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Chris E. Jensen [signature] 26MAR98 Signature of EDT Originator Date	~~Richard J. Nicklas~~ Authorized Representative for Receiving Organization Date	R. J. NICKLAS [signature] 3/27/98 Design Authority/Cognizant Manager Date	Ctrl. No. NA [] Approved [] Approved w/comments [] Disapproved w/comments

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HNF-2331, Rev. 0

1998 242-A Interim Evaporator Tank System Integrity Assessment Plan

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U.S. Department of Energy Contract DE-AC06-96RL13200

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Key Words: Integrity Assessment, Inspection, NDE, Leak Test

Abstract: The Plan provides the requirements to perform the required activities for the five year integrity assessment for the 242A Evaporator.

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1998 INTERIM
242-A EVAPORATOR TANK SYSTEM
INTEGRITY ASSESSMENT PLAN

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1998 INTERIM 242-A EVAPORATOR-CRYSTALLIZER TANK SYSTEM INTEGRITY ASSESSMENT PLAN

1.0 INTRODUCTION

Portions of the 242-A Evaporator (242-A Evaporator) on the Hanford Site must be assessed to meet the requirements of the Washington State Department of Ecology's (ECOLOGY) Dangerous Waste Regulation, Washington Administrative Code (WAC) 173-303 (Reference 2). The assessment is limited to the provisions of Section 173-303-640 (2). This Integrity Assessment Plan (IAP) identifies tasks which will be performed during the assessment phase and describes the intended assessment techniques.

The 242-A Evaporator facility processes waste solutions from most of the operating laboratories and plants of the Hanford Site. The waste solutions are concentrated in the evaporator to a slurry of liquid and crystallized salts. This concentrated slurry is returned to the Tank Farms at a significantly reduce volume. The water vapor from the evaporation process is condensed, filtered, and can be pumped through an ion exchange bed before transfer to a retention basin. The non-condensable portion of the vapor is filtered and continuously monitored before venting to the atmosphere.

The 242-A Evaporator will be assessed as seven subsystems. Four of the subsystems store, transport or treat Washington State Dangerous wastes, the other three subsystems are integral parts of the process, however, they do not directly store, transfer, or treat listed dangerous wastes. The facility will be inspected, tested, and analyzed through this assessment. The seven subsystems, defined in detail in Appendix B, are:

1. Evaporator Process and Slurry Subsystem
2. Vapor Condenser Subsystem
3. Vessel Vent Subsystem **(NON-DANGEROUS WASTE SUBSYSTEM)**
4. Process Condensate Subsystem
5. Steam Condensate Subsystem **(NON-DANGEROUS WASTE SUBSYSTEM)**
6. Raw Water Disposal Subsystem **(NON-DANGEROUS WASTE SUBSYSTEM)**
7. Building and Secondary Containment Subsystem

Figure 1a shows a schematic of the facility process flow.

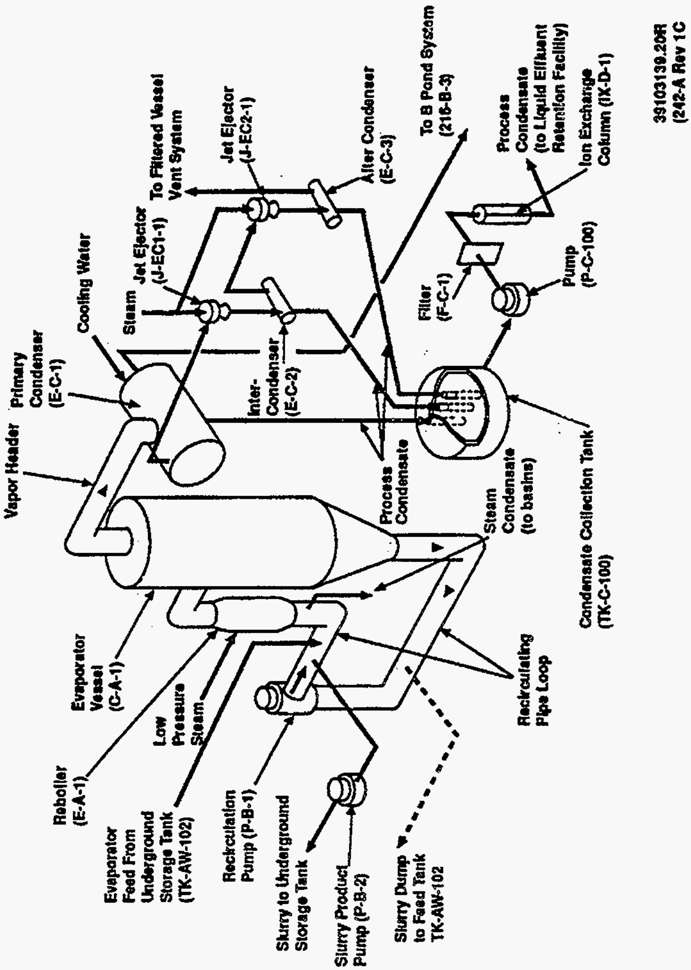

Figure 1a SCHEMATIC OF PROCESS FLOW

2.0 SCOPE

2.1 OBJECTIVES

This IAP will establish inspections, tests and evaluation procedures required to assess the integrity of the 242-A Evaporator facility. This IAP will provide the information necessary for the Independent, Qualified, Registered Professional Engineer (IQRPE) to certify the integrity assessment program.

2.1.1 Items to be Subjected to Integrity Assessment

The boundaries of this system are defined as:

> All associated piping, drains, valves, sumps, secondary containment and tanks which receive, store, accumulate, transfer or treat Washington State Dangerous waste or waste components within the 242-A Facility.

These components and piping will be included in the integrity assessment.

2.1.2 Items not to be Subjected to the Integrity Assessment

Piping system which either introduce liquid waste streams into the building or transfer solids, liquids, or vapors to other facilities will be tested up to but not to include the last valve or flanged connection inside the facility perimeter.

- Dangerous Waste feed and drain lines from/to 241-AW Tank Farm will be assessed by the 241-AW Tank System Integrity Assessment.
- Process condensate lines to the Liquid Effluent Retention Facility (LERF) will be assessed as part of the LERF permitting process.
- Drain lines to the Treated Effluent Disposal Facility (TEDF) do not carry dangerous waste, so they will not be assessed according to WAC requirements.

2.2 DELIVERABLES

The deliverable for this project will be:

1. A Final Tank System Integrity Assessment Report (Supporting Document) with IQRPE certification of report accuracy. This report will include specific conclusions and recommendations regarding the integrity of the system components and use of the system for management of the wastes. The Integrity

Assessment Report (IAR) will specifically include a recommendation for the frequency of the future integrity assessments.

2. Specific letter reports will be written to document completion of 1) Inspections and Walkdowns, 2) Analyses, and 3) Leak tests. Periodic status reports will be issued to track assessment progress and spending and to provide a historical document trail of the assessment.

3.0 DESCRIPTION OF 242-A EVAPORATOR COMPLEX

3.1 PROCESS DESCRIPTION

Solutions containing dangerous waste materials from operating areas and laboratories on the Hanford Site are transferred to the 242-A Evaporator for treatment. In the Evaporator, the feed solutions are circulated continuously from the evaporator vessel through the shell and tube reboiler and back to the evaporator vessel. Heat is added to the solution in the reboiler and vapor is separated from the concentrated slurry in the evaporator system. The vapor is passed through two de-entrainment pads and then to the primary condenser.

Uncondensed vapors and non-condensable gases are extracted from the primary condenser by a steam jet ejector. The effluent from the primary condenser is further condensed in the inter- and after-condensers.

The slurry produced by this facility is transferred to an underground double shell storage tank where the precipitates are allowed to settle and the supernate is returned to the Evaporator feed tank. The process condensate is sent to LERF to await further treatment at the 200 East Effluent Treatment Facility (ETF). Off gasses are filtered and monitored for radioactive contamination prior to discharge to the atmosphere. Steam condensate is monitored continuously and, if contaminated, is diverted to the 242-A Evaporator feed tank. Uncontaminated cooling water and steam condensate streams are pumped to TEDF.

3.2 SYSTEM DESCRIPTION

The 242-A Evaporator is conveniently described by seven subsystems according to the function or process of each subsystem. Four of the subsystems store, transport or treat Washington State Dangerous wastes, the other three subsystems do not. The seven subsystems, listed in section 1.0 of this report, are described in more detail below.

Equipment and component lists, major equipment descriptions, and P&ID drawings of each of the subsystems are included in Appendix B.

3.2.1 Evaporator Process and Slurry Subsystem

The Evaporator and Process Slurry subsystem circulates the waste feed through the Evaporator and the Reboiler vessels, boiling off water vapor and concentrating the waste into a slurry. The water vapor is routed through the Vapor Condenser subsystem and the concentrated slurry is sent to a Double Shell Tank.

3.2.2 Vapor Condenser Subsystem

The Vapor Condenser (VC) subsystem includes the three condensers operated within the facility. They condense the water vapor from the Evaporator to form the process condensate (PC). The PC goes through the PC subsystem. The uncondensed vapors and non-condensable gases are filtered and monitored for radioactive contamination prior to discharge to the atmosphere through the Vessel Vent subsystem.

3.2.3 Vessel Vent Subsystem (NON-DANGEROUS WASTE SUBSYSTEM)

The Vessel Vent (VV) subsystem contains a series of High-Efficiency Particulate Air (HEPA) filters, de-entrainment pads, radiation monitoring system, and various Heating and Ventilating equipment. Uncondensed vapors and non-condensable gases that have been through the VC subsystem are filtered and vented to the atmosphere through this subsystem.

3.2.4 Process Condensate Subsystem

The PC subsystem receives the condensed water vapors (process condensate) from the Vapor Condenser subsystem. If additional decontamination is necessary prior to transferring process condensate to the LERF, the process condensate may be sent through the IX-D-1 Ion Exchange Column to reduce the cesium (Cs) and strontium (Sr) content of the PC. The Process Condensate subsystem is continuously monitored for radioactive contamination with the RC-3 radiation monitor. In the event of radioactive contamination above the RC-3 monitoring/diversion system activation setpoint the process condensate is automatically diverted back to the TK-C-100 Condensate Catch Tank or the 241-AW-102 Feed Tank.

3.2.5 Steam Condensate Subsystem (NON-DANGEROUS WASTE SUBSYSTEM)

The Steam Condensate subsystem routes steam condensed in the reboiler to the TEDF. The Steam Condensate subsystem has an in-line radiation monitor, RC-1 (Appendix B) which continuously monitors for excessive radioactive contamination. In the event of radiation detection in the system, the steam condensate is automatically diverted to the 241-AW-102 Feed Tank.

3.2.6 Raw Water Disposal Subsystem (NON-DANGEROUS WASTE SUBSYSTEM)

The Raw Water Disposal subsystem discharges raw water used as the coolant for the condensers to TEDF. The Raw Water Disposal subsystem is continuously monitored for radioactive contamination with the RC-2 radiation monitor. In the event of radioactive contamination above the RC-2 monitoring system activation setpoint, an alarm sounds and the system is manually shutdown.

3.2.7 Building and Secondary Containment Subsystem

The Building and Secondary Containment subsystem includes the Evaporator building structure and the associated sump and drain systems. The operating area is a poured-in-place concrete structure divided into six specific rooms. Those portions of the structure that may come in contact with the waste solutions are coated with a chemically resistant acrylic coating or lined with stainless steel catch pans.

The facility has six primary drains which gravity flow to one stainless steel lined sump with gravity flows back to the 241-AW-102 Feed Tank.

3.3 OPERATING PARAMETERS

Operating parameters for the 242-A Evaporator include the pressures and temperatures listed below in Table 3.3a. These temperatures and pressures are calculated from the appropriate process flow and operational data sheet (Reference 11) design parameters for these components which are also included in Appendix A.

Table 3.3a OPERATING PARAMETERS

Component	Pressure/Flow	Temperature (F)
C-A-1 Evaporator		
Vapor Section	<0.8 psia	120
Lower Circulation Pipe	16,000 gpm	200
E-A-1 Reboiler		
Tube Side (Waste)	16,000 gpm	
Shell Side (Steam)	29.7 psia	250
E-C-1 Primary Condenser		
Tube Side (Cooling Water)	2,800 gpm	72
Shell Side (Waste Vapor)	0.8 psia	95
E-C-2 Intermediate Condenser		
Tube Side (Cooling Water)	150 gpm	72
Shell Side (Waste Vapor)	1.0 psia	150
E-C-3 Final Condenser		
Tube Side (Cooling Water)	150 gpm	95
Shell Side (Waste Vapor)	14.0 psia	170
TK-C-100 Condensate Catch Tank	14.0 psia	151

4.0 DESIGN AND OPERATING INFORMATION

An integrity assessment of the existing 242-A Evapaorator tank systems is a requirement of the WAC. The basic requirement imposed on the owner or operator is that he "determine that the tank system is not leaking or is unfit for use" [WAC 173-303-640(2)(a)]. Upon completion of an integrity assessment which concludes that the tank system is not leaking and is not unfit for use, "the owner or operator must develop a schedule for conducting integrity assessments over the life of the tank..." in accordance with WAC 173-303-640(2)(e). If the "tank system is found to be leaking or unfit for use, the owner or operator must comply with the requirements of subsection (7) of this section" [WAC 173-303-640(2)(d)].

WAC 173-303-640(2)(c) requires that the integrity "assessment must determine that the tank system is adequately designed and has sufficient structural strength and compatibility with the waste(s) to be stored or treated, to ensure that it will not collapse, rupture, or fail. At a minimum, consideration must be given to the following factors:

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

Modifications or upgrades to the 242-A Evaporator since the last existing facility integrity assessment (Reference 18) that were performed will be assessed in this integrity assessment unless further evaluations are identified during the performance of the integrity assessment.

4.1 DESIGN CODES AND STANDARDS

Specifications for construction of the 242-A Evaporator were taken directly from specifications for the 242-S Evaporator which was initiated in 1972 (Reference 9). The principal design standards for the original facility design included: ASME Section VIII, Division 1 (1972), UBC 1972, and Hanford Plant Standard "M" piping codes. The design loads were established by Hanford Plant Standard, SDC-4.1, Rev. (1972). Appendix A lists the specific design standards and design criteria used for construction of the 242-A Evaporator. Also included in Appendix A, is a listing of the specific "M" piping codes used on the project. These design codes and standards will be reviewed by LMHC/WMH to determine if there are any significant changes from the current revisions to these design codes and standards that might affect the operation and safety of the facility. The results will be provided to the IQRPE in the form of a letter.

4.2 WASTE CHARACTERISTICS

The 242-A Evaporator Complex receives and treats Washington State dangerous waste (categorized as "Extremely Hazardous Waste" by the Resource Conservation and Recovery Act (RCRA) Part A permit application (Reference 10)) from the Double Shell Tanks and segregates the waste into a concentrated Slurry and a dilute Process Condensate, both of which are also Washington State dangerous wastes. The Steam Condensate, Raw Water, and Non-Condensable Gases generated by the evaporator process, through subsystems 3, 5, and 6 (section 3.2 of this document), are not Washington State dangerous wastes.

Evaporator Feed Composition

The 242-A Evaporator receives a mixed blend of feed from tanks throughout the double-shell tank system via the Evaporator Feed Tank, 241-AW-102. The feed contains liquid waste from chemical processing operations, facility deactivations, and miscellaneous facility and laboratory discharges. The largest portion of wastes are non-radioactive aqueous salts. The feeds are highly alkaline (pH>12) and the primary chemical compounds are sodium compounds of hydroxide, nitrite, nitrate, aluminate, carbonate and sulfate. The feed may also contain minor amounts of organic material (<7g/L). The approximate maximum concentrations of the most abundant salts and ammonia are noted in Table 4.2a, below, (also see Reference 1).

The chemical composition of the evaporator feed will vary from run to run and can range from essentially water to saturated supernates.

The principal radionuclides in evaporator feed are Cs-137, and Sr-90 (Reference 1). Minor and trace quantities of other radionuclides are also present. Similar to the chemical constituents, the concentrations or radionuclides in the feed varies as a function of source and blending.

Table 4.2a CHEMICAL COMPOSITION OF EVAPORATOR FEED

COMPOUND	MAXIMUM CONCENTRATION (M)
NaOH	3.9
$NaNO_3$	2.8
$NaNO_2$	1.8
$NaAlO_2$	1.8
$NaCO_3$	0.7
Na_2SO_4	0.2
Na_3PO_4	0.5
NH_3	0.11
NaF	0.07

Slurry Compositions

Prior to the previous 242-A Evaporator integrity assessment, slurry waste was concentrated to three basic forms. These forms were Dilute Double-Shell Slurry Feed (DDSSF), Double-Shell Slurry Feed (DSSF), and Double-Shell Slurry (DSS). Concentration is performed at the 242-A Evaporator in passes, each pass assumes 50% water removal from the feed solution. DSS is slurry that has been concentrated past the sodium aluminate saturation boundary where massive crystallization/precipitation occurs. DSSF is concentrated slurry which is one pass away from becoming DSS. Due to tank farm requirements imposed prior to the previous integrity assessment, the sodium aluminate boundary is no longer the controlling factor for target slurry concentrations, but is typically driven by specific gravity (SpG) limits. Therefore, the terms DDSSF, DSSF, and DSS will not be used. Instead, the product will be referred to as concentrated slurry. The maximum concentration of the concentrated slurry is shown in Table 4.2b. (Reference 1).

Table 4.2b CHEMICAL COMPOSITION OF CONCENTRATED SLURRY

COMPOUND	MAXIMUM CONCENTRATION (M)
NaOH	5.5
$NaNO_3$	5.0
$NaNO_2$	2.5
$NaAlO_2$	2.5
$NaCO_3$	1.2
Na_2SO_4	0.3
Na_3PO_4	0.1
NH_3	0.15
NaF	0.6

4.3 CORROSION PROTECTION

Existing corrosion protection for the 242-A Evaporator Complex consists of the materials and methods of construction, pH control of the environment (liquid waste) (Reference 15), and protective coatings. The plant components and piping are constructed primarily of austenitic stainless steels (SS) and plain carbon steels (CS), the gaskets at component and piping connections are chemically resistant non-metallics, and the portions of the concrete structure that may come in contact with the waste are coated with a chemically resistant acrylic coating (Carboline D3358 primer and Carboline D3359 topcoat)[1]. The plant operating conditions are typically neutral to alkaline with process temperatures typically lower than 250°F. (Reference 19).

4.4 TANK SYSTEM AGE

The 242-A Evaporator was constructed in 1977 with an original design life of ten years (Reference 1). The structure, piping, and majority of the components were fabricated at this time. The TK-C-100 Condensate Catch Tank was fabricated in 1951 as part of

[1]Carboline D3358/D3359 is a trademark of the Carboline Corporation.

another project, however, was never used. The tank was upgraded in 1977 to be consistent with the facility design standards and installed in the 242-A facility. Some portions of the facility were upgraded or replaced under Project B-534. These components were evaluated in the last 242-A facility integrity assessment (Reference 18) and will not be separated out for special examinations for this integrity assessment.

These components are noted here for historical record. They include:

Components	Year
E-C-1 Primary Condenser	1990
P-B-1 Pump	1990
P-B-2 Bottoms Pump	1990
Miscellaneous Process Piping	1990

4.5 INTEGRITY EXAMINATION

To monitor critical components containment integrity, the 242-A Evaporator uses radiation monitors to continuously monitor effluent streams for excessive radioactive contamination. The presence of excessive radioactive contamination in the effluent streams would indicate a breach of one of the primary containment boundaries. This continuous monitoring is combined with periodic sampling of the Dangerous Waste streams and the non-regulated effluents.

- The continuous monitoring of the Steam Condensate subsystem provides automatic interlocks that divert this stream to the 241-AW-102 Feed Tank in the event of excessive radiation detection in the system.
- A similar system is in-place for the Process Condensate with the capability to divert the PC to the feed tank or the condensate Collection Tank in the event of excessive radiation being detected in the stream.
- In the event of excessive radioactive contamination in the Raw Water Disposal subsystem, an alarm sounds and the system is manually shutdown.

Administrative procedures control and monitor the process flow for indication of process upsets through material balance calculations (Reference 13) and operation data sheets (Reference 14).

5.0 ENGINEERING TASKS

The following tasks describe the work to be performed in order to assess the integrity of the 242-A Evaporator System.

5.1 DESIGN STANDARD COMPARISON

The original design standards for the Dangerous Waste subsystems (1972 ASME Section VIII, Division 1, etc.) will be compared to current design standards for a Moderate Hazard Classification facility with Safety Significant and General Services equipment and components. The Safety Classifications of the facility equipment and components are defined in Reference 16. The design standards to be used for the comparison are:

Component	National Design Standard
Evaporator	ASME Section VIII, Division 1 (1989*)
Reboiler	ASME Section VIII, Division 1 (1989*)
Condensers	ASME Section VIII, Division 1 (1989*)
Condensate Catch Tank	ASME Section VIII, Division 1 (1989*)
Building Structure	UBC, (1989*)
Piping	ANSI B31.1, (1990*)

* Or as amended in most current edition.

The original design standards are compiled in Section 4.1, "Design Standards of Construction" in this document. Design loads for the facility will be compared to design loads specified in Hanford Plant Standard, SDC-4.1, Rev. 11 (Reference 8**). The original design loads were taken from the 1972 revision of this same Hanford Plant Standard.

The design standard comparison will be done my LMHC Engineering. The comparison will identify differences (if any) in the physical requirements of the system, (e.g., wall thickness, design loads, and material properties). The comparison will specifically not identify inconsistencies in non-physical requirements such as inspection practices and material certifications. The design standard comparison will also review operational loads to ensure that the facility is operating within the design parameters. Technical inconsistencies will be dispositioned item by item through analysis. The results of the comparison will be forwarded to the IQRPE in the form of a letter.

** Or current Standard used on Hanford Site.

5.2 WASTE CHARACTERISTICS, COMPATIBILITY AND CORROSION PROTECTION

The data gathered during the examination of the tank system will be used in addition to waste characterization, tank system age, and tank system materials information to perform an evaluation of existing corrosion protection and waste/tank compatibility for the Dangerous Waste subsystems. The assessment will compile a listing of all of the tank system materials and analyze the corrosion potential for each material in the waste stream environment under the projected corrosive concentrations.

5.3 INTEGRITY EXAMINATIONS

Procedures and Process Memos will be used to direct integrity assessment examinations. Procedures and Process Memos will describe, in detail, the personnel, personnel qualifications, and examination equipment required to perform the work (Reference 10 for guidance). Support for the examination activities will be released as separate Work Plans through the customer job control system in accordance with WHM-200, Section 3.1, "Maintenance Work Management."

5.3.1 Leak Test

Leak testing of the Dangerous Waste subsystem tanks and components will be performed through a combination of visual examination for evidence of leaks concurrently with hydrostatic testing under operational head of water.

Visual examinations will be performed using ASME Section XI acceptance criteria as a <u>guide</u> to identify components requiring further evaluation. Hydrostatic testing will focus on the C-A-1 Evaporator shell, the E-A-1 Reboiler tubes, and the TK-C-100 Condensate Catch Tank.

A specific leak test process memo (provided by LMHC to FDNW) will define the boundary of the leak test. The process memo will be submitted to the IQRPE for review one week prior to performing the leak test. The boundary of the leak test shall encompass all major components of the evaporator/reboiler system and condensate catch tank components that come in contact with evaporator system products in the 242-A facility. These components include tanks, vessels, seams, pipes, flanges, and valves. The process memo will focus on the major components of the evaporator/reboiler system and condensate catch tank. This test will be conducted under the overview of an IQRPE. It will not be necessary for ECOLOGY inspectors to witness the test, nor is it necessary to notify ECOLOGY of the date and time of the test. Results of the leak test will be available to ECOLOGY at the completion of the integrity assessment.

Leaving Insulation in Place: Much of the E-A-1 Evaporator & C-A-1 Reboiler loop is covered with insulation. Because removal of the insulation would be time consuming and expensive, and would create excessive radiation exposure, the insulation will remain in place during the leak test inspection of these vessels. It is reasonable that As Low As Reasonably Achievable (ALARA) guideline considerations obviously dictate minimal contact with the evaporator loop.

> NOTE: Because the insulation on the evaporator loop was designed to be waterproof by virtue of a silicone coating. Each coated insulation panel was tested for water tight integrity by immersion (Reference Kaiser Engineers Hanford Engineering Change Notice [ECN] B-534-289, dated 5/1/90). Therefore, appreciable water absorption masking small leaks is considered minimal. In addition, hourly surveillance of tank levels will be logged in accordance with the process memo. Drain sumps will be inspected to indicate whether water leakage occurs during the hold period.

5.3.2 Inspection

A walkdown of the critical portions of the Dangerous and Non-Dangerous Waste subsystems will be examined for evidence of degradation and deformation due to corrosion, erosion, mechanical stresses, and fatigue. (This walkdown will be performed in conjunction with the Leak Test.) The walkdown will also look for significant differences between the actual system configuration and the process drawings. The major components to be included in the walkdown are:

E-C-1 Condenser	E-A-1 Reboiler
E-C-2 Condenser	C-A-1 Evaporator
E-C-3 Condenser	TK-C-100 Condensate Catch Tank
Building/Secondary Containment	

Various sections of piping connecting these components together will also be inspected. The walkdowns will be performed by PHMC Level II Mechanical Inspectors. The C-A-1 Evaporator, E-A-1 Reboiler, E-C-1 Condenser, and five sections of piping will be inspected using this criteria and format as specified in this IAP.

ASME Section XI acceptance criteria will be used as a guide to identify components requiring further evaluation. Additional inspection(s) will be performed if leaks are detected during the system leak test(s) or if the planned inspections and analyses suggest evidence of system damage/degredation. The results of the walkdown will be documented on data sheets included in the Walkdown/NDE process memo, (provided by the LMHC). The results of the Walkdown/Leak Test will be included in a letter and provided to the IQRPE for inclusion in the IAR package.

Table 5.3.2a LEAK TEST SEQUENCE OF ACTIVITIES

HOLD POINT	ACTIVITY
1	242-A Operations Prepares Work Package and Job Description
2	LMHC to Issue Work Order for PHMC Level II Mechanical Inspector Services
3	Begin Evaporator System Leak Test
4	Leak Test Hold Point
5	242-A Operations to Perform Pre-Hold Period Preparations
6	24-Hour Hold Period
7	242-A Operations to Perform Leak Test and Photograph System
8	PHMC QA Engineer, 242-A Cognizant Engineer, and IQRPE to Review and Accept Test Results
9	242-A Operations to Recover from Leak Test System Configuration

5.3.3 Ultrasonic Test - Corrosion Evaluation

In addition to the visual walkdown to be performed, portions of the facility tank system will be measured for wall thickness using Ultrasonic Testing (UT) methods. UT examinations will determine if there has been any significant deterioration of the 242-A tank system since the last integrity assessment. The corrosion examination will include the following corrosive environments:

- Evaporator Feed and Slurry system
- Process Condensate
- Evaporator Radiation Fields
- Pump Room and Evaporator Room

UT examinations will be performed by Dyncorp Hanford Company or as determined by LMHC. The UT data will be compared to the UT results obtained during the 1993 Integrity Assessment. The components and piping measured in the previous assessment include; the C-A-1 Evaporator, E-A-1 Reboiler, and E-C-1 Condenser, and six sections of piping. The specific locations and criteria are noted in Reference 6 and summarized in this IAP in Table 5.3.3a. Fewer UT examination areas and grid points will be examined for this integrity assessment than the 1993 Integrity Assessment (References 18 and 19). Where possible, the UT examination team should use UT grids currently in-place on the 242-A Evaporator equipment from the previous integrity assessment for this UT evaluation. The points on each grid will be identified by using every other letter starting with "A" and every other number starting with "1". If a test point shows a significant decrease in material thickness of the component being examined, continue taking additional ultrasonic examination points around the first examination point until the material thickness readings indicate at least a nominal material thickness (Reference 18). Identify the area(s) and the size of the decrease in material thickness determined by the UT examination and report this data in a letter and provided to the IQRPE within 5 working days. The grid points at the desired locations may be expanded or reduced with a representative cross section of the points being measured. The facility representative will determine these points based on ALARA guidelines at the time of UT examination.

To obtain the UT data located at upper elevations on the equipment in the Evaporator Room, scaffolding must be erected and removed from the 242-A facility. This would cause the workers to be exposed to excessive radiation to perform this work. As a result, the worker dose limits would be excessive in accordance with ALARA guidelines. Therefore, selected UT examination locations (e.g., #1, #2S, #2T, #4, #9, and #13) may not be UT examined for this integrity assessment.

Table 5.3.3a UT LOCATIONS AND EQUIPMENT

UT LOC.	COMPONENT UT TO BE PERFORMED ON	LOCATION OF UT GRID	DESCRIPTION OF UT GRID
3	C-A-1 Evaporator Shell (3/8" thk. SS)	Horizontal grid band on the Evaporator vessel, centered over the vapor/condensate level.	2" square grid; 4" square grid plan. Grid: 4ft. Tall x 6ft Wide.
5	Recirc. Line Elbow #1-1.2 (1/4" thk. SS)	On mitered elbow located on 28" Diameter Recirc. line, below E-A-1 discharge from P-B-1.	2" square grid; 4" square grid plan. Grid: 6" wide along outside radius portion of elbow, and extending 3" beyond the upper ends of elbow including welded joints.
7	Line #1-1.4 (1/4" thk. SS)	Grid location is along the length of mitered elbow on outside radius, to extend 3" on each side of last weld joint.	2" square grid. Grid: 6" wide.
8	E-C-1 Condenser (1/2" thk. CS)	Individual wall thickness measured along one length and one diameter between end flanges.	UT every 12" along a condenser horizontal line and one along a circumferential line inside the end flanges at the end opposite the cooling water inlet/outlet head.
11	TK-C-100 Condensate Catch Tank (5/16" thk. SS)	Wall thickness of tank measured on side of tank approximately one-third of the distance up from bottom on the tank on the outlet side of the tank.	2" square grid. Grid: 2ft. (vertical) x 6 ft. (horizontal) band.
12	E-C-2 Condenser (5/16" thk. CS)	Individual wall thickness measured around circumference of condenser.	2" square grid. Grid: 4" wide band 360°
13	E-C-3 Condenser (0.332" thk. CS)	Individual wall thickness measured around circumference of condenser.	2" square grid. Grid: 4" wide band 360°
15	Slurry Drain Line #1-3.5 to 241-AW Tank Farm (6" DR-335-M9) (0.134" thk. SS)	6 individual wall thickness measurements along pipe.	Grid: 4" intervals beginning downstream from the first exit elbow on the slurry return line toward the 241-AW Tank Farm
16	TK-C-100 to 241-AW drain line 4.33 (3" DR-359-M42) (0.216 thk. CS)	6 individual wall thickness measurements along pipe.	Grid: 4" interval UT points beginning outward from the TK-C-100 Tank toward LERF.
17	E-C-1 to E-C-2 Line 2.4 (6" VAC-1500-M42) (0.280" thk. CS)	6 individual wall thickness measurements along pipe.	Grid: 4" interval UT points on the process condensate connecting line between E-C-1 to E-C-2.

* UT Location numbers are those that were used in the 1993 242-A Integrity Assessment.

5.3.4 Breakdown of Required Integrity Assessment Tasks

A list of necessary tasks and task providers has been generated to ensure the completeness of the integrity assessment, in accordance with WAC 173-303-640(2), see Appendix D in this IAP.

6.0 CERTIFICATION

On completion of the tank system integrity assessment, the designated IQRPE will certify the accuracy of the report with the following statement:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

7.0 ORGANIZATION

7.1 INTERNAL ORGANIZATIONS

Cognizant Engineering Organization

The tank system owner for this assessment is Liquid Waste Processing Facilities (LWPF) of Waste Management Hanford Company (WMH). The WMH Technical Process Support Team will provide the cognizant engineering staff to the facility. The Technical Process Support Team is responsible for performance and reporting of the tank system integrity assessment.

The authority to perform the assessment and prepare the report has been delegated to the Lockheed Martin Hanford Co. (LMHC) by LWPF. Authority for disposition of Nonconformance Reports (NCRs) generated by this integrity assessment specifically remains with LWPF. WMH will use the IAR as a basis for determining if the system is "Fit for Use."

Environmental, Safety, Quality Assurance

The Environmental, Safety, and Quality Assurance services will be provided by WMH, as appropriate. Environmental and regulatory support consists of reviewing assessment activities to verify adequate documentation of compliance to Washington State environmental law.

Safety support will consist of coordinating all Safety reviews of assessment activities to verify planned work will not violate the existing safety envelope for operation of the facility (SAR and OSRs) and to verify that performance of the physical assessments do not place onsite or offsite personnel at undue risk to industrial, radiological, or toxicological hazards.

Quality Assurance support for this assessment will consist of reviewing assessment activities to ensure compliance with WMH and DOE procedures, policies and guidelines. Quality Assurance will review planned activities for compliance to this IAP, establish appropriate levels and methods of control and will provide qualified inspection and verification personnel to document compliance with planned activities.

7.2 EXTERNAL ORGANIZATIONS

Independent, Qualified, Registered Professional Engineer

IQRPE services will be provided through Fluor Daniel Northwest (FDNW), Richland WA. The designated IQRPE for this assessment is:

Sherman R. Tifft
Washington State PE Registration
#0018708
Expiration date 5-22-99

The IQRPE will review plans and procedures to ensure that information required to perform the assessment is obtained and review results to ensure that information obtained is interpreted and presented accurately. The IQRPE will certify the Integrity Assessment Report on satisfactory completion of the assessment.

Third Party Inspection

Insurance Underwriters, Hartford Steam Boiler Co. will be notified by the customer of this integrity assessment.

8.0 SCHEDULE

The detailed schedules for the integrity examination will be included in the specific procedures and work plans. Project milestone and critical path items will be completed in the following order. The IAR will be issued within three months after the completion of the leak tests.

1998 INTERIM 242-A EVAPORATOR
TANK SYSTEM INTEGRITY ASSESSMENT

Task	Completion Date*
NDE Examination	5/01/1998
NDE (Letter Report)	5/4/1998
Corrosion Evaluation (Letter Report)	5/8/1998
Design Standard (Letter Report)	6/1/1998
Walkdown/Leak Test	6/16/1998
Walkdown/Leak Tests (Letter Report)	6/19/1998
First Draft IAR	6/23/1998
Issue IAR	6/25/1998

* These completion dates are dependent on the performance of the 242-A Evaporator's operational and technical schedules issued for the Evaporator start-up for the next run/campaign and the availability of the integrity assessment support personnel.

9.0 SAFETY & QUALITY ASSURANCE

9.1 GENERAL REQUIREMENTS

Activities associated with this integrity assessment shall be in accordance with Hanford Site HNF-PRO Quality assurance procedures HNF-PRO-297, HNF-PRO-298, HNF-PRO-263, HNF-PRO-283 and Engineering Program procedures HNF-PRO-227, HNF-PRO-244, HNF-PRO-439 and HNF-PRO-446. Review and approval of inspections, tests, and analyses performed as a part of this integrity assessment shall be in accordance with the appropriate job control implementing procedures and HNF-PRO-233, "Review and Approval of Documents." Personnel performing inspection and testing support to this assessment must comply with all the applicable 242-A Evaporator training requirements.

Technical changes to this IAP shall be in accordance with HNF-PRO-439, "Supporting Document Requirements." All changes to this IAP shall be submitted to the IQRPE for approval. Tests and inspections supporting this assessment shall be controlled through the job control system in accordance with WMH-200, section 3.1, "Maintenance Work Management."

9.2 NONCONFORMING CONDITIONS

Items that do not physically meet the acceptance criteria defined in the text of this IAP or are not in accordance with facility specifications shall be dispositioned and tracked through the HNF-PRO-298, "Nonconforming Item Reporting and Control". The IQRPE shall be included as an "Additional Approval" (NCR Block 11) on disposition of nonconforming conditions.

Critical changes in design criteria and loading conditions such as minimum wall thickness requirements and Design Basis Earthquake loads shall be noted within the text of the IAR along with recommendations for resolution.

10.0 REFERENCES

1. HNF-SD-WM-SAR-023, Rev. 2-D, "242-A Evaporator/Crystallizer Safety Analysis Report."

2. State of Washington, Washington Administrative Code, Chapter 173-303, "Dangerous Waste Regulations", January, 1989.

3. Project B-534, CVI Files

4. WHC-SD-GN-AR-001, Rev. 0, "Procedure for Integrity Assessment of Existing Dangerous Waste Tank Systems."

5. Project B-100, CVI Files

6. WHC-SD-WM-WP-056, Rev. 1, "242-A Evaporator/Reboiler System Evaluation."

7. DOE-RL, Hanford Plant Standard, SDC-4.1, Rev. (1972), "Standard Arch-Civil Design Criteria."

8. DOE-RL, Hanford Plant Standard, SDC-4.1, Rev. 11, "Standard Arch-Civil Design Criteria."

9. RHO-SD-WM-TI-003, Rev. 0, "Compilation of Basis Letters and Communications Referenced in 242-A Evaporator/Crystallizer Specifications."

10. DOE/RL, 1997a, "242-A Dangerous Waste Permit Application", DOE/RL-90-42, Rev. 1, 1997, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

11. Internal Memo #23460-90-105, P. C. Ohl to J. E. Geary, 8/22/90, "Operating Parameter Calculations & References."

12. KEH Process Control Package #B-534-28, "Spare Condenser EC-1 Leak/Pressure Test and Weld Examinations for 242-A Evaporator Crystallizer Upgrade."

13. Operating Procedure TO-600-100, current revision, "Calculate 242-A Material Balance."

14. Operating Procedure TO-600-040, current revision, "242-A Evaporator-Crystallizer Operation."

15. Double Shell Tank Operating Specification Document, OSD-T-151-00007, current revision.

16. HNF-SD-WM-SEL-028, Rev. 1, "Safety Equipment List 242-A Evaporator."

17. WHC-SD-WM-WP-062, Rev. 0-A, "242-A Evaporator-Crystallizer Tank System Integrity Assessment Plan."

18. WHC-SD-WM-ER-124, Rev. 1, "242-A Evaporator-Crystallizer Tank System Integrity Assessment Report", (contained in Reference 10).

19. WHC-SD-WM-WP-019, Rev. 0, "Data Package for 242-A Evaporator/Crystallizer Tank System Integrity Assessment Report"

20. WHC-SD-WM-TC-020, "242-A Evaporator/Reboiler/Condensate Catch Tank Leak Test Procedure," dated 2-7-92.

APPENDIX A: DESIGN STANDARDS FOR COMPONENTS

Table A.1a EQUIPMENT DESIGN CRITERIA

COMPONENTS	DESIGN CRITERIA		COMMENTS
C-A-1 Evaporator	Standard(s):	ASME Section VIII Div. 1, HPS 230W & 220W	Designed by Struthers Nuclear and Process Co.
	Temperature:	200°F	
	Pressure:	Full Vacuum	
	Materials:	ASTM SA 240 304L (Shell)	
	Reference:	Construction Spec. B-100-P1, SD-WM-TI-003	
E-A-1 Reboiler	Standard(s):	ASME Section VIII Div. 1, HPS 230W & 220W	ASTM SA 312 304 (NOZZLES)
	Temperature:	350°F (Shell), 250°F (Tubes)	
	Pressure:	100 psig (Shell), Full Vacuum (Tubes)	
	Materials:	ASTM SA 240 304L (Shell)	
	Reference:	Construction Spec. B-100-P1, SD-WM-TI-003	
P-B-1 Recirculation Pump	Standard(s):	Not Specified	New Installation per Project B-534
	Temperature:	200°F	
	Pressure:	Not Specified	
	Materials:	ASTM A296 Gr CF-8 and GrGF-8	
	Reference:	Procurement Spec. B-534-P4	
	Capacity:	14,000 GPM	
P-B-2 Bottoms Pump	Standard(s):	Not Specified	New Installation per Project B-534
	Temperature:	Not Specified	
	Pressure:	Not Specified	
	Materials:	Stainless Steel	
	Reference:	Procurement Spec. B-534-P11	

COMPONENTS	DESIGN CRITERIA		COMMENTS
E-C-1 Primary Condenser	Standard(s):	ASME Section VIII Div. 1, HPS 220W	SA 515 GR70 (Tube Sheets). Original unit is being replaced by unused spare on Project B-534.
	Temperature:	150°F(Shell and Tubes)	
	Pressure:	Full Vacuum (Shell), 100 psig (Tubes)	
	Materials:	SA285 GrC (Shell Heads, Internal Supports)	
	Reference:	Construction Spec. B-100-P1	
E-C-2 Intermediate Condenser	Standard(s):	ASME Section VIII Div. 1, TEMAC	
	Temperature:	350°F(Shell and Tube)	
	Pressure:	100 psig to Full Vacuum (Shell), 100 psig (Tube)	
	Materials:	Carbon Steel	
	Reference:	Shutte and Koerting Co. Spec. Sheet 72-T-018-J-1	
E-C-3 Final Condenser	Standard(s):	ASME Section VIII Div. 1, TEMAC	
	Temperature:	350°F	
	Pressure:	100 psig to Full Vacuum (Shell), 100 psig (Tube)	
	Materials:	Carbon Steel	
	Reference:	Shutte and Koerting Co. Spec. Sheet 72-T-018-J-1	
TK-C-100 Condensate Catch Tank	Standard(s):	ASME Section VIII Div. 1 & HWS 4311, Rev. 2	Modified in 1977 per ASME Sec. VIII Div. 2 New material ASTM A312 Type 304. 1124 Gallon capacity.
	Temperature:	Not Available	
	Pressure:	5 psig	
	Materials:	347 SS	
	Reference:	H-2-69357 & H-2-40704	

COMPONENTS	DESIGN CRITERIA		COMMENTS
IX-D-1 Ion Exchange Column	Standard(s):	ASME Section VIII Div. 1	Fabricated in 1977. Corrosion allowance 1/16 inch. Mesh Screens 304 or 316 SS
	Temperature:	150°F	
	Pressure:	120 psig	
	Materials:	Carbon Steel (ASTM A36 & A285 GrC)	
	Reference:	H-2-69359	
TK-C-103 Condensate Measurement Tank	Standard(s):	ASME Section VIII Div. 1	500 Gallon tank
	Temperature:	Not Available	
	Pressure:	Atmospheric	
	Materials:	ASTM A36 (Wier Plate ASTM A240 304L)	
	Reference:	H-2-69370	
Seal Pot, Liquid Seal	Standard(s):	ASME Section VIII Div. 1	27 Gallon tank
	Temperature:	Not Available	
	Pressure:	Atmospheric	
	Materials:	ASTM A36 CS	
	Reference:	H-2-69368	
Building/Structure	Standard(s):	UBC, 1972	Seismic Design Loads: Horizontal, 0.25g DBE/0.125g OBE, Vertical, 2/3 horizontal. Coated with phenoline 305 chemically resistant coating.
	Temperature:	N/A	
	Pressure:	N/A	
	Materials:	Poured in-place concrete	
	Reference:	Structural Dwgs. H-2-69276 thru 85 and H-2-69269 thru 75 and H-2-90739 thru 41	

Table A.1b PIPE MATERIALS
(PER VITRO SPEC B-100-C1)

SYSTEM DESIGNATOR	MATERIAL
M1	ASTM A53, TYPE E OR S, GR A OR B, OR ASTM A106, GR A OR B
M2	ASTM A53, TYPE E OR S, GR A OR B, OR ASTM A106, GR A OR B
M5	ASTM A53, TYPE E OR S, GR A OR B, OR ASTM A106, GR A OR B
M7	ASTM A53, TYPE E OR S, GR A OR B, OR ASTM A106, GR A OR B
M8	ASTM A312, TP304L
M9	≤12": ASTM A312, GRTP304L, ≥14": ASTM A240, GRTP304L
M21	SS 304L, PER HPS-124-M
M24	ASTM A53, TYPE S, GR B, OR ASTM A106, GR B
M25	ASTM A53, TYPE S, GR B, OR ASTM A106, GR B
M27	SS ASTM A312, TYPE 304L
M31 (TUBING)	.035" WALL THK, ASTM A269, GR TP304
M32 (TUBING)	POLYETHYLENE, SINGLE LINE OR BUNDLED & SHEATHED IN PVC
M33 (TUBING)	COPPER ASTM B68
M42	ASTM A53, TYPE E OR S, GR A OR B, OR ASTM A106, GR A OR B
(REFER TO SPEC. FOR VARIOUS SCHEDULES)	

APPENDIX B: EQUIPMENT LISTS AND P&ID DRAWINGS OF SUBSYSTEMS

242-A EVAPORATOR
EQUIPMENT LISTS AND P&ID DRAWINGS

The 242-Evaporator Complex consists of the following major components spread across the seven subsystems identified in Section 1.0.

C-A-1 Evaporator TK-C-103 Flow Measurement Tank
E-A-1 Reboiler P-B-1 Recirculation Pump
E-C-1 Condenser P-B-2 Bottoms Pump
E-C-2 Condenser P-C-100 Condensate Pump
IX-D-1 Ion Exchange RC-1 Radiation Monitor
TK-C-100 Condensate Catch Tank RC-3 Radiation Monitor
Building/Secondary Containment

Various piping and ancillary equipment, routes, and monitors the process solutions in and out of the complex and through these major components. The line designations listed in the descriptions correspond to the isometric sketches attached.

1.0 EVAPORATOR PROCESS AND SLURRY SUBSYSTEM

Major Components

C-A-1 EVAPORATOR: 14' OD x 18' long x ⅜" thick, 304L SS (Figure B.1a, C-A-1 Evaporator).

E-A-1 REBOILER: Primary shell is 40½" OD x 14' ⅛" long x ¼" thick 304L SS, secondary shell is 50" OD x 14' ⅛" long x 5/16" thick 304L SS. Tube sheets are 40½" OD x 1¼" thick, 304L SS. Tube bundle consists of 364 1½" OD x 14 ga. seamless SS tubes (Figure B.1b, E-A-1 Reboiler).

P-B-1 RECIRCULATION PUMP: ASTM A296 Gr CF-8 and Gr GF-8, 14,000 gpm capacity.

P-B-2 BOTTOMS PUMP: Variable speed, max. capacity 125 gpm, mechanical seals: 316 SS, shaft 316 SS, impeller and casing: CD4MCU.

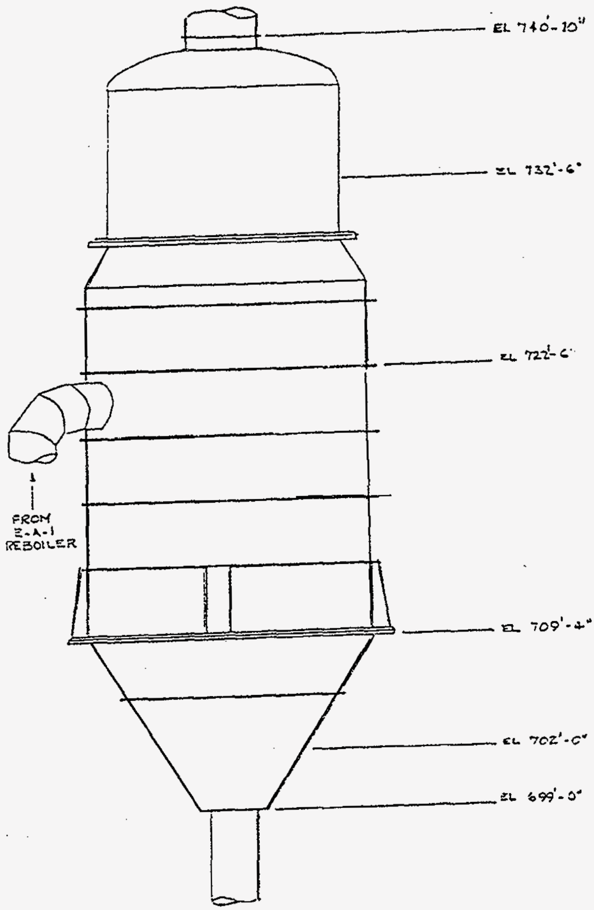

Figure B.1a C-A-1 EVAPORATOR

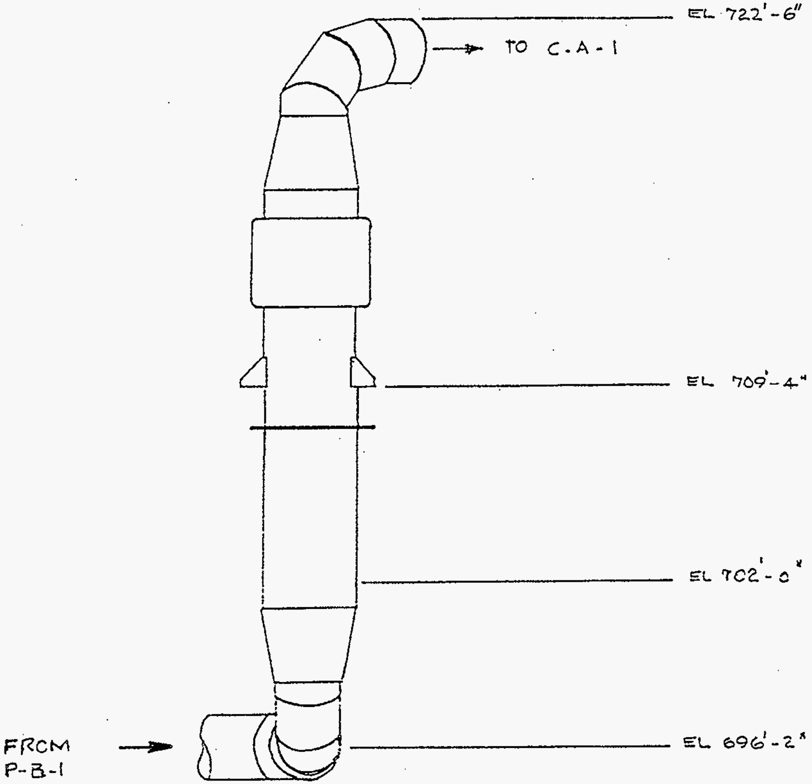

Figure B.1b E-A-1 REBOILER

Piping and Ancillary Equipment

1-1 RECIRC

1-1.1	28" line from C-A-1 to P-B-1 inlet, ¼" thick, SS
P-B-1	Pump
1-1.2	28" line from P-B-1 outlet to E-A-1 inlet, ¼" thick, SS
E-A-1	Reboiler
1-1.3	4" SC-500-M9 (part of system 5 - see line 5.1)
1-1.4	28" line from E-A-1 to C-A-1, ¼" thick, SS
1-1.5	42" line from C-A-1 to E-C-1 (part of system 2 but included here) (5/16" thick, SS)
1-1.6	3" SL.130-M9 from nozzle B to SAMP-F-2 (includes HV-F2-3) SCH 10S, SS
SAMP-F-2	Sampler
1-1.7	1" DR-M9 from HV-F2-4 to just upstream of HV-F2-3, SCH 10S, SS
1-1.8	1" RW-M9 from HV-F2-5 to just upstream of HV-F2-3, SCH 10S, SS
1-1.9	½" RW-M9 from HV-F2-1 to SAMP-F-2, SCH 40S, SS
1-1.10	¾" SL-131-M9 to HV-F2-6 from SAMP-F-2 SCH 10S, SS
1-1.11	1" RW-M9 from HV-F2-2 to 3" SL (just downstream of SAMP-F-2) SCH 10S, SS
1-1.12	3" SL-M9 from SAMP-F-2 to nozzle A (on 28" line), SCH 10S, SS
1-1.13	½" I-CAI-8-M9 from 5-116 to flange H (28" line), 0.035" thick, SS
1-1.14	3/8" FRW-M31 from 5-116B to 5-116, SCH 40S, SS
1-1.15	½" I-CAI-M9 from 5-109 to C-A-1 (G), 0.035" thick SS
1-1.16	½" I-CAI-M9 from 5-110 to C-A-1 (E), 0.035" thick SS
1-1.17	½" I-CAI-M9 from 5-111 to C-A-1 (F), 0.035" thick SS
1-1.18	½" I-CAI-M9 from 5-112 to C-A-1 (D), 0.035" thick SS

1-2 FEED

1-2.1	3" SN-251-M9 from nozzle 13 to SAMP-F-1, SCH 10S, SS
SAMP-F-1	Sampler
1-2.2	¾" SN-250-M9 from HV-F1-2 to SAMP-F-1, SCH 10S, SS
1-2.3	½" RW-M9 from HV-F1-1 to SAMP-F-1, SCH 40, SS
1-2.4	3" SN-251-M9 from SAMP-F-1 to HV-CA1-1, SCH 10S, SS
1-2.5	3" SN-251-M9 from HV-CA1-1 to Nozzle D, SCH 10S, SS
1-2.6	¾" SN-250-M9 from HV_F1-2 to sample bottle, SCH 10S, SS

1-3 SLURRY

1-3.1	3" SL-M9 from nozzle C (28" line), past HV-CA1-2 and HV-CA1-2A to P.B-2 inlet SCH 10S, SS
P-B-2	Pump
1-3.2	2" SL-M9 from P-B-2 outlet, past HV-CA1-3 and HV-CA1-5 to Nozzle 18, SCH 10S, SS
1-3.3	2" SL-M9 from nozzle 19 to HV-CA1-5, SCH 10S, SS

1-3.4 2" SL-M9 from PSV-PB2-1 to 2" SL (upstream of HV-CA1-3), SCH 10S, SS
1-3.5 6" DR-335-M9 (evaporator drop-part of System 7, Line 7.32) from 28" line, past HV-CA1-7 to HV-CA1-9, SCH 10S, SS
1-3.6 2" U-850-M9 (flush line) from 5-47 to HV-cA1-2 and HV-CA1-2A, SCH 10S, SS

2.0 VAPOR CONDENSATE SUBSYSTEM

Major Components

E-C-1 PRIMARY CONDENSER: Shell is 85" ID x 1' 7" long x 1½" thick CS. Tube sheets are 90⅝" OD x 2 7/16" thick CS. Tube bundle consists of 2,950 ¾" OD x 12' long x 0.8" thick seamless CS tubes (Figure B.3, E-C-1 Condenser).

E-C-2 INTER-CONDENSER: Shell is 16" ID x 87" long x 5/16" thick CS (1/16" corrosion allowance). Tube sheets are 16" OD x 1" thick CS. Tube bundle consists of 144¾" OD x 66' long x 16 ga. seamless CS tubes. (NOTE: DIMENSIONAL DISCREPANCIES BETWEEN ASME DATA REPORT AND MANUFACTURER SPECIFICATION TO BE MEASURED DURING WALKDOWN.)

E-C-3 AFTER-CONDENSER: Shell is 8 5/8" ID x 93 7/8" long x 0.322" thick CS (1/16" corrosion allowance). Tube sheets are 8 5/8" OD x 1" thick CS. Tube bundle consists of 45 3/4" OD x 72' long x 16 ga. seamless CS tubes. (NOTE: DIMENSIONAL DISCREPANCIES BETWEEN ASME DATA REPORT AND MANUFACTURER SPECIFICATION TO BE MEASURED DURING WALKDOWN.)

Piping and Ancillary Equipment

2.1 42" VAPOR LINE from C-A-1 covered by System 1 (Line 1-1.5)
2.2 ¾" DECON-817-M42 from 5-69 to flange H (42" line). SCH 40, CS CS/SS
E-C-1 PRIMARY CONDENSER CS
2.3 E-C-1 Condensate Drain to 3-23, CS
2.4 6" VAC-1500-M42 from E-C-1 to J-ECI-1, SCH 40, CS J-EC1-1 EDUCTOR
2.5 10" JET-DISCH-M2 from J-EC1-1 to E-C-2 inlet flange, SCH 40, CS
E-C-2 INTER CONDENSER CS
2.6 E-C-2 Condensate Drain to 4-24, CS
2.7 2½" VAC-1501-M42 from E-C-2 to J-EC2-1, SCH 40, CS
J-EC2-1 EDUCTOR
2.8 4" JET DISCH-M2 from J-EC2-1 to E-C-3 inlet, SCH 40, CS
E-C-3 AFTER CONDENSER, CS
2.9 E-C-3 Condensate Drain to 4-23, CS
2.10 3" V-1202-M42 from Evaporator Room, code change from M8 to M42, through HV-EC1-1, to 3" VAC-1502-M42. SS/CS
M8: SCH40S SS

M42: SCH 40CS

2.11 3" VAC-1502-M42 from 3" V-1202-M42 to 6" VAC-1501-M42.
SCH 40, CS

2.12 6" VAC-1501-M42 from E-C-1 (flange E) and 3" VAC-1502-M42, to
6" VAC-1500-M42

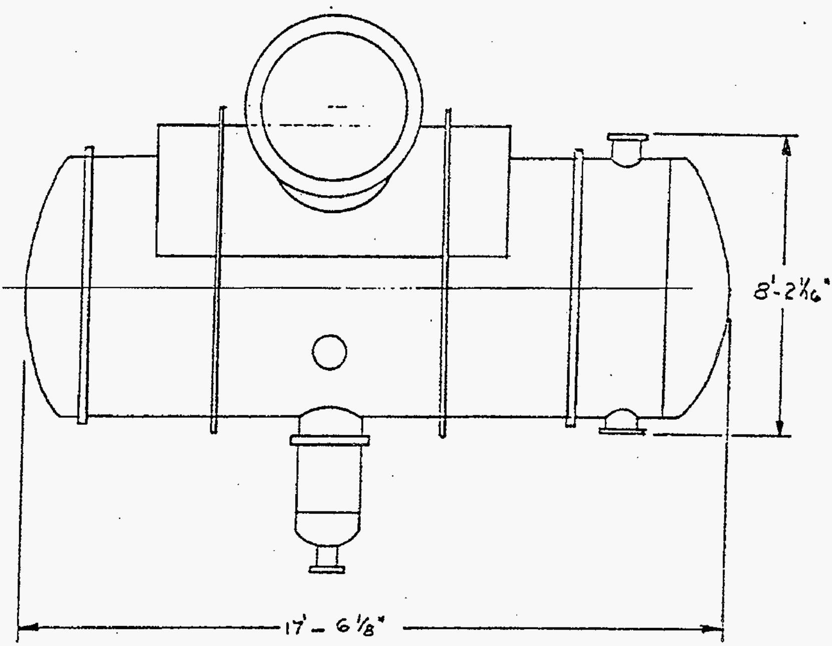

Figure B.3 E-C-1 PRIMARY CONDENSER

3.0 VESSEL VENT SUBSYSTEM

Major Components

None

Piping and Ancillary Equipment

3.13" VV-1001-M42 from E-C-3 outlet, past counter balance damper to 4" x 3" reducer, SCH 40, CS

3.2	3/4" VENT DRAIN-M42 from 3" VV-1001-M42 to 4" VV-1000-M42 SCH 40, CS
3.3	4" VV-1000-M42 from 4" x 3" reducer, past 2 C-5 to TK-C-100 (Flange C), SCH 40, CS
3.4	4" VV-AIR INTAKE-M42 from F-C-7, through damper 3-1, to 4" VV-1000-M42. SCH 40, CS
3.5	4" VV-1000-M42 from just downstream of 4" x 3" reducer to DU-C-1 Deentrainment Unit, SCH 40, CS
3.6	3/4" RW-614-M5 from 3-6to DU-C-1, SCH 40, CS
3.7	½" I-M31 from 3-4 to DU-C-1, 0.035" thick, SS
DU-C-I	DEENTRAINMENT UNIT
F-C-6	PRE-FILTER/DEMISTER
H-C-1	VV HEATER
HV-FC5-1	VALVE
3.8	3/4" DECON-18-M9 from 3-5 to F-C-6 inlet plenum, SCH 10S, SS
F-C-5-1	HEPA FILTER
3.9	1" DR-M42 from F-C-5-1 to seal pot (Nozzle E)
	F-C-5-2 HEPA FILTER
3.10	1" DRA-M42 from F-C-5-2 to seal pot (Nozzle J) CS
HV-FC5-2	VALVE
3.11	1½" DR-337-M42 from downstream of HV-FC5-2 to seal pot (Nozzle G) - Note: H-2-98990 shows this line coming from F-C-5, SCH 40, CS
3.12	Ducting between flex joint and Fan EX-C1
3.13	½" DR-353-M42 from EX-C1 to seal pot (Nozzle H) SCH 80, CS
3.14	Discharge ducting between EX-C1 and building wall
3.15	1" OVERFLOW-M42 from F-C-6 to seal pot (Nozzle K)

4.0 PROCESS CONDENSATE SUBSYSTEM

Major Components

TK-C-100 CONDENSATE COLLECTION TANK: 14' OD x 19' 9 7/8" tall x 5/16" thick, 17,800 gal 347 and 304L SS.

P-C100 CONDENSATE PUMP: Standard end section, single stage, centrifugal pump. CS shaft and impeller with SS shaft sleeve. 10 hp/3,500 RPM motor, capacity is 50 gpm at 110' head.

IX-D-1 ION EXCHANGE COLUMN: 48" OD x 11' 4" long x 3/8" thick CS, 48" OD x ½" thick CS heads. 3 SS mesh screens contained within.

SEAL POT LIQUID SEAL: 18" OD X 24" deep SCH 40 CS pipe

RC-3 RADIATION MONITOR: Standard scintillation radiation monitor for gamma detection.

Piping and Ancillary Equipment

4.1 4" PC-550-M42 from 3-23 (E-C-1) through 3-26, to TK-C-100 (Flange U) SCH 40, CS, CS/SS
4.2 ¾" PC-551-M42 from 4-24 (E-C-2) to TK-C-100 (Flange S) SCH 40, CS, CS/SS
4.3 ¾" PC-552-M42 from 4-23 (E-C-3) to TK-C-100 (Flange L) SCH 40, CS, CS/SS
4.4 2" V-1209-M42 from TK-C-103 (Flange J) to TK-C-100 (Flange R), SCH 40, CS, CS/SS
4.5 1½" PC-553-M42 from seal pot Flange B and Flange A (through 2C-4) to TK-C-100 (Flange F) SCH 40, CS, CS/SS
4.6 ½" PC SAMPLE BYPASS RETURN - SST from HV-RC3-1 to TK-C-100 (Flange E)
4.7 1" PC SAMPLE RETURN - SST from FIAS - RC3-1 to TK-C-100 (Flange E)
4.8 2" PC-562-M42 from TK-C-100 (Flange A), through 1-8, to P-C100 inlet, SCH 40, CS, CS/SS
P-C100 CONDENSATE PUMP
4.9 2" PC-554-M42 from P-C100 outlet, through: SCH 40, CS
1-9
Check valve (?) 2-30
FIT-C100-5
Bypass around FIT-C100-5, including 2-29
2-28
2-26
FV-C100-5
2-24
2-25 (FV bypass NC)
1-11 (F-C-1 bypass NC)
1-12
F-C-1

1-15

4.10 ½" VENT-0M42 from F-C-1, through 1-13A, to 3" DR-380-M24 (drain funnel), SCH 80, CS

4.11 2" PC-555-M42 from 2-37 to 2" PC-556-M42, SCH 40, CS

4.12 2" PC-M42 (back wash disch.) from IX-D-1 (Flange A), through 2-31, to 2-34, SCH 40, CS

4.13 2" PC-559-M42 from 2-34, through SIGHT GLASS 2-39, 2-38, F-C-3, 2-40, 1-37 to SAMP-RC3-1, SCH 40, CS

4.14 2" PC-559-M42 from 2-34 to 2-32 (NC), SCH 40, CS
- <u>NOTE:</u> Discharge of 2-34 is connected to 2" PC-M9. CS/SS (Line continues via 2" flex to TK-C-100 Flange Z)

4.15 2" PC-556-M42 from IX-D-1 (Flange H) thru: SCH 40, CS
1-31
1-32
1-28
FE-RC3-1
1-21
PCV-RC3-1
1-18
TO: HV-RC3-3 Diversion Valve

4.16 4" PC-557-M42 from HV-RC3-3, SCH 40, CS

4.17 3" PC-558-M42 from HV-RC3-3, through 1-16, to TK-C-100 (Flange B) SCH 40, SS, CS/SS

4.18 3" DR-338-M42 from 3" PC-558-M42 (Downstream of HV-RC3-3), through 1-17, sight glass, to sample valve 1-14, SCH 40, CS

4.19 3" DR-338-M24 from sample valve 1-14 to TK-241-AW-102, SCH 40, CS

4.20 2" PC-559-M42 from SAMP-RC3-1 through 1-27 to 2" PC-556-M42 (just downstream of 1-28) SCH 40, CS

4.21 2" PC-M42 (back wash) from 2" PC-556-M42 (downstream of 1-31), through 1-30 to IX-D-1 (Flange M), SCH 40, CS

4.22 3" DR-339-M42 (resin out) from IX-D-1 (Flange N), through 1-23, to 3" DR-338-M42, SCH 40, CS

4.23 3" DR-340-M42 from IX-D-1 (Flange K), through 1-24, to 3" DR-338-M42, SCH 40, CS

4.24 Resin fill line from IX-1 to IX-D-1 (Flange C). <u>NOTE:</u> Pipecode not specified on P & ID or engr. flow drawings. Assume to be CS.

4.25 3" OVERFLOW from IX-D-1 (Flanges P and 1-50), thru 1-51, to 2" DR-341-M24 floor drain (no pipe code specified). See Note 1.

4.26 2" OVERFLOW from IX-D-1 (Flanges O and 1-52), thru 1-53, to 2" DR-341-M24 floor drain (no pipe code specified). See Note 1.

4.27 1" DR-M42 from F-C-3 drain pan to 2" DR-382-M2 drain funnel, SCH 40 CS

4.28 ½" DR-M42 (sample) from 2" PC-556-M42 (upstream of FE-RC3-1), through 1-26, to 2" DR-382-M2 drain funnel. SCH 80 CS

4.29 ½" DR-336-M42 from sample valve (line no. 4.18), through 1-25, to 2" DR-382-M2 drain funnel. SCH 80, CS

IX-D-1 Ion Exchange Unit
TK-C-100 Condensate Collection Tank
SEAL POT Liquid Seal
F-C-3 Duplex Filter
RC-3 Sample Rack and Radiation Monitor

4.30 2" PC - Sample drain from RC-3 to 3" DR-370-M24 Floor Drain. - NOTE: Pipe code not specified. Assume to be SS.
4.31 4" PC-550-M42 loop through 3-24, FE-EC1-2, 3-25
Note 1: Both overflow lines are routed to 2" floor drain via flex hose.
4.32 1" V-1203-M42 from 4" PC-550-M42 (FE Loop, Line 4.31) to 3" V-1202-M42, SCH 40 CS
4.33 3" DR-359-M42 from TK-C-100 (Flange V), through 1-3A, code change to M24, to 6" DR-343-M2, SCH 40 CS
4.34 3" OVFL-1801-M24 from TK-C-100 (Flange G), through seal loop, code change to M24, to 3" DR-359-M42, SCH 40 CS

5.0 STEAM CONDENSATE DISPOSAL SUBSYSTEM

Major Components

TK-C-103 FLOW MEASUREMENT TANK: 72" LONG x 42" WIDE x 36" DEEP x ¼" thick CS, with 304L SS wier plate.

RC-1 RADIATION MONITOR: Standard scintillation radiation monitor for gamma detection.

Piping and Ancillary Equipment

5.1 4" SC-500-M9 from E-A-1 reboiler, into condenser room/pipe code change from M9 to M2), past 2-14B, to inlet of steam traps (3)
M9: SCH 10S SS
M2: SCH 40 CS SS/CS
NOTE: Section of 4" pipe passing through evaporator/condenser room wall is M8, SCH 40S SS
5.2 There are three steam traps, each with two isolation valves and a drain valve. All piping in this trap network is code M2 and ranges in size from ½" to 4". The traps all drain into 1" SC-511-M2.
½" M2, SCH 80 CS
1" M2, SCH 40 CS
3" M2, SCH 40 CS
4" M2, SCH 40 CS
5.3 4" SC-500-M2 discharge from trap network, through 2-11 diversion valve HV-EA1-2, SCH 40, CS
5.4 4" SC-M2 from trap network, through 2-13 to diversion line (bypasses HV-EA1-2) 4" SC-502-M2, SCH 40, CS
5.5 4" SC-500-M2 (normal) from HV-EA1-2, through 2-9, to TK-C-103 (Flange A) SCH 40, CS
5.6 4" SC-502-M2 (divert) from HV-EA1-2, through 2-10, changes to 4" SC-503-M2, and then back to 4" SC-502-M2, and finally to 10" DR-334-M27
- NOTE: Pipe identification numbers don't agree with engineering flow diagram.
5.7 ¾" SC-Sample - M31 from TK-C-103 (Flange M), through valve RC1-7, (past 2-2), SAMPLE COOLER, to pump P-RC-1. 0.035"

thick, SS
- <u>NOTE:</u> B100 Spec for M31 code is < ½"
B534 Spec for M31 code is ¼" - 2"

P-RC-1 SC SAMPLE PUMP

5.8 ½" SC-SAMPLE-M31 from P-RC-1 discharge, code change to M2, to HV-RC1-1 SS/CS
M31: 0.035 thick SS
M2: SCH 80 CS

5.9 ½" SC-SAMPLE and RETURN M31 from HV-RC1-1 (normal), through RC-1, RC1-18, FIAS-RC1-1, check valve, by-pass RC1-34 around CE STM-1 & AE STM-1 code change to M2 at 2-5, to TK-C-103 (Flange H) SS/CS
M31: 0.035" thick SS
M2: SCH 80 CS

5.10 ½" SC-SAMPLE BYPASS-M31 from HV-RC1-1 (divert), through RC1-4, to ½" SC - SAMPLE AND RETURN - M31 (downstream of check valve) 0.035" thick SS

5.11 ½" SC-GRAB SAMPLE - M31 from ½" SC-SAMPLE AND RETURN - M31 to RC1 - 17. 0.035" thick SS

5.12 ½" FLUSH - M31 from FLUSH FUNNEL, through HV-RC1-4, to ½" SC-SAMPLE AND RETURN M31. 0.035" thick SS

5.13 ½" DRAIN - M5 (code M31 at intersection) from ¾" SC-SAMPLE-M31, through 2-1, to 6" DR-343-M24 drain funnel.
M5: SCH 40 SS CS/SS
M31: 0.035" thick SS

5.14 ½" SC-DRAIN-M31 from HV-RC1-1, through HV-RC1-2, code change to M2 to 6" DR-343-M24 drain funnel
M31: 0.035" thick SS
M2: SCH 80 CS

5.15 ½" SAMPLE-M31 from ½" SC-SAMPLE AND RETURN - M31 to HV-RC1-5

5.16 ½" SC-SAMPLE/PURGE from HV-RC1-5 to RC1 SAMPLE RACK (pipe code not shown on drawing)

5.17 ½" SC-PURGE-M31 from HV-rC1-5 to TK-C-103 (Flange D) 0.035" thick SS

5.18 2" V-1209-M42 from TK-C-103 to TK-C-100 (covered in PC system - line 4.4)

5.19 4" OVERFLOW-1802-M2 from TK-C-103 (Flange C), past 2.5A, through seal trap, to 4" SC-502-M2
SCH 40 CS

5.20 1" SC-511-M2 from (steam trap drains 1" SC-500-M2 (at outlet of 2-14B), through 2-14A, to 4" SC-503-M2. SCH 40, CS

5.21 4" SC-501-M2 from TK-C-103 (Flange B) to HV-RC1-3 SCH 40, CS

5.22 4" SC-501-M2 from HV-RC1-3 (divert) to 4" SC-503-M2 SCH 40, CS

5.23 4" SC-501-M2 from HV-RC1-3 (normal) to steam condensate retention basins. SCH 40, CS

5.24 1" SC-DRAIN - M2 from RC-1 SAMPLE RACK to 6" DR-343-M24 DRAIN FUNNEL SCH 40, CS

6.0 RAW WATER DISPOSAL SUBSYSTEM

Major Components

RC-2 RADIATION MONITOR: Standard scintillation radiation monitor for gamma detection.

Piping and Ancillary Equipment

6.1 12" URW-1600-M5 from E-C-1, through FE-EC1-1, 3-22, FV-EC1-1, 3-21, to FE-RC2-1, SCH 40, CS

6.2 12" URW-1600-M5 bypass around FV-EC1-1 through 3-20 assume 12" SCH 40, CS

6.3 3" URW-1602-M5 from E-C-3 Piping for FV EC3-1 to 12" URW-1600-M5. SCH 40, CS

6.4 12" URW-1601-M5 from FT-RC2-1, through SAMP-RC2-1, HV-EC1-2, code change to M-24, to TEDF
M5: SCH 40 CS
M24: SCH 20, 0.250 thick, CS

6.5 ½" URW-SAMPLE-M31 from 12" URW-1600-M5, through HV-RC2-5, to HV-RC2-1. 0.035" thick SS, CS/SS

6.6 ½" URW-SAMPLE-M31 from SAMP-RC2-1, via section of ½" flex, to SAMPLER RECEIVER. 0.035" thick SS

6.7 ½" SAMPLE (no code) from 12" URW-1601-M5, through 2-21. Assume to be M5: SCH 40 CS

6.8 ½" URW-SAMPLE RETURN-M31 (divert) from HV-RC2-1, code change to SST, to 12" URW-1601-M5 SS/CS
SST: SS
M31: 0.035" thick SS
M5: SCH 40 CS

6.9 ½" URW-SAMPLE-M31 (normal) from HV-RC2-1 to RC-2 RADIATION MONITOR, 0.035" thick SS

6.10 ½" URW-SAMPLE RETURN-M31 from RC-2 RAD. MON., through RC2-11, code change to SST, to ½" URW-OVERFLOW and VENT-M31
M31: 0.035" thick SS
SST: SS

6.11 ½" FLUSH-M5 from hose connection, through RC2-7, to ½" FLUSH-M5, between RC2-6 and RC2-8
M5: SCH 40 CS

6.12 ½" FLUSH-M31 from SAMPLER RECEIVER, through RC2-8 and RC2-6, code change from M5 to M31, to SAMP-RC2-1 CS/SS
M5: SCH 40 CS
M31: 0.035" thick SS

6.13 ½" Drain (code not specified) from SAMPLE RECEIVER, through RC2-14 to ½" URW-OVERFLOW and VENT-M31
Assume SS

6.14 ½" URW-OVERFLOW and VENT-M31 from SAMPLE RECEIVER (code change from M31 to SS) to 3" DR-380-M24 DRAIN FUNNEL - SST
M31: 0.035" thick SS (flows to 2" DR-382-M24 drain funnel)

6.15 1" DR-SST from SAMPLE RECEIVER to 1" URW-SAMPLE DRAIN-SST, SS

6.16 ½" URW - SAMPLE RETURN-M31 loop from RC2-3, through F1AS-RC2-1
M31: 0.035" thick SS

7.0 BUILDING AND SECONDARY CONTAINMENT SUBSYSTEM

Major Components

BUILDING/SECONDARY CONTAINMENT: The 242-A Evaporator building consists of an operating area of approximately 3,800 square feet and a control, office area of 3,000 square feet.

The operating area is a poured-in-place concrete structure divided into six operating areas or rooms separated by poured-in-place concrete walls. The evaporator room and pump room have 22-in. thick concrete walls and the loadout and hot equipment storage room has three 22-in. walls. The wall on the loading room side and the loading room walls are all 12-in. thick. These four rooms comprise the wester half of the operating area. The eastern half of this area is divided into two rooms, the condenser room and the aqueous makeup room. The walls for this portion of the operating area are 12-in. poured walls. There is a room for HVAC equipment above the AMU room.

Floor slabs on grade are typically 6 in. thick except 8 in. in the loading room and 20 in. in the evaporator and condenser rooms.

The pump room floor is lined with 11 gage stainless steel sheet. The floor of the condenser, evaporator, loadout and hot equipment rooms are covered with a special protective coating (SPC). The same SPC is used on the pump room walls and all surfaces of the pump room cover blocks. The condenser room walls are covered to elevation 688'-0" (6 ft above floor). The evaporator room walls are also covered to the same elevation. Walls of the loadout and the hot equipment storage rooms are painted with SPC to elevation 704'-6".

Outside the north wall at the northeast corner of the condenser room is an ion exchange room. It is 6 x 9 ft with 12-in. walls. The interior surfaces, including the floor and all surfaces of the cover blocks, are coated with SPC.

The special protective coating used for this building is Phenoline 305, a modified phenolic manufactured by the Carboline Company. This coating is a 100% solids, catalyzed, room temperature curing non-yellowing white finish. It is resistant to:

3% Nitric acid
3% Sulfuric acid
25% Sodium hydroxide.

It will withstand 5 x 9^9 rad without serious damage.

Three coats with a minimum coverage of 12 mils (0.012 in.) was specified.

The process section of the facility is well supplied with floor drains and sumps, where appropriate. There are also drain funnels and equipment drain facilities. The drain facilities are kept segregated so that those most likely to be contaminated may be recycled without special effort.

<u>Piping and Ancillary Equipment</u>

7.1 2" VENT-M24 from 6" DR-358-M24 to AMU. SCH 40, CS
7.2 1" SC DRAIN-M2 covered by Sys 5 (5.24)
7.3 ½" DRAIN-M5 from R-C-1 SAMPLE COOLER to 10" funnel, covered by Sys 5 (5.13)
7.4 2" VENT-M24 from 6" DR-343-M24, via HEPA filter to condenser room. SCH 40, CS
7.5 3" DR-359-M42 covered in Sys 4 (4.33)
7.6 2" DR-348-M42 (with five 4" funnels and safety shower catch pan) to 4" drain funnel - all in condenser room. SCH 40, CS
7.7 Deleted
7.8 Not used
7.9 ½" PC-563-M42 from 3" OVFL Seal Loop, through 1-5, to 4" drain funnel (condenser room). SCH 80, CS
7.10 ½" PC-563-M42 from 1-3 to 4" DRAIN FUNNEL (Condensate Room) ½" SCH 80, CS
7.11 2" PC-SAMPLE DRAIN covered in Sys 4 (line 4.30)
7.12 ½" DR-378-M42 from 2" PC-554-M42 (upstream of FIT-C100-5), through2-29 and 1-10 to 4" drain funnel (Condenser Room) SCH 80, CS (½")
7.13 ½DR-378-M42 from 2" PC-554-M42 (downstream of FIT-C100-5), through 1-10, to 4" drain funnel (Condenser Room) SCH80,CS (½") SCH 40, CS (2")
7.14 1" DR-M42 covered in Sys 4 (4.27)
7.15 ½" DR-M42 covered in Sys 4 (4.28)
7.16 1 1/2" URW-SAMPLE DRAIN - SST covered in Sys 6 (6.14)
7.17 ½" VENT-M42 covered in Sys 4 (4.10)
7.18 ½" DR-349-M42 from F-C-1, through 1-13, to 2" DR-380-M24 drain funnel SCH 80, CS
7.19 3" line from IX-D-1 (Flange P) to 3" DR-338-M24. Covered in Sys 4 (4.25)
7.20 3" line from IX-D-1 (Flange O) to 3" DR-338-M24. Covered in Sys 4 (4.26)
7.40 Deleted
7.21 2" DR-420-M27 from SAMP-F-1 sample station funnel to Decon sump. SCH 40S SS
7.22 2" DR-420-M27 from SAMP-F-2 sample station funnel to 2" DR-420-M27. SCH 40S SS
7.23 1½" DR (no code specified) from P-B-2 drip pan to 6" drain funnel (pump room)
7.24 ½" SEAL WTR OUT (no code specified) from P-B-2 pump seal to 6" drain funnel (pump room)
7.25 ½" SEAL CAVITY DRAIN from P-B-1 pump seal to 6" drain funnel (pump room) (no code specified)
7.26 1½" SEAL WTR OUT from P-B-1 pump seal to 6" drain funnel (pump room) (no code specified)
7.27 3" SL-M27 from PSV-PB2-1 to 10" DR-334-M27. SCH 40S, SS
7.28 2" DR-351-M27
7.29 2" DR-402-M8 from 6" drain funnel (pump room) to pump room

sump, SCH 40S SS
7.30 4" DR-502-M2 from 4" SC-503-M2 to 10" DR-334-M27. CS/SS
M2: SCH 40 CS
M27: SCH 40S SS
7.31 3" DR-338-M24 covered by Sys 4 (4.19)
7.32 6" DR=335-M9 to HV-CA1-9 covered by Sys 1 (1-3.5)
7.33 2" U-852-M9 from RW Supply, through 5-44 HV-CA1-8 5-40 to 6" DR-335-M9. SCH 10S SS
7.34 6" DR-335-M27 from HV-CA1-9 to building wall. SCH 40S SS

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Table B.1a APPLICABLE P&ID DRAWING LIST

P&ID No.	P&ID DRAWING TITLE	P&ID DRAWING NUMBER
1	Process Condensate System	H-2-98990, Sht. 1 (Rev. 8, dated 10/96)
2	Steam Condensate System	H-2-98993, (Rev. 11, dated 9/97)
3	Used Raw Water System	H-2-98994, (Rev. 8, dated 10/97)
4	Drain System	H-2-98995, Sht. 1, (Rev. 10, dated 10/97)
5	Drain System	H-2-98995, Sht. 2, (Rev. 4, dated 3/95)
6	Evaporator Recir. System	H-2-98988, Sht. 1, (Rev. 4, dated 11/96)
7	Evaporator Recir. System	H-2-98988, Sht. 2, (Rev. 4, dated 10/96)
8	Vacuum Condenser System	H-2-98999, Sht. 1, (Rev. 10, dated 8/96)
9	Vessel Vent System	H-2-98998, Sht. 1, (Rev. 10, dated 6/95)

APPENDIX C: ASSESSMENT SUMMARY SHEETS

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: C-A-1 Evaporator

Reference Drawing: H-2-98988, Sht. 1, Rev. 0

Design	Operating
Temp. 200°F	Temp. 120°F
Pressure: Full Vacuum	Pressure <0.8 psia

Leak Test	Date/Initials
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

==

_____ System or Component Acceptable

_____ System or Component Require Further Evaluation
Reference: ________________________________

Cognizant/Project Engineer ____

Cognizant/Project Manager ____

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: E-A-1 Reboiler

Reference Drawing: Vendor CVI #20253 (Dwg. 71-04-31000-D1)

Design	Operating
Temp. 350°F (Shell), 250°F (Tubes)	Temp. 250°F
Pressure: 100 psig (Shell)	Pressure: 29.7 psia (Shell)
Full Vacuum (Tubes)	16,000 gpm (Tubes)

	Date/Initials
Leak Test	
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

==

______ System or Component Acceptable

______ System or Component Require Further Evaluation
Reference:______________________________

Cognizant/Project Engineer______________________________

Cognizant/Project Manager______________________________

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: E-C-1 Condenser (Shell)

Reference Drawing: H-2-78281 Sht. 1, Rev. 1

Design	Operating
Temp. 150°F	Temp. 95°F
Pressure: 100 psig (Tubes) Full Vacuum (Shell)	Pressure: 0.8 psia

Leak Test	Date/Initials
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. Walkdown	______/______
2. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

==

______ System or Component Acceptable

______ System or Component Require Further Evaluation
Reference: ______________________________

Cognizant/Project Engineer______________________________________

Cognizant/Project Manager______________________________________

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: E-C-2 Condenser (Shell)

Reference Drawing: Shutte & Koerting Specification Sheet

Design	Operating
Temp. 350°F	Temp. 150°F
Pressure: 100 psig to Full Vacuum (Shell) 100 psig (Tube)	Pressure: 1.0 psia

Leak Test	Date/Initials
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. Walkdown	______/______
2. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

==

_____ System or Component Acceptable

_____ System or Component Require Further Evaluation
Reference: ________________________________

Cognizant/Project Engineer ________________________________

Cognizant/Project Manager ________________________________

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: E-C-3 Condenser (Shell)

Reference Drawing: Shutte & Koerting Specification Sheet

Design	Operating
Temp. 350°F	Temp. 170°F
Pressure: 100 psig to Full Vacuum	Pressure: 14.0 psia (Shell)
100 psig (Tube)	150 gpm (Tubes)

Leak Test	Date/Initials
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. Walkdown	______/______
2. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

==

_____ System or Component Acceptable

_____ System or Component Require Further Evaluation
Reference: ________________________________

Cognizant/Project Engineer ____

Cognizant/Project Manager ____

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: TK-C-100 Condensate Catch Tank

Reference Drawing: H-2-40704 & H-2-69357, Sht. 1, Rev. 2

Design	Operating
Temp. Not Available	Temp. 151°F
Pressure: 5 psig	Pressure: 14.0 psig

Leak Test	Date/Initials
1. Walkdown	______/______
2. Leak Test	______/______
Inspection	
1. Walkdown	______/______
2. NDE	______/______
Design Standard Comparison	
1. Design Standard Comparison Complete	______/______
Corrosion Evaluation	
1. Compatibility Assessment Complete	______/______

===

______ System or Component Acceptable

______ System or Component Require Further Evaluation
Reference: ________________________________

Cognizant/Project Engineer ____

Cognizant/Project Manager ____

242-A EVAPORATOR
ASSESSMENT SUMMARY SHEET

Component/System: Building/Secondary Containment

Reference Drawing: H-2-69276 thru 85 & H-2-69265

Design	Operating
UBC, 1972	Temp. (Not Applicable) Pressure: (Not Applicable)

Inspection	Date/Initials
1. Walkdown	______/______

==

Design Standard Comparison

1. Design Standard Comparison Complete ______/______

Corrosion Evaluation

1. Compatibility Assessment Complete ______/_____

==

_____ System or Component Acceptable

_____ System or Component Require Further Evaluation
Reference:______________________________

Cognizant/Project Engineer____

Cognizant/Project Manager____

APPENDIX D: ASSESSMENT TASK AND TASK PROVIDER SUMMARY

Table D.1a ASSESSMENT TASK AND TASK PROVIDER SUMMARY

TASK ITEM	ACTION/TASK	LMHC ACTION	FDNW TASK	COMMENTS
	A. Prepare Tank Assessment Plan			
1	Review drawings and associate ECNs for facility modifications	N	Y	Required to determine changes to the facility for evaluation of tank system.
2	Review vessel code date sheets	N	Y	To support leak test and UT of tank system
3	Review construction specification pipe codes for material specifications	N	Y	To support UT examinations
4	Determine UT examination requirements	Y	Y	Evaluate support equipment, procedures, etc.
5	Determine locations on tank systems to be UT examined	N	Y	
6	Determine leak test requirements	Y	Y	Such things as operational requirements, schedules, and procedures.
7	Determine requirements for facility walkdown/inspection/surveillance	Y	Y	
8	Determine and evaluate qualification and certification requirements for personnel performing walkdown inspections, UT exams, and leak test(s)	Y	Y	
9	LMHC (or WMH) will provide assistance in evaluating the secondary confinements for the tank systems	Y	Y	Includes modifications to building, new penetrations through walls or floors, condition of coatings, etc.
10	LMHC will provide operations data	Y	N	Operations logs, unusual occurrence reports, radiologfical occurrence, off-normal condition/event reports, and post run.
11	LMHC will provide input of dst waste characteristics and on last corrosion evaluation as to applicability of present waste being treated.	Y	N	
12	LMHC will provide status of last assessment report deficiencies.	Y	N	
13	LMHC will provide input to support the use of the last assessment's design standards evaluation. (WHC-SD-WM-DP-019, Rev. 0)	Y	N	
14	LMHC will provide input on the internal visual examination of the condensers.	Y	N	LMHC to evaluate and arrange internal inspection of the E-C-1 Condenser and provide written response to the IQRPE
15	LMHC will provide operating parameters of tank systems.	Y	Y	Flow rates and pressures for C-A-1, E-A-1, etc.
16	LMHC will provide internal operations organizationa structure of the 242-A facility	Y	N	
17	Evaluate need or requirement to have third party inspector.	Y	Y	Insurance underwriter inspector for pressure vessels involved with this tank assessment.

TASK ITEM	ACTION/TASK	LMHC ACTION	FDNW TASK	COMMENTS
18	Draft deficiency on pump room sump decondary confinement - sump wall can not be evaluated or provied secondary confinement.	Y	Y	
19	Draft deficiency of transfer piping penetrations given in last tank assessment.	Y	Y	
20	Determine scope of assessment based on last assessment.	Y	Y	Drawings, ECNs, and LMHC input
21	Define out-of-scope issues	Y	Y	Corrosion analysis, structural analysis, codes/standards analysis, etc.
22	Review WAC for tank system requirements.	N	Y	
23	Review last tank assessment report.	N	Y	
24	Develop (or copy) figures for IAP.	N	Y	
25	Develop list of documents to be provided by LMHC to IQRPE for review.	Y	Y	NDE procedures, personnel qualification procedures, personnel certifications for walkdowns, leak tests, corrosion tests, etc.
26	Develop draft of 242-A facility tank IAP.	N	Y	
27	Determine and define deliverables.	N	Y	
28	Review references from last 241-A tank IAR.	N	Y	
29	IAP TO LMHC for review.	N	Y	
30	Incorporate LMHC comments into IAP.	N	Y	
31	Final review of IAP.	Y	Y	
32	Incorporate final IAP comments.	N	Y	
33	Issue IAP to LMHC.	N	Y	
	Review LMHC Submitted Data			
1	Procedure for leak testing the 242-A tank system.	Y	Y	
2	Procedure for UT examinations.	Y	Y	
3	Procedure for qualifying NDE and leak test personnel.	Y	Y	NDE means ultrasonic and visual testing.
4	NDE and leak test personnel certifications.	Y	Y	
5	Work package for performing walkdowns and surviellances, leak testing, NDE, condenser examination, and other preparations necessary for the IAR.	Y	Y	

TASK ITEM	ACTION/TASK	LMHC ACTION	FDNW TASK	COMMENTS
6	LMHC letter defining waste characteristics.	Y	Y	
7	LMHC letter defining waste characteristics and corrosion.	Y	Y	
8	LMHC letter defining secondary confinement evaluation	Y	Y	
9	LMHC letter defining status of last assessment report deficiencies.	Y	Y	
10	LMHC provided operations data	Y	Y	242-A facility operations logs, unusual occurrence reports, radiological occurrence reports, off-normal condition/event reports, etc.
11	LMHC letter providing concurrence to use last IAR's design standards evaluation.	Y	Y	
12	LMHC letter providing operational parameters of 242-A tank systems.	Y	Y	
13	LMHC letter providing internal operations organizational structure for the 242-A facility.	Y	Y	
	Walkdown/Surveillance/Inspection of 242-A Tank Systems			
1	Perform walkdowns/surveillance/inspection of tank systems.	Y	Y	
2	Assist in input to walkdowns/surveillance/inspection reports.	N	Y	
3	Review and evaluate final inspection reports.	N	Y	
	Leak Testing of 242-A Tank Systems			
1	Perform leak testing of tank systems.	Y	N	
2	Review and evaluate final inspection reports.	N	Y	
	UT Examination of 242-A Tank Systems			
1	Perform UT examination of tank systems.	Y	N	
2	Review and evaluate final inspection reports.	N	Y	
	Condenser Evaluations			
1	Perform visual examination of condenser components.	Y	Y	
2	Review and evaluate final inspection reports.	N	Y	
	Prepare 242-A Integrity Assessment Report			
1	Develop list of drawings, and ECNs for 242-A facility modifications.	N	Y	

TASK ITEM	ACTION/TASK	LMHC ACTION	FDNW TASK	COMMENTS
2	Evaluate the results of the UT examinations	N	Y	
3	Prepare figures with datafor locations and extent of UT examinations.	N	Y	
4	Evaluate leak test results including definition of tank systems that were tested.	N	Y	
5	Evaluate the results of the facitliy walkdown/inspection/surveillance.	N	Y	
6	Review and evaluate references of personnel qualification/certification requirements for walkdowns, UT, and leak test of 242-A tank systems.	N	Y	
7	Evaluate input concerning the facility secondary confinement data.	N	Y	
8	Evaluate operations data.	N	Y	Operations logs, unusual occurrence reports, radiological occurence reports, off-normal condition event reports, post-run reports, etc.
9	Evaluate input on waste characteristics.	N	Y	Chemical, physical, thermal, and nuclear.
10	Evaluate any new deficiencies for the IAR.	N	Y	
11	Evaluate last IAR's design standards evaluation.	N	Y	
12	Evaluate internal visual examination reports of condensers.	N	Y	
13	Evaluate operating parameters of tank systems.	N	Y	Flow rates and pressures for C-A-1, E-A-1, etc.
14	Evaluate internal operations organization structure of the 242-A facility.	N	Y	
15	Evaluate deficiency of pump room sump secondary confinement.	N	Y	Sump wall can not be evaluated or provide secondary confinement.
16	Evaluate deficiency on transfer piping penetrations given in last IAR.	N	Y	
17	Provide figures for IAR.	N	Y	
18	Develop reference lists.	N	Y	
19	Develop draft IAR.	N	Y	
20	IAR to LMHC for review.	N	Y	
21	Incorporate comments into IAR.	N	Y	
22	Final review of assessment report.	N	Y	
23	Incorporate final comments into IAR.	N	Y	

TASK ITEM	ACTION/TASK	LMHC ACTION	FDNW TASK	COMMENTS
24	Issue IAR to LMHC.	N	Y	Hard copy and electronic file.
	Miscellaneous Activities			
1	Meetings.			
2	Field trips.			Including entry into 242-A.
3	Clerical.			
4	Management.			

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