Building to the 234-5Z Building by means of an underground trench (Drawing H-2-43517). The D-5 and D-6 piping then joins the 234-5Z piping at the south end of Tunnel No. 3 of the 234-5Z Building. Note that the D-5 piping is routed to both the D-5 and the D-8 tanks in the 241-Z Facility. The D-6 pipe is routed to tank D-4 in the 241-Z Facility.

Secondary containment is provided by the canyon liner, gloveboxes, and underground trench.

3.3 234-5Z FACILITY WASTE PIPING

In the 234-5Z Building, waste drainage piping originates on the first floor and proceeds though the concrete floor into the basement level. This network of piping runs through the tunnels and pipe trenches (Figures 3a and 3b) and is used to deliver dangerous waste to the tanks in the 241-Z Facility.

As in the PRF, pipes within the main pipe tunnels are also labeled D-4, D-5, etc. However, these lines are not necessarily the same as those in the PRF; i.e., the D-5 line in the PRF is different from the D-5 line in 234-5Z.

In 234-5Z, the D-3 (which ties into the D-6 line), D-4, D-5, and D-6 lines are routed to tank D-4 in the 241-Z Facility. Line D-8 is routed to tank D-8 in the 241-Z Facility. The concrete pipe tunnels act as secondary containment for these transfer lines.

3.4 WASTE PIPING FROM 234-5Z TO 241-Z

Waste piping from the 234-5Z and 236-Z Buildings converge at the south end of Tunnel No. 3 in the basement of the 234-5Z Building. This piping, D-4, D-5, D-6, and D-8, then proceeds south to the 241-Z Waste Retention Facility via a sloped, underground trench. Once at the 241-Z Facility, the below-grade trench branches east and west along the north side of the facility. Individual pipes penetrate through the facility and proceed to the destination tanks inside individual vaults.

3.5 241-Z WASTE RETENTION FACILITY

Several dangerous waste tanks are located within the 241-Z Waste Retention Facility in separate underground vaults. The tanks are TK-D-4, TK-D-5, TK-D-6, TK-D-7, and TK-D-8 and are each capable of holding 4,200 gal of waste. A sixth tank, the facility's 212-gal (approximately) overflow tank, is also located in vault D-7. In 1972, TK-D-6 was found to be leaking and was removed from service. Tank TK-D-6's inlet piping was rerouted to TK-D-4. All tanks but TK-D-6 are still active and are to be assessed.

Aqueous wastes from processes and laboratories in the PFP complex are received at TK-D-4. Wastes collected in TK-D-4 are batch transferred to the D-7 tank for sampling and analysis to determine their composition. TK-D-8 receives aqueous wastes from the 236-Z solvent extraction and organic cleanup

Figure 3a. 234-5Z East Basement Level Waste Piping Tunnel.

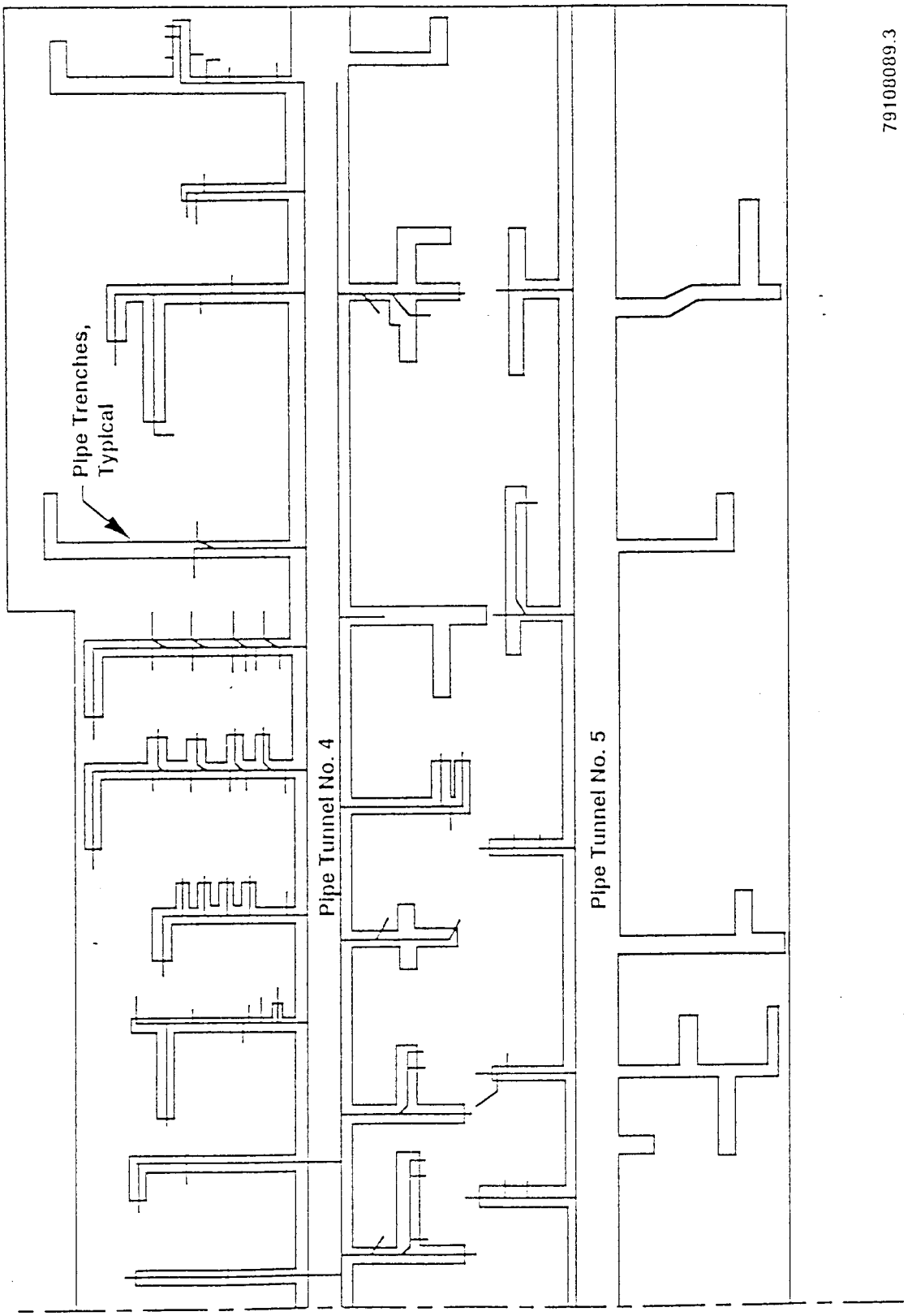
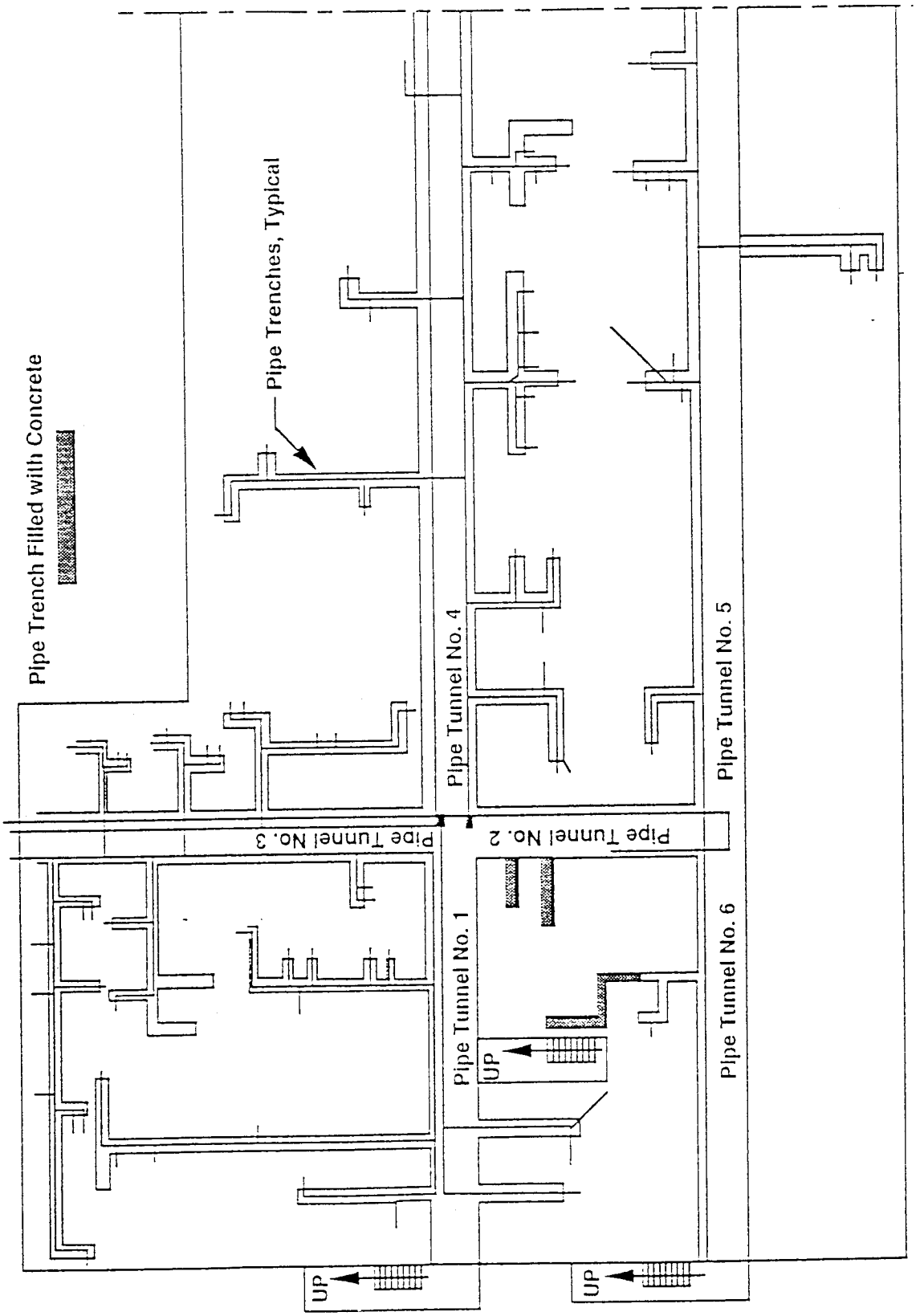


Figure 3b. 235-5Z West Basement Level Waste Piping Tunnel.



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processes. In past operations TK-D-8 has received aqueous wastes from the RMC Line potassium hydroxide (KOH) scrubber. These wastes are sampled and analyzed to determine their composition before transfer to the D-5 tank for neutralization and transfer to tank farms. If the D-8 tank is not available, solvent extraction wastes can be routed to TK-D-5 for the neutralization, sampling, and analysis before transfer to tank farms. The TK-D-5 is equipped with a pump and steam jet for use in waste transfer, with steam jet normally used only for transfer of the pump heel. The dangerous waste tanks are provided with overflow piping that is routed to the overflow tank.

4.0 DESIGN AND OPERATING INFORMATION RELEVANT TO REQUIREMENTS FOR THE INTEGRITY ASSESSMENT

The tank integrity assessment determines whether the tank system is or is not leaking and whether it is unfit for use (WAC 173-303-640[2][a]). It also determines whether the tank system is adequately designed and has sufficient structural strength and compatibility with the waste(s) that are being stored or treated within (WAC 173-303-640[2][c]). The following are discussed in this section:

- Design standard(s) of construction (if available)
- Dangerous characteristics of the waste(s) that have been and will be handled
- Existing corrosion protection measures
- Documented age (if available, otherwise an estimate)
- Tank system leak test, internal inspection or other tank system integrity examination.

4.1 PLUTONIUM RECLAMATION FACILITY CANYON TANKS (236-Z BUILDING)

4.1.1 Design Codes and Standards

The PRF dangerous waste tanks are constructed of 5-in. diameter, schedule 40S, type 304L stainless steel pipe. See Table 1 for tank description and ancillary equipment scope boundaries.

Ancillary equipment construction materials are primarily stainless steel and are governed by HWS-8114, pipe code M-21. See Table 2 for piping description.

Table 1. Plutonium Finishing Plant Dangerous Waste Tanks. (2 sheets)

Location	Tank	Description	Capacity	Anc. Eqt. Boundaries
	TK-D-8	120-in. OD, 3/8-in. thick AISI type 347 stainless steel	4,200 gal	Same as above
	Overflow tank	30-in. OD, 3/16-in. thick Type 304L stainless steel ASTM A240	212 gal (approx)	Same as above

AISI = American Iron and Steel Institute
OD = outside diameter
MT = miscellaneous treatment
CAW = CA column waste.

Table 2. Plutonium Finishing Plant Dangerous Waste Tank Ancillary Equipment.

Location	Pipe	Operating pressure	Maximum temperature	Pipe material
236-Z	D-5	Gravity		ASTM A312-59T, 304L stainless steel, schedule 40S
	D-6	Gravity		ASTM A312-59T, 304L stainless steel, schedule 40S
	Piping material in accordance with HWS-8114, Pipe Code M-21			
234-5Z	D-3	Gravity	200 °F	AISI, 347 stainless steel, schedule 40S
	D-4	Gravity	200 °F	AISI, 347 stainless steel, schedule 40S
	D-5	Gravity	200 °F	AISI, 347 stainless steel, schedule 40S
	D-6	Gravity	200 °F	AISI, 347 stainless steel, schedule 40S
	D-8	Gravity	200 °F	AISI, 347 stainless steel, schedule 40S
	Piping supports in accordance with HWS-3165, standard B4-35 Piping material in accordance with HWS-3165, Pipe Code P-86			

AISI = American Iron and steel Institute.
ASTM = American Society for Testing Material.

4.1.3 Corrosion Protection

Most of the pipe lines encountered during this integrity assessment are butt-welded and flanged piping systems that have been fabricated of either 347 or 304L alloy stainless steel. Originally, type 347 stainless steel alloy was used since it inhibited the formation of chromium carbide. Once type 304L stainless steel alloy which prevents the formation of chromium carbide became available, it replaced type 347 stainless steel as the preferred alloy. Both these stainless steel materials and their characteristics enable the alloys to exhibit excellent corrosion resistance.

Corrosion in the gloveboxes is minimized by the type 304L stainless steel material of the glovebox.

The PRF dangerous waste tanks and most of the ancillary piping and equipment are fabricated from type 304L stainless steel. The main containment structure in the PRF canyon is the floor liner. A stainless steel, type 304L, 16-gage plate (0.0625 in.) is used to line the floor (and approximately 8 in. of the wall) to aid in preventing corrosion attack on the concrete structure.

4.1.4 System Age

Design of the 236-Z Building began in 1960. Construction was completed in 1964. The PRF dangerous waste tanks and ancillary equipment were put into operation at approximately that same time.

4.1.5 Integrity Examination

Leakage of the tank system within the canyon and gloveboxes would be indicated by the tank's weight factor sensing elements which are routinely monitored (twice daily). Liquid level changes equivalent to less than 1 gallon can be detected with these instruments. The tank system is also outfitted with high/low automatic alarms. Any material that may be spilled onto the canyon floor liner can be readily removed by the canyon slurp system (a suction liquid-removal system). Leaks of plutonium-bearing materials into areas outside the canyon and gloveboxes would require visual detection.

The only leak detection available in the underground trench is provided by the 241-Z sump alarms. A floor drain located at the west end of the trench drains into the underground trench between the 234-5Z Building and the 241-Z Facility (Drawing H-2-43518). The underground trench, between the 234-5Z Building and the 241-Z Facility, in turn drains into the 241-Z TK-D-6 vault sump and triggers an alarm. A steam jet is located in the sump that can move spilled material to the TK-D-4 tank.

Accessibility into the canyon is limited. However, the canyon crane is available to move the dangerous waste tanks to a maintenance area where tests can take place. Piping within the underground trench that leads to the 234-5Z Building also has limited accessibility.

4.2 234-5Z FACILITY WASTE PIPING

4.2.1 Design Codes and Standards

Original installation of the piping within the 234-5Z Building specified schedule 40S, type 347 stainless steel pipe (see Table 2). Later repairs used schedule 40S, type 304L stainless steel piping. All waste piping systems examined in this IAP are butt-welded systems.

Secondary containment is provided by the building tunnels. The floor is sloped to a gutter that runs along one wall of each tunnel. This gutter in turn slopes to one or more sumps. Piping tunnels may lack a chemically impervious coating, do lack leak detection, and have some expansion joints within the area. Assessment activities will determine acceptable methods to resolve this condition (daily inspection in lieu of compliant secondary containment may be required).

4.2.2 Waste Characteristics

Processes that historically generated waste that has flowed through the pipes in the 234-5Z Building have not been fully documented. However, the chemical composition of future processes is not expected to be significantly different from that of past processes.

Waste streams generated by the 234-5Z Building operations have been a mixture of HSW from the RMC Line KOH scrubber and LSW from the PFP EL, the PPSL, and the 236-Z filtrate evaporator. The KOH scrubber is utilized to neutralize excess HF gas used during the RMC Line fluorination process. The scrubber stream is a highly caustic solution containing potassium fluoride and unreacted KOH. Originally using ANN to complex the fluoride ion and later using KOH in the late 1980s, a water jet had been used to remove HF from the fluorinator offgas before incorporating the neutralization process (KOH scrubber) in 1972. This earlier practice may have exposed the waste lines to fluoride ion in a highly corrosive form. The HF gas will not be used during future RMC Line operations, thereby eliminating a potential source of fluoride ion in the waste stream.

The LSW generated by the PFP EL and PPSL contains trace amounts of HNO_3. Based on historical short-term variances from planned operating conditions, nitric acid is considered the primary corrosion agent.

4.2.3 Corrosion Protection

Corrosion protection for the waste piping in the 234-5Z Building is provided by the piping material which is either type 347 or 304L stainless steel.

Each of the tank's vaults in the 241-Z Facility is equipped with a conductivity probe in low-end sumps. The probe is designed to determine the presence of a conductive solution. Any liquid reaching one of these locations will sound an alarm.

Piping within the trench is not accessible. However, the piping will be assessed once it enters the 241-Z Facility vaults.

4.4 241-Z WASTE RETENTION FACILITY

4.4.1 Design Codes and Standards

The 241-Z Facility dangerous waste tanks are 10 ft in diameter and can hold 8 ft of liquid. They are constructed primarily of 3/8-in. thick, type 347 stainless steel (see Table 1). The overflow tank is 30-in. in diameter and holds approximately 212 gal.

4.4.2 Waste Characteristics

The chemical makeup of the waste is a mixture of waste from the 236-Z and 234-5Z Buildings (see Sections 4.1.2 and 4.2.2).

4.4.3 Corrosion Protection

Corrosion protection on tanks TK-D-4, TK-D-5, TK-D-7, TK-D-8 and on the overflow tank is provided by the construction material; i.e., type 347 stainless steel for the dangerous waste tanks and type 304L stainless steel for the overflow tank.

4.4.4 System Age

Design on the 241-Z Facility began in 1947. The facility was constructed by 1949. The dangerous waste tanks and ancillary equipment are considered to have been installed at approximately the same time. The overflow tank was installed in approximately 1974.

4.4.5 Integrity Examination

Leakage is indicated in two ways on the 241-Z Facility's dangerous waste tanks. First, each of these tanks is equipped with weight factor metering which is capable of detecting any change in the tank level. The second method is provided by the leak detectors located within the vaults. Losses of less than 1 gallon can be detected in tanks D-4, D-5, D-7, and D-8. Losses of less than 1/4 gallon can be detected in the overflow tank. Spilled material will flow to the low end of the vault into a sump which is equipped with a conductivity probe that would trigger an alarm. Steam jets are located in the sumps which can move spilled material to the TK-D-4 tank.

Leakage of the overflow tank would be detected by the sump alarms mentioned above.

This tank system is not visually accessible on a routine basis. The tank vaults normally are kept closed with manhole covers. Only when tank manhole covers are removed and replaced with plexiglass can the top of the tanks be seen. Due to grating near the top of the tanks, it is not possible to see the lower portions of the tanks or the surface of the secondary containment structure. However, it is possible for an entry to be made into the tank vaults. Such an entry is periodically made for ultrasonic testing of the tank wall thickness.

5.0 ENGINEERING TASKS REQUIRED TO COMPLETE THE INTEGRITY ASSESSMENT

The integrity assessments for the PFP dangerous waste tank systems must determine if the tank systems have sufficient structural strength and compatibility with the waste they contain to ensure they will not collapse, rupture, or fail. The following sections describe the assessments that will be made to satisfy the requirements for the PFP tank systems. After the initial integrity assessment is completed, a schedule to identify requirements for future integrity assessments and conduct the assessments will be developed.

Quality Assurance (QA) will verify that only qualified and trained Westinghouse Hanford personnel will perform the inspections, tests, and analyses necessary to prepare an IAR. In addition, the completed IAR will be reviewed and certified by an IQRPE in accordance with the certification statement in Section 6.0.

The tank systems that will be covered in this IAP are listed in Section 2.1.1, and system components to be tested are identified in Section 5.3. Integrity assessment activities will, at a minimum, consider the following items:

- Design codes and standards
- Waste characteristics
- Corrosion protection
- Tank system age
- Tank system inspections and tests.

5.1 DESIGN STANDARDS

The design must withstand standard operating conditions and abnormal conditions. The evaluation of design standards is based on the premise that

the design for past and current operating conditions will be proven to be adequate by the tests and inspections planned and by the evaluation of time-dependent failure mechanisms. The design adequacy relative to the abnormal conditions (infrequent events) imposed by the design specification will be proven by design calculations or use of experience data. Changes in design standards since the time of the original design will also be addressed in the evaluation.

- Past and future operating conditions (pressure, temperature, and mechanical loads) will be compared with design conditions to ensure the tank system (including secondary containment) is operated within the original design envelope.

- Operating records, visual inspection, and test results will be reviewed to assess the effects of fatigue, creep, radiation, and corrosion on the remaining life of the tank system.

- Planned changes to more severe operating conditions that are relevant to structural integrity (pressure, temperature, chemical composition, and mechanical loads) will be evaluated by analysis and tests.

- Design documents will be reviewed to ensure that abnormal conditions required to be evaluated by the design specification have been considered in the design. In the absence of seismic design analysis, industry seismic experience data and data from past qualification programs may be used in lieu of performing calculations.

- Significant changes in site-specific loads and structural integrity requirements of design standards since the system was designed will be identified. Actions required to meet current design standards will be identified. A schedule for completion of the required actions will be prepared.

5.2 WASTE CHARACTERISTICS, COMPATIBILITY, AND CORROSION PROTECTION

An analysis will be made to demonstrate by a combination of material behavior analyses and historical data that the PFP tank systems either have not experienced general corrosion of stress corrosion cracking damage from the waste (total compatibility) or have experienced damage at a slow rate (tank system components have a finite life). The waste handled by each of the tank systems will be reviewed and compared with corrosion protection available. Information obtained during the inspections and tests defined in Section 5.3 also will be incorporated into this determination. An assessment will be performed that will permit conclusions to be made about current conditions and life expectancy of the PFP tank systems.

5.3 INTEGRITY EXAMINATION

5.3.1 Plutonium Reclamation Facility Canyon Tanks (236-Z Building)

The PRF dangerous waste tanks, TK-19, TK-39, TK-40, and TK-WM-1, and their ancillary equipment (see Table 1 for scope boundaries upstream of tanks) up to the point where the ancillary waste piping joins the process waste piping from 234-5Z, will have the integrity assessment activities described below performed.

- A visual examination of each dangerous waste tank assembly, the ancillary equipment within the canyon and gloveboxes, the gloveboxes themselves, the D-5 and D-6 lines (portions may require closed-circuit television [CCTV] inspection), the tank and piping supports, the canyon liner, and the trench between 236-Z and 234-5Z (may require CCTV inspection). Acceptance Criteria: No evidence of localized degradation compared to the overall appearance of adjacent areas being examined.

- A leak test of each dangerous waste tank assembly. Acceptance Criteria: No evidence of a leak.

- An ultrasonic inspection to check for wall thinning of the D-5 and D-6 lines. Perform the ultrasonic inspection immediately after the first bend as the lines enter the south end of Tunnel No. 3 of the 234-5Z Building. Acceptance Criteria: No evidence of wall thinning that reduces the effective wall thickness below the minimum wall thickness required by the applicable design code.

- A test of all leak detection systems. Acceptance Criteria: Leak detection functioning properly.

5.3.2 234-5Z Facility Waste Piping

The 234-5Z Facility waste pipe lines D-4, D-5, D-6, and D-8 and their tributaries from the first floor of the 234-5Z Building up to the point where the piping exits the building at the south end of Tunnel No. 3 will have the integrity assessment activities described below performed.

- A visual examination of the accessible portions of the above mentioned pipelines, pipe supports and pipe tunnels. Piping within pipe trenches may require CCTV inspection. Acceptance Criteria: No evidence of localized degradation compared to the overall appearance of adjacent areas being examined.

- An ultrasonic inspection to check for wall thinning of above mentioned lines. Piping from the pipe trenches will be ultrasonically examined at the first bend after exiting the trenches. Evaluation of piping within the tunnels may make use of results from any recent ultrasonic testing of the D-4, D-5, D-6, and

D-8 lines which will fulfill these ultrasonic inspection requirements. Acceptance Criteria: No evidence of wall thinning that reduces the effective wall thickness below the minimum wall thickness required by the applicable design code.

5.3.3 Waste Piping from 234-5Z to 241-Z

Pipe lines D-4, D-5, D-6, and D-8, as they travel through the underground trench between the 234-5Z and 241-Z Buildings, will have the integrity assessment activity described below performed.

- An ultrasonic inspection to check for wall thinning of these pipes. Since pipes within the underground trench are not accessible, perform the ultrasonic test on the bend of each pipe as it enters its respective 241-Z tank vault. Acceptance Criteria: No evidence of wall thinning that reduces the effective wall thickness below the minimum wall thickness required by the applicable design code.

5.3.4 241-Z Waste Retention Facility

The 241-Z Facility tanks TK-D-4, TK-D-5, TK-D-7, and TK-D-8, the overflow tank, and their ancillary equipment (within the Facility) will have the integrity assessment activities described below performed.

- A visual examination of each dangerous waste tank, the ancillary equipment, and the tank and piping supports. Acceptance Criteria: No evidence of localized degradation compared to the overall appearance of adjacent areas being examined.

- An ultrasonic inspection to check for wall thinning of these tanks. If available, results from a recent ultrasonic testing of the D-4, D-5, D-7, and D-8 tanks may be used in lieu of performing this additional ultrasonic test. Perform an ultrasonic inspection of the overflow tank. Acceptance Criteria: No evidence of wall thinning that reduces the effective wall thickness below the minimum wall thickness required by the applicable design code.

- A test of all leak detection systems, i.e., tank level monitors and sump alarms. Acceptance Criteria: Leak detection functioning properly.

6.0 CERTIFICATION

The IQRPE will certify the IAR with the statement below.

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my assessment of the plans and procedures utilized for obtaining this information, I believe that

the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

7.0 ORGANIZATION

7.1 INTERNAL ORGANIZATIONS

Cognizant Engineering Organization--The tank system manager for this assessment is the Plutonium Finishing Plant Department of the Facility Operations Division.

The PFP Environmental Compliance group, a division of the PFP Engineering Function, is responsible for performance, reporting, and approval of the tank system integrity assessment. The PFP Environmental Compliance group is also responsible for preparing the detailed work plans and procedures used during the assessment.

Environmental--Environmental and regulatory support for this assessment will be provided by the Facility Compliance section of the Environmental Division. Facility Compliance will be responsible for reviewing assessment activities to ensure adequate documentation with compliance of Washington State environmental law.

Safety--Safety support for this assessment will be provided by the PFP Safety Assurance Group of the Health and Safety Assurance Department. PFP Safety Assurance will coordinate all Safety reviews of assessment activities to ensure planned work will not violate the existing safety envelope for operation of the facility (safety analysis report and operating safety requirements) and to ensure that performance of the physical assessments do not place onsite or offsite personnel at undue risk to industrial, radiological, or toxicological hazards.

The PFP Safety Assurance Group will be included on formal distribution of the approved and certified IAR for internal (Safety) review against existing safety analyses.

Quality Assurance--QA support for this assessment will be provided by the PFP Quality Assurance/Quality Control Group of the QA Department, which will review assessment activities to ensure compliance with Westinghouse Hanford and DOE procedures, policies, and guidelines. The PFP Quality Assurance/Quality Control Group will review planned activities for compliance to this IAP and document compliance with planned activities. They will verify that only qualified and trained Westinghouse Hanford personnel will perform the inspections, tests, and analyses necessary to prepare an IAR.

7.2 EXTERNAL ORGANIZATIONS

The IQRPE shall ensure that information required to make an integrity assessment of the tank system will be obtained through the assessments planned. The IQRPE shall certify the IAR.

The IQRPE shall certify the integrity test report(s) for the PFP dangerous waste tank systems.

8.0 COST ESTIMATE

Table 3 is an estimated cost of the IAP for the PFP dangerous waste tank systems.

9.0 SCHEDULE

Table 4 is a schedule of the work.

10.0 QUALITY ASSURANCE

10.1 GENERAL REQUIREMENTS

All work performed in support of the PFP tank integrity assessment will be performed by trained and qualified personnel in accordance with the procedures specified in the following Westinghouse Hanford controlled procedure manuals:

- WHC-CM-1-3, *Management Requirements and Procedures* (WHC 1990a)
- WHC-CM-4-2, *Quality Assurance Manual* (WHC 1991a)
- WHC-CM-4-10, *Radiation Protection* (WHC 1990b)
- WHC-CM-4-11, *ALARA Program Manual* (WHC 1991b)
- WHC-CM-6-1, *Standard Engineering Practices - Engineering Standards Board* (WHC 1990c)
- WHC-CM-7-5, *Environmental Compliance* (WHC 1990d)
- WHC-CM-8-8, *Job Control System Manual - Vol. 1-4* (WHC 1989).

The impact level of the IAR is 3 (WHC-CM-1-3, MRP 5.43, 5.0, c).

Table 3. Cost Estimate for the Plutonium Finishing Plant Dangerous Waste Tank Systems Integrity Assessment Plan. (2 sheets)

Item	Estimate ($K)
Review design and compare with current standards	130
Review process data to determine corrosion conditions	8
Prepare plans for inspection and tests	20
Perform visual inspections PRF: tanks, ancillary equipment, supports, and secondary containment (CCTV inspection may be required) 234-5Z pipe lines and tunnels (CCTV inspection may be required) 241-Z: tanks, ancillary equipment, and supports	130
Perform leak tests of PRF tanks	64
Perform ultrasonic inspections PRF's D-5 and D-6 pipe lines 234-5Z's D-4, D-5, D-6, and D-8 pipe lines and their tributaries (recent ultrasonic inspection results may be available on the main pipe lines) Waste piping from 234-5Z to 241-Z 241-Z tanks TK-D-4, TK-D-5, TK-D-7, and TK-D-8 (recent ultrasonic inspection results may be available on these tanks) and overflow tank	48
Perform leak detection systems tests PRF systems 241-Z systems	8
Prepare and issue report on results of design standards evaluation	16
Prepare and issue report on corrosion conditions	6

Table 3. Cost Estimate for the Plutonium Finishing Plant Dangerous Waste Tank Systems Integrity Assessment Plan. (2 sheets)

Item	Estimate ($K)
Prepare and issue reports on inspection and test results	24
IQRPE review and certification of IAR	64
Prepare and issue final IAR	8
Contingency	81.9
	TOTAL $ 607.9

Table 4. Schedule.

Item	Time required (months)
Prepare and issue report on results of design standards evaluation	10
Prepare and issue report on corrosion conditions	1.75
Prepare and issue plans for inspections and tests	2.5
Perform visual inspection	9
Perform leak test of PRF tanks	8
Perform ultrasonic inspections	6
Perform leak detection systems tests	1
Prepare and issue reports on inspection and test results	3
IQRPE review and certification of IAR	8
Prepare and issue final IAR	1
	TOTAL 50.25

10.2 NONCONFORMING CONDITIONS

All changes, inspections, and test reports associated with this IAP shall be in accordance with the Supporting Document procedures described in WHC-CM-6-1 (WHC 1990c), EP 1.12, "Supporting Documents." The IQRPE shall approve any changes to these procedures.

Items that do not meet the acceptance criteria defined in detailed work plans or are not in accordance with facility specifications shall be dispositioned and tracked through the Westinghouse Hanford Nonconformance System (WHC-CM-4.2 [WHC 1991a], QR 15.0, Rev. 1, "Control of Nonconforming Items"). Differences between current design standards and the design standards of construction that have not been reconciled shall be noted within the text of the IAR along with recommendations for resolution.

11.0 REFERENCES

WAC, 1990, *Dangerous Waste Regulations*, Washington Administrative Code 173-303, Washington State Department of Ecology, Olympia, Washington.

WHC, 1988, *PRF Solvent Extraction Depletion Flowsheet High Uranium/High Fluoride Feed*, PFD-Z-180-00001, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989, *Job Control System Manual - Vol. 1-4*, WHC-CM-8-8, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990a, *Management Requirements and Procedures*, WHC-CM-1-3-REL46, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990b, *Radiation Protection*, WHC-CM-4-10-REL6, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990c, *Standard Engineering Practices - Engineering Standards Board*, WHC-CM-6-1-REL28, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990d, *Environmental Compliance*, WHC-CM-7-5-REL21, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, *Quality Assurance Manual*, WHC-CM-4-2-REL39, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *ALARA Program Manual*, WHC-CM-4-11-REL4, Westinghouse Hanford Company, Richland, Washington.

H-2-28418 sheet 5, "General Piping Layout Cell Tanks TK-19, TK-37, TK-38, TK-40, TK-41," Rev 2.

H-2-43517 sheet 1, "Process Pipe Trench Arrangement," Rev 9.

H-2-43518 sheet 1, "Process Drainage Sections," Rev 6.

HWS-3165, "Power and Process Piping for Manufacturing and Service Areas," Rev 6, October 13, 1950.

HWS-7985, "Specification for Plutonium Reclamation Facility 236-Z Building - Phase I Project CAC-880," June 22, 1961.

HWS-7986, "Specification for Plutonium Reclamation Facility 236-Z Building - Phase II Project CAC-880," Rev 1, March 2, 1962.

HWS-8114, "Specifications for Waste Treatment Facility 242-Z Building - Phase II Project CGC-912," June 28, 1961.

HWS-8124, "Procurement Specification for Glove-Type Enclosures 236-Z Building Project CAC-880," September 1961.

ASTM, 1974, "Specifications for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels," ASTM A240, American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1979, "Specification for Seamless and Welded Austenitic Stainless Steel Pipe," ASTM A312-59T, American Society for Testing and Materials, Philadelphia, Pennsylvania.

Loberg, R. J., to D. G. Harlow, Internal Memo, "Results of Ultrasonic Examination of 241-Z Sump Tanks," April 20, 1977, Atlantic Richfield Hanford Company, Richland, Washington.

Bergman, D. W., to E. T. Abramowski, Internal Memo No. 65930-87-CMK-034, "Ultrasonic Thickness Inspection of Tanks D-4, D-5, D-7 and D-8," April 2, 1987, Rockwell Hanford Company, Richland, Washington.

RHO-CD-703, "Evaluation of Continued Plutonium Reclamation Facility Operation," D. W. Reberger, dated April 24, 1979.

WHC 1990, Ultrasonic Thickness Measurement Procedure and Test Report, Job No. 90-202, Request No. 4596, Westinghouse Hanford Company, Richland, Washington.