ENGINEERING CHANGE NOTICE

1. ECN 644602

Proj. ECN NA

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	E. A. Pacquet/TWRS P&D/R3-47/373-2684	[] Yes [X] No	10/28/97
	6. Project Title/No./Work Order No. RCSTS/W-058	7. Bldg./Sys./Fac. No. N/A	8. Approval Designator SQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-W058-SUP-002, Rev. 0 - Total Revision	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

See attached ECN Continuation sheet.

14a. Justification (mark one)

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

14b. Justification Details

The W-058 Test Plan has been revised to reflect recent Project/Operations discussions regarding testing boundaries (see ECN attached).

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

See attached distribution sheet

RELEASE STAMP

DATE: NOV 05 1997

STA: 4

HANFORD RELEASE

ID: 3

ENGINEERING CHANGE NOTICE	Page 2 of 3	1. ECN (use no. from pg. 1) 644602

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

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

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

Document Number/Revision	Document Number/Revision	Document Number Revision

21. Approvals

	Signature	Date
Design Authority	Warren Brown Warren A Brown	10/31/97
Cog. Eng.	E. A. PACQUET	10/28/97
Cog. Mgr.		
QA	L.P.HALL(FONW) Lam R Hall	10/29/97
Safety	M. O'Brien Jules (M.O'BRIEN JR/FOR)	10/28/97
Environ.		
TWRS Engineering		10/31/97
TWRS Operations		10-29-97
Fac. Engrg Mgr.	R E Larsen	10/31/97

	Signature	Date
Design Agent		10/28/97
PE		
QA		
Safety		
Design		
Environ.		
Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

Overall document revised for clarification. Main changes include:

- The Cross Site Transfer is a stand alone system that connects to the existing tank farms (East and West) with jumpers in 244A and SY A and B.

  Based on a common agreement between the W-058 Project and Tank Farm Operations, all testing described herein will be performed prior to jumper installation in 244A and SY A and B in order to:

  - Eliminate the risk of contamination of the new system before all practicable testing is completed.
  - Minimize waste generation to the tank farms resulting from testing.
  - Avoid repetitive access to the pits.

  In consideration of the above and the fact that projects such as simple piping systems typically do not require operational testing (HNF-PRO-446 "Test Requirements), operational testing of the Cross Site Transfer System is not deemed necessary. Inclusion of operations personnel throughout the preoperational testing phases in this specific case will satisfy training requirements normally fullfilled in the performance of a true operational test.

- Revised testing boundaries. All preoperational and operational testing will be performed prior to jumper installation in 244A and SY-A and B.

- Flush system is tested in a closed circuit around a temporary water tank in order to eliminate any risk of contamination of the system by the existing flush tank.

- The integrated preoperational test is performed in a closed circuit. The boundary combines testing of both headers between the diversion box and vent station.

- In order to account for the new testing boundary and eliminate redundant testing Preoperational Testing, Integrated Closed Circuit Test (HNF-SD-W058-POTP-007) cancels and replaces:

  HNF-SD-W058-OTP-001, Transfer Header 3150
  HNF-SD-W058-OTP-002, Transfer Header 3160

PROJECT W058 STARTUP TEST PLAN

E. A. Pacquet
Numatec Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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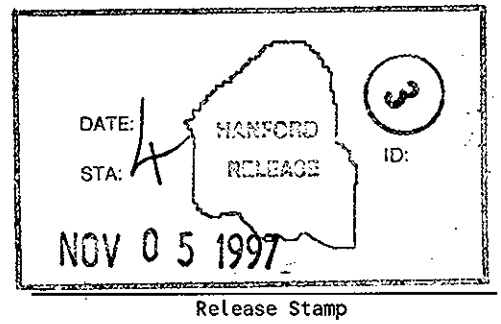

Release Approval 11/5/97 Date

Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-W058-SUP-002	Page 1

(2) Title
Project W058 Startup Test Plan

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
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1 RS	Fully revised per ECN number 644602	EA Pacquet 11/4/97	GL Parsons 11/4/97

HNF-SD-W058-SUP-002
Revision 1

Project W-058
Startup Test Plan

TWRS Approval:

10/28/97
Lead Startup Engineer

11/3/97
Project Manager

11/3/97
Tank Farm Engineering

11/3/97
Tank Farm Operations

11/3/97
Safety

10/29/97
Quality Assurance

Fluor Daniel Northwest Concurrence:

Project Construction Manager

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1.0 PURPOSE

This Test Plan provides a detailed written plan for the sequential and systematic startup testing of Project W-058, Cross Site Transfer. It develops the outline for test procedures that show system performance to Project design criteria.

2.0 SCOPE

The Test Plan encompasses overall testing activities. The Test Interface Diagram identifies specific testing activities by system and the responsible organization for performance. The Cross Site Transfer System Interface Diagram is displayed in Appendix 8. Startup testing includes tests performed before connection of systems to the waste tanks, Preoperational Testing. Startup testing activities begin concurrently with the completion of acceptance testing, and finish with preoperational testing.

3.0 ADMINISTRATIVE

3.1 SAFETY INFORMATION/COMMUNICATIONS

The Control Room will be the central communication point for all testing and other activities. The following items will be available:

- Test Exception Log
- Electrical Panel Lockout Status List
- Electrical Panel Key Cabinet and Log
- Blue-Tag Issue and Log Station
- Controlled Drawing Set
- Worker/Visitor Sign In

Once testing begins, all Project W058 work-related activities (construction, testing, and operation) will be released by the W058 Test Director. Release will occur via the daily briefing held by the Test Director. Applicable safety information will be exchanged and communicated at that time.

During the performance of ATPs and POTPs, the Test Director will be the direct line of communication and centralized point of control during normal, abnormal and casualty situations.

Blue tags are not safety related, but will be placed by test engineers to indicate systems and components under test. Test engineers will maintain the blue-tag log, which will be located in the control station. Blue-tagged systems, structures, or components shall not be disturbed without clearance from the control station.

Startup team may request lock and tag, working through the contractors lock and tag station. Plant personnel will perform lock and tag under Plant procedures.

3.2 Assignments of Responsibility

Test Director - and Alternate
Responsibilities: The Test Director will be responsible for the safe, efficient, and productive accomplishment of the tests necessary to achieve startup. His primary responsibilities are to ensure: 1) safe working conditions and practices during preoperational tests; 2) compliance with test documents during the performance of ATP and POTP testing; 3) during performance testing he shall ensure compliance with test documents, Operational Safety Requirements/Documents (OSRs/OSDs), all administrative controls, standing orders and JCOs; 4) communication and coordination of test with the Tank Farm Shift Managers if required; 5) appropriate review/approval of any modifications to test plans prior to resumption of work; and 6) for the release of all work items (construction, testing and operation). Release will occur via the daily shift briefing.

Project Interface with Construction- Carl Van Katwijk/Jim Gilbert
Responsibilities: Will be the Project link for all communications with Construction. Will be responsible for coordinating day to day routine activities involving construction.

Tank Farm Shift Office- Certified Tank Farm Shift Manager
Responsibilities: The building emergency director/event commander responsibilities for Project W-058 remain with the Tank Farm Shift Manager.

Project Interface with Operations - Responsibilities: Will act as the Project interface with operations including operator and technician support as needed.

Startup Test Engineers -
Responsibilities: For each subsystem, the applicable Startup Engineer will be responsible for: 1) preparing test documents and startup documentation; 2) directing the preoperational tests for that subsystem; 3) coordinating the personnel and materials necessary to perform the tests; 4) documenting test results; 5) providing technical support and input to the Test Director; 6) reviewing test documents to validate acceptance; 7) preparing post-testing documents; and 8) all other activities identified in WHC-SD-W058-SUP-001, Revision 0, including POTP change control. The applicable Startup Engineer reports to Projects.

FDNW Construction Interface with the Project-
Responsibilities: Will provide support, as needed, for lock and tag, rework, and troubleshooting. He may draw assistance from subcontractors as needed. All communication with construction must be conveyed through the Construction Interface. All work must be released by the Test Director.

Testing Support/Startup Coordination- Responsibilities: 1) Will be responsible for support of testing, as needed. 2) Will also coordinate all startup activities for the Project.

3.3 Test Review Board

Startup testing activities will be governed by a dedicated Test Review Board (TRB). The TRB concept was conceived as a way to expedite review and resolution of testing issues and approval of test procedures and results. The TRB will be organized and will function in accordance with reference HNF-PRO-446; TESTING PRACTICES REQUIREMENTS.

The following organizations shall provide a permanent member of the W-058 TRB:

TWRS Safety
Quality Assurance
TWRS Operations
TWRS Engineering
W-058 Projects Startup (TRB Chair)
FDNW Construction
Project Manager W-058 (Alt. Chair)
Design Authority
Joint Test Oversight Group

If the member is unavailable, an alternate will be named. Temporary TRB members will be designated and will be called on as needed, e.g. from other NHC groups, FDNW Engineering, DOE-RL Projects, or a specific vendor representative.

The permanent TRB members will meet briefly on a regular basis (monthly as a minimum) to resolve test issues and to sign off test documents. Each TRB member will have technical authority to fully represent his/her organization and approve all test-related documents. A TRB member needing additional expertise from his/her organization will be responsible for obtaining same and coordinating related reviews. Delegation of signature authority for this application is appropriate and in compliance with reference HNF-PRO-224, DOCUMENT CONTROL. If a member happens to be author of a document in review, his manager will sign for him.

When appropriate, regular TRB meetings will be initiated (i.e. weekly). A commitment to attend all meetings is required, and an alternate should be designated when necessary.

It is understood that the functions of the TRB will include as a minimum those listed below for Project W-058:

- Review and approval of appropriate test plans and specifications.
- Review and approval of all Project test-related procedures (standard formats and Operational Test Procedures, OTPs).
- Review and approval of test schedules and turnover plans.
- Review and approval of ATP and OTP test results and reports to verify acceptability of the tested component, subsystem, or system and to ensure that documentation is controlled consistent with HNF-PRO-224, DOCUMENT CONTROL.
- Resolve test issues as needed and as requested by the W-058 startup team.
- Conduct pre-test readiness walkdowns when requested by the startup team.
- Review and approve ECNs against Project test documentation.

3.4 Test Configuration Control

A statement of deviation will be issued for project W-058 troubleshooting and startup activities and will be used for completion of Test Phase 1 through 3 only. All design changes must be as-built before the Cross Site Transfer System final jumper installation occurs. The various documents used in the process of pre-operational testing will be controlled as outlined below. Field changes may be made as required to bring systems into compliance with the approved design; a test log entry will be made to document changes. (any field changes will require inspections as to original installation and ECNs if design changes are required).

A graded approach will be used for documenting discrepancies found during procurement, construction and testing activities. Five different reporting mechanisms are available to be used when a problem is found; Nonconformance Reports (NCR), Deficiency Reports, Hold Notices, Surveillance and Audits, and a Variance Log. The proper reporting mechanism is selected based on the work being performed, the severity of the discrepancy, and the safety significance of the system impacted. Any of the above mechanisms can be upgraded to an NCR if the deficiency has sufficient importance. This graded approach is a cost effective way to assure that deficiencies are identified, and dispositioned in a manner commensurate with the seriousness of the problem.

- A variance log, see Figure 1, will be established and the master copy will be on hand. An entry will be made in the variance log for non-technical changes and design changes. Entries will also be made for non-conforming items for safety class equipment which will require a Non Conformance Report to be processed. Each entry in the variance log will record date, description and signature of the person making the entry. Closure of an entry will require a description of the resolution of the problem, safety class identification, if any and a signature for closure of the item.

- Acceptance Test Procedures (ATP) and Pre-Operational test procedures (POTP) are released as Supporting Documents and contain their own change control requirements in accordance with HNF-PRO-440 DOCUMENT CONTROL; minor (changes not affecting operating facility safety, function,or performance and will not compromise or influence test date) red-line corrections are allowed. Requirement changes, changed to acceptance criteria, or changes to Danger, Caution, Special Precautions, or other safety or environmental instructions in test procedures prepared as supporting documents must be made through an Engineering Change Notice (ECN). These procedures are approved by the W-58 Test Review Board (TRB).

- Process/Instrument Diagrams (P&ID) are the top-level baseline documents governing system configuration. They will be as-built, along with those drawings listed in memo NHC-969240, by FDNW and released prior to testing. The P&IDs will be validated during the testing process as noted below. Correction will be noted using a red-lining process, to identify discrepancies between the drawings and field installation, as described below. The red-lined corrections will be incorporated in the final as building effort and a new revision of the drawings will be released.

- Applicable instrument, control and electrical drawings (latest released versions) will be on hand for reference during testing. These include loop, single-line, equipment installation, and elementary wiring diagrams, as well as wiring installation drawings. Applicable released Engineering Change Notices (ECN) will be on-hand to verify the latest approved system configuration. If errors are discovered, they will be red-lined in the same manner as P&IDs above. These drawings will be reissued as part of the final as-building effort.

- MCS logic diagrams will be made available for testing. A special section of the change log will be devoted to potential logic changes to be resolved at the end of the pre-op testing phase and will include all actual logic-related changes made (such as interlock timer settings). All changes will be incorporated into the logic diagrams and released as part of the final as-building effort.

- Applicable Vendor Information (VI) shall be on hand for reference during testing.

- Validation process for P&IDs:
  As testing is accomplished, each P&ID will be highlighted in detail as being correct. When each drawing is fully validated, this shall be so noted on the master copy and signed by the test engineer. At the completion of planned preoperational testing, any features found not to have been so highlighted, will be investigated, and the need for additional testing will be evaluated by the W-058 TRB.

- Red-line process:
  A full set of controlled drawings will be located in the W-058 control building on a stick file. Each will have a designated control stamp affixed.

  If errors are found, the authorized test engineer will mark the correction on the affected sheet in red, sign/date the change, and enter a notation in the variance log.

A full set of released ECNs will be available.

Field corrections may be made on the spot as needed to facilitate testing. The change will be followed within 48 hours by submitting a draft Project field-change ECN to the FDNW Engineering Project Manager to be processed in accordance with previous standing instructions and agreements for construction changes. Field corrections will be entered in the variance log. (See Figure 1)

Draft field-change ECNs will be approved by the originating test engineer and plant facility cognizant engineer (for plant modifications) and assigned a unique temporary serial number; a block of temporary ECN numbers will be assigned for this purpose. Copies of each ECN will be forwarded immediately to the W-058 Project and Q/A Engineers. Approval of field change ECNs must be received within one work week of issuance.

Incorporation of ECNs will be done according to in-place agreements for W-058 as-building at completion of the test program.

4.0 STARTUP TEST PLAN

4.1 Description

The Project W-058 Test Program includes factory and construction acceptance tests performed in accordance with Construction Specifications and Acceptance Test Procedures (ATPs), and system functional tests performed in accordance with Pre-operational Test Procedures (POTPs). In addition, Calibration, Grooming, and Alignment (CGA) tests will be performed in preparation for performance of ATPs. Testing will be performed in phases as noted below, as required to meet contractual milestone obligations related to Official Acceptance of Construction (OAC) and Operational Readiness Review (ORR):

Test Phase/ Performed by	Description	Timing
Phase I Tests/ Constructor	Factory Acceptance Tests, CGA, CAL/groom/ align package	Pre-OAC I
Phase II Tests/ Constructor	ATP, Acceptance Test Procedure	Pre-OAC I
Phase III Tests/ Startup Group	POTP, Pre-Operational Test Procedure	Pre-ORR

Note that all testing will be performed prior to any jumper installation. The CGA tests will cover initial instrument calibration and will be performed by the constructor under his work control system (FDNW Process Control Package, PCP). The Startup Group consists of a team of personnel made up of Operations, Project test engineers and construction crafts.

This Startup Test Plan provides a detailed written plan for preoperational and operational testing of the project. A detailed description of testing to be performed on each system is provided in Appendices A1 through A8. The description of testing includes test boundaries, testing within each boundary, test objectives, system conditions, and system interface requirements. Functional testing is summarized in Table 1. Technical bases for testing is summarized in Table 2. Procedures are also listed in Reference 7.10 and 7.11.

A key element of the Startup Test Plan is to maximize the amount of testing performed prior to connection of equipment to the contaminated systems in 200 East and 200 West Tank Farms and to minimize testing after such connection. The use of temporary jumpers that connect the transfer header 3150 to transfer header 3160, will allow testing of most design functions before connecting the transfer headers in the respective tank farms.

4.2 Factory Acceptance Testing

Factory Acceptance Tests (FAT) will be performed by the vendor to demonstrate compliance with procurement specifications. FATs will be conducted for the transfer booster pumps and the Monitor and Control System (MCS).

The booster pumps will undergo a performance test using a vendor supplied motor to verify pump performance and develop pump performance curves. The pumps will then undergo a run-in test using the variable speed drives and motors purchased for project W-058.

The MCS will undergo a burn-in test of 5 days minimum. The factory test procedure shall also include testing to demonstrate compliance with the procurement specification as follows:

- 100% of all analog and discrete I/O points
- Verification of database entry
- Simulation of a typical control scheme
- Tag functionality
- Simulation of a typical control loop
- Retrieval of data
- Verification of each type of alarm
- Display features
- Verification of trending features
- Data archiving
- Verification of supervisory actions for each display type
- Control function
- Alarm logging to printer and storage disk

4.3 Construction Acceptance Testing

Acceptance tests will be performed by equipment vendors and the Construction Contractor to demonstrate compliance with fabrication, assembly, installation, and construction requirements as identified in procurement and construction specifications. This includes the equipment and software for the (MCS/PLC) Monitor and Control System. A complete listing of ATPs is given in Reference 7.9.

The ATPs shall be prepared by the Engineering/Construction Contractor with input from vendors as needed. They will confirm such things as initial instrument calibration, wiring tests, correct motor rotation, no-load motor current and baseline vibration, and proper operation of local and remote control devices and vendor tests of packaged equipment. ATPs prepared in this manner will simplify turnover of systems from the Construction Contractor to the Startup Group. All process input signals are to be simulated at the sensor. Actual process input and alarm parameters will be used for the execution of the ATPs. All discrete output signals will be initiated from the MCS. All analog signals are to be displayed at the MCS. All instruments will be calibrated before the initiation of a test procedure.

4.4 Preoperational Testing

Preoperational testing will be performed by the Project Startup Group prior to start of initial process operations to verify that components, subsystems, and systems perform their intended design function before activating systems in their operating environment. Integrated system and subsystem testing is performed under non-radiological conditions to the maximum extent practical. Preoperational testing will verify the feasibility of automatic and manual control of the transfer systems.

Preoperational testing includes testing of components, subsystems, and system operation to verify setpoints for alarms, control functions, and normal operating values for system parameters.

This testing will also demonstrate any required system response to potential abnormal operating conditions such as critical component failure, loss of signal from process detectors, and loss of utilities (air, water, electrical power).

4.5 Operational Testing

The Cross Site Transfer is a stand alone system that connects to the existing tank farms (East and West) with jumpers in 244A and SY A and B.

Based on a common agreement between the W-058 Project and Tank Farm Operations, all testing described herein will be performed prior to jumper installation in 244A and SY A and B in order to:

- Eliminate the risk of contamination of the new system before all practicable testing is completed.
- Minimize waste generation to the tank farms resulting from testing.
- Avoid repetitive access to the pits.

In consideration of the above and the fact that projects such as simple piping systems typically do not require operational testing (HNF-PRO-446 "Test Requirements), operational testing of the Cross Site Transfer System is not deemed necessary. Inclusion of operations personnel case throughout the preoperational testing phases in this specific will satisfy training requirements normally fullfilled in the performance of a true operational test.

4.6 Jumper Installation and Testing Boundary

The Cross Site Transfer System is a stand alone system that connects to the existing tank farms (East and West) with jumpers in 244A and SY A and B.

Based on a common agreement between the W058 Project and Tank Farm Operations, all testing described herein will be performed prior to any jumper installation in 244A and SY A and B in order to:

- eliminate the risk of contamination of the new system before all practicable testing is completed,
- minimize waste generation to the tank farms resulting from testing and,
- avoid repetitive access to the pits.

Hence, the preoperational testing described herein will be performed prior to connecting the new system and will demonstrate and verify adequate system performance within the identified boundaries which exclude 244A and SY A and B (See Appendix 7, section 2). Test results will be reviewed by the W-058 Test Review Board (TRB) and any appropriate changes made to control methodology and operating procedures before jumper installation.

5.0 SYSTEM BOUNDARIES

5.1 Purpose

Project W-058 systems have been divided into specific system boundaries that are used as the basis for planning and implementing the Startup Test Program. These boundaries define specific system/subsystem boundaries for startup testing and turnover of systems, subsystems, and components from the Construction Contractor to the Startup Group.

The system boundaries identified in this Startup Test Plan should be used as the basis for preparation of Startup Turnover Packages, ATPs, and POTPs. There should be a one-to-one relationship between system boundaries and the turnover packages and test procedures.

5.2 Description

Project W-058 systems have been divided into several specific systems identified in Table 1. System boundaries have been established to include enough components, subsystems, and systems within each boundary to allow a meaningful amount of testing and to allow the maximum amount of testing to be performed prior to connecting the systems to the tank farms.

A summary of Project W-058 systems, test boundaries, and Preoperational Test Procedures that perform testing within each system boundary is provided in Table 1. A diagram and written description of each boundary is provided in Appendices A1 through A5. On the diagrams, the area within the dashed line is the specified boundary. Adjacent boundaries are identified only when necessary to clearly identify a specific boundary.

5.3 System Turnover

Following completion of all construction and acceptance testing activities within a given system boundary, the Construction Contractor shall transfer control of all components, subsystems, and systems within that boundary to the Startup Group. The Startup Group will participate in any OAC walkdowns to ensure that completed systems are in fact ready for testing.

Following turnover of a system to the Startup Group, the system boundary may separate systems on which construction activities are still in progress from those systems which have startup activities taking place. Blue tags will be placed on all components/systems turned over to the Startup Group. Construction and startup personnel may be working in close proximity, therefore control of system boundaries and strict

compliance with the administrative requirements concerning turnover of systems is absolutely essential for the safe conduct of construction activities and preoperational testing.

6.0 TEST METHODS

6.1 General

6.1.1 Initial Conditions (pre-requisites):

6.1.1.1 Construction acceptance testing on components within and including the test boundary has been completed and all deficiencies have been resolved. The Startup Group has accepted control of components, subsystems, and systems within and including the boundary.

6.1.2 During construction acceptance testing, test engineers and/or construction craft shall manually cycle all valves and dampers and verify proper operation. Construction shall also verify proper failure positions ("fail open" or "fail close") as applicable.

6.1.3 During test operation of each system, verify that all system instrumentation (local and [MCS/PLC]) indicates the expected normal operating values for system parameters (temperature, pressure, differential pressure, flow, electric current, etc.).

6.2 Instrumentation and Control

6.2.1 Initial calibration of instrumentation and cable testing should be performed by the Construction Contractor (prior to acceptance testing) before system turnover to the Startup Group.

6.2.2 When verifying (MCS)indications and alarms, include those received at the control room console and at local control units (PLCs) when applicable.

6.2.3 Demonstrate that alarms are actuated as required in case of abnormal conditions (e.g. loss of electrical power and loss of signal from the applicable process detector).

6.2.4 Perform functional tests to demonstrate proper operation of instrumentation and control loops and process controllers (hard and soft) without operation of the process system (to the maximum extent practical). This should be completed by the Construction Contractor and should include final calibration of all instruments.

6.3 Functional Tests

6.3.1 *Specific testing steps in POTP tests may be satisfied using data transfer if other tests/checks have satisfied the requirements.* Functional tests are performed to demonstrate that a system functions properly or to verify proper configuration, integrity, and operation of instrumentation and control loops. Functional testing will verify that field devices have been properly connected to instrumentation and control systems.

6.3.2 Tests are performed by injecting a simulated or actual signal into an instrumentation loop system or as close as practical to the applicable transducer to verify an alarm, indication, interlock, or control function is functioning properly. Adjustments, as necessary, are performed so that actuation points are within the required range and accuracy.

6.3.3 System response can be verified by observing actual equipment response or by checking the position of appropriate contacts, lights, or relays. Actual equipment response should be used whenever possible.

6.3.4 Functional tests of instrumentation loops shall be performed at a minimum of five points (increasing and decreasing): lowest input signal (zero), 25% of full scale, 50% of full scale, 75% of full scale, full-scale, and at setpoints for alarms, interlocks, or control functions.

6.4 Temporary Modifications

6.4.1 The use of temporary jumpers will also allow construction, turnover, and operational testing of Project W-058 systems to be performed independently of construction work on the valve pits at the tank farms. Final connections will be made following the completion of testing.

6.4.2 Temporary filter assemblies will be installed as required by test procedure (e.g. on the transfer header vent line at the vent station to support system operation prior to connection to the waste tank farms).

6.5 Equipment and Materials

6.5.1 Required test instruments and startup consumables will be identified in the individual test procedures.

7.0 REFERENCES

7.1 WHC-SD-W058-FDC-001, Functional Design Criteria for Project W-058, Replacement of Cross-Site Transfer System.

7.2 Project W-058 Startup Plan, WHC-SD-W-058-SUP-001, Rev 0.

7.3 HNF-PRO-572, Project Acceptance and Closeout.

7.4 Project W-058 Cross Site Transfer System Descriptions.

7.5 Diagrams, Project W-058 Cross Site Transfer System
H-2-822400, Sh.1-3, P&ID Legend
H-2-822401, Sh.1, P&ID Tank 241-SY-102
H-2-822402, Sh.1, P&ID SY Valve Pits
H-2-822403, Sh.1, P&ID Diversion Box 6241-A
H-2-822404, Sh.1, P&ID Vent Station 6241-V
H-2-822405, Sh.1, P&ID Lift Station 244-A
H-2-822406, Sh.1, P&ID Instrument Air System Diversion Box 6241-A
H-2-822407, Sh.1, P&ID Instrument Air System Vent Station 6241-V
H-2-822505, Sh.1, Electrical One-Line Diversion Box 6241-A
H-6-14009, Sh.1, Electrical One-Line Ventilation Station
H-2-822440, Sh.1, Instrumentation Plan, Elev, Detail, & Elementary Diagram
H-2-822441, Sh.1-2, Electrical Plan, Elev, Detail & Elem Diag.
H-2-822513, Sh.1-9, Electrical Elementary Diagrams Diversion Box 6241-A
H-2-822400, Sh.1, P&ID Tank 241-SY-102

7.6 Construction Specifications

Technical Requirements Buried Pipeline For Replacement of the Cross Site Transfer System, W-058-C1.
Pipeline Tie-ins For Replacement of the Cross Site Transfer System, W-058-C2.
Diversion Box/Vent Station For Replacement of the Cross Site Transfer System, W-058-C3.
Flush System for Replacement of the Cross Site Transfer System, W-058-C5.

7.7 Procurement Specifications

Slurry Transfer Pump, W-058-P1
Process Monitor and Control System, W-058-P2
Process Instruments, W-058-P5
Horizontal End Suction Centrifugal Pump, W-058-P6
Compressed Air System, W-058-P8

Air Operated Ball Valves, W-058-P9
Rupture Discs, W-058-P10
Electric Circulating Heating System, W-058-P11
Chemical Feed System, W-058-P12

7.8 MCS Logic Diagrams

ES-058-Y40 Logic Diagram Symbols & Def.
ES-058-Y41 Logic Diagram Scheme-1 241-SY-A to 241-SY-A-B
ES-058-Y42 Logic Diagram Scheme 2A 241-SY-B to 241-A-A
ES-058-Y43 Logic Diagram Scheme 2B 241-SY-B to 241-A-A
ES-058-Y44 Logic Diagram Scheme 3 241-A-B to 241-SY-A
ES-058-Y70 Logic Diagram Xfr Permissives
ES-058-Y71 Logic Diagram Transfer Valves
ES-058-Y72 Logic Diagram Leak Detection Control Logic
ES-058-Y73 Logic Diagram Valve Leak
ES-058-Y74 Sh.1-2, Logic Diagram Booster Pumps
ES-058-Y75 Logic Diagram Transfer Pump Interlocks
ES-058-Y76 Logic Diagram Abnormal Pump Operation
ES-058-Y77 Logic Diagram Master Shutdown
ES-058-Y78 Logic Diagram Booster Pump Interlocks
ES-058-Y79 Sh. 1-2, Logic Diagram Booster Pump P-3125A Drain Valves
ES-058-Y80 Sh. 1-2, Logic Diagram Booster Pump P-3125B Drain Valves
ES-058-Y81 Sh. 1-4, Logic Diagram Vent Valves
ES-058-Y82 Logic Diagram Miscellaneous Interlocks

7.9 ACCEPTANCE TEST PROCEDURES

HNF-SD-W058-ATP-001, Leak Detection System
HNF-SD-W058-ATP-002, Diversion Box/Vent Station Instrumentation
HNF-SD-W058-ATP-003, 244A & SY Farm Instrumentation
HNF-SD-W058-ATP-004, Booster Pump 3175A and 3125D
HNF-SD-W058-ATP-005, Water Flush System and Instrumentation
HNF-SD-W058-ATP-006, SY Farm and 244A Lift Station Jumper Instrumentation

7.10 PRE-OPERATIONAL TEST PROCEDURES

HNF-SD-W058-POTP-001, Preoperational Testing, Cross Site Transfer Water Flush System
HNF-SD-W058-POTP-002, Preoperational Testing, Diversion Box Instrument Air System
HNF-SD-W058-POTP-003, Preoperational Testing, Vent Station Instrument Air System
HNF-SD-W058-POTP-004, Preoperational Testing, Slurry Transfer Header 3160
HNF-SD-W058-POTP-005, Preoperational Testing, Supernate Transfer Header 3150
HNF-SD-W058-POTP-006, Preoperational Testing, Vent Station and Diversion Box Ventilation

HNF-SD-W058-OTP-001, Integrated Preoperational Testing, Closed Circuit Test

7.11 FACTORY ACCEPTANCE TESTS

Specification W-058-P2, Submittal # 7, Monitor and Control System

VI 22798, Supp 28, Pump Performance Documentation

7.12 PRELIMINARY SAFETY ANALYSIS REPORT

WHC-SD-W058-PSAR-001, RCSTS Preliminary Safety Analysis Report

FIGURE 1. W-058 Variance Log (Example)

W-058 VARIANCE LOG						
Date	Drawing #	Description of Variance	Found by	Resolution (Record redlines in Mod Log)	S/C	Verified Complete SC2 requires AI

TABLE 1: Preoperational Testing for Project W-058

Boundary Description		Preoperational Test Procedures
1	Cross Site Transfer Water Flush System	Preoperational Testing, Cross Site Transfer Water Flush System. HNF-SD-W058-POTP-001
2	Diversion Box Instrument Air System	Preoperational Testing, Diversion Box Instrument Air System. HNF-SD-W058-POTP-002
3A	Vent Station Instrument Air System	Preoperational Testing, Vent Station Instrument Air System. HNF-SD-W058-POTP-003
4	Slurry Transfer Header and Booster Pump	Preoperational Testing, Slurry Transfer Header and Booster Pumps. HNF-SD-W058-POTP-004
5	Supernate Transfer Header	Preoperational Testing, Supernate Transfer Header HNF-SD-W058-POTP-005
6	Monitor and Control System (MCS/PLC)	Preoperational testing of the Monitor and Control System (MCS/PLC) is performed in concert with the preoperational test procedures for the individual Project W-058 systems.
7	Vent Station and Diversion Box Ventilation.	Preoperational Testing, Vent Station and Diversion Box Ventilation. HNF-SD-W058-POTP-006
8	Electrical Power Service and Distribution System	Preoperational testing of the Electrical Power Service and Distribution System is performed in concert with the preoperational test procedures for the individual Project W-058 systems.
9	Integrated Testing of Cross Site Transfer system.	Integrated preoperational test of system. HNF-SD-W058-POTP-003, Closed Circuit Test.

TABLE 2: Technical Bases for Testing, Project W-058

System/Equipment	Commitment	Test Source I.D.
Cross Site Transfer Headers	Piping systems to be flushed and leak tested. Valves to be tested for proper operation and sequencing. Booster pumps to be performance tested.	Construction Specification W-058-C1, C2, C3, ASME B31.3, WHC-SD-W058-FDC-001
Water Flush System	Piping systems to be flushed and leak tested. Flush water pump to be performance tested. Chemical addition system and in line heaters to be performance tested.	Construction Specification W-058-C5, WHC-SD-W058-FDC-001, ASME B31.3.
Electrical Service and Distribution System	Wiring and equipment test for continuity, unintentional grounds, proper phase sequence and voltage. Motors checked for proper rotation, voltage and current agree with nameplate data. HiPot testing of Power Transformers and cables shall be conducted. Conduct performance testing of Standby Power System.	Construction Specification W-058-C1, C3 & C5, WHC-SD-W058-FDC-001
Monitoring and Control System	Conduct software and system performance testing.	Construction Specification W-058-C3, WHC-SD-W058-FDC-001
Instrumentation	Instrument tubing to be flushed and leak tested, wire continuity test to be performed from instruments to readout devices. Electrical testing per section 16400 of W-058-C3.	ISA-RP7.1, Construction Specification W-058-C1,C2, C3 & C5, WHC-SD-W058-FDC-001
Instrument Air	Piping to be flushed and leak tested. Air compressor package to be performance tested and air dryers checked to ensure -40°F dewpoint can be obtained.	Construction Specification W-058-C3, WHC-SD-W058-FDC-001, ASME B31-3
Heat Trace System	Megger heat trace cable, energize each circuit and measure voltage and current. Verify operation of temperature controls.	Construction Specification W-058-C5, WHC-SD-W058-FDC-001
R.W.,. WDS, VTL.	Piping to be flushed and leak tested.	Construction Specification W-058-C3, WHC-SD-W058-FDC-001, ASME B31-3
HVAC	Control system functional test. HVAC System functional test and balance.	Construction Specification W-058-C3, WHC-SD-W058-FDC-001, ASME N510

APPENDICES

1.0 Scoping Boundary

Boundary 1: Cross Site Transfer Water Flush System

2.0 Boundary Description

The Water Flush System boundaries are shown on Figure A1-1 and are designated as boundary #1.

The Water Flush System is divided into two separate boundaries, one for the flush tank recirculation and one for the chemical addition, to provide additional flexibility while performing preoperational testing.

In order to maintain the flush system clean, preoperational testing will not use the flush tank (TK-302-C), identified as containing radiological contamination. The flush tank recirculation and chemical addition circuits will be tested in isolation from the flush tank using a temporary water tank.

3.0 Test Procedures

Preoperational Testing, Cross Site Transfer Water Flush System, HNF-SD-W058-POTP-001

4.0 Startup Testing

Preoperational testing will be performed on the Water Flush System in isolation from the flush tank. Testing of the Water Flush System may commence independently of the transfer header testing.

Preoperational testing will include testing of components, subsystems, and system operation to verify or determine setpoints for alarms, control functions, and normal operating values for system parameters.

5.0 System/Facility Conditions

Construction acceptance testing on components within and including the test boundary has been completed and all deficiencies have been resolved. The Startup Group has accepted control of components, subsystems, and systems within and including the boundary and has access to the area.

Installation of the 4" service water supply piping to the flush tank and recirculation piping from the flush tank to the in-line heaters and back to the flush tank is complete.

6.0 Interfacing Systems

Temporary Water Tank
A temporary water tank is connected and operational.

Service Water
The Service Water System is connected to the temporary water tank and is available to supply make-up water.

Monitoring and Control
The Monitoring and Control System is connected and operational.

Electrical Power Service and Distribution
The Electrical Power Distribution System is installed and available to supply power from Switchgear SWG-E-001 to the applicable Bussed Gutter A or B.

7.0 Preoperational Testing Objectives/Specifications

7.1 Flush Pump: P-3100A

7.1.1 Demonstrate proper operation of local controls and verify; (1) pump can be controlled by the Local START/STOP switch, (2) local control switch in STOP inhibits MCS controls (Locally implemented Interlocks I-18)

7.1.2 Demonstrate proper operation of MCS controls; for example, verify; (1) pump can be controlled from the MCS ON/OFF switch, (2) the pump will shutdown upon manual activation of "STOP" state,(3) the will startup upon manual activation of the "START". (MCS implemented interlocks I-18)

7.2 Flush Tank Sump Pump: P-302C-3

7.2.1 Demonstrate proper operation of local controls and verify; (1) pump can be controlled by the Local START/STOP switch.

7.3 Flush Tank: TK-302-C

7.3.1 Determine normal operating values for flush tank level indication.

7.3.2 Simulate low level signal to verify interlock shuts down flush pump.

7.4 Flow Element: FE/FT-302C-1

7.4.1 Adjust initial system flow with the recirculation line valve as required to provide the specified flow rate. The flowmeter is

used to provide indication of flow rate.

7.4.2 Perform a functional test of the flow instrumentation loop and verify proper instantaneous flow on the MCS.

7.5 In-line Heater Temperature Elements: TE-302C-4A, TE-302C-4A1, TE-302C-4B, TE-302C-4B1

7.5.1 Perform a functional test of the in-line heater outlet temperature instruments and verify: (1)correct temperatures are indicated on the MCS, (2) high temperature alarm is actuated at the correct setpoint.

7.6 In-line Heater Flow Switch: FSL-302C-4A, FSL-302C-4B.

7.6.1 Perform a functional test of the heater outlet flow switch and verify heaters are de-energized at the correct setpoint.

7.7 Water Flush System

7.7.1 Conduct a flush pump performance test. Verify flush pump performance at sufficient operating points (head/flow) to verify the performance curve and to document system effects.

7.7.2 Conduct a performance test of the in-line heaters.

7.7.3 Operate the system and verify that applicable system instrumentation (PLC and MCS) indicate expected normal operating values for system parameters (temperature, pressure, differential pressure, flow, electric current, etc.).

7.7.4 Operate the system and determine setpoints and normal operating values for all required system parameters.

7.8 Chemical Addition System (using water)

7.8.1 Conduct chemical addition pump performance test. Verify chemical addition pump performance at sufficient flow points.

7.8.2 Conduct a barrel heater performance test.

7.8.3 Flow Transmitter: FE/FT-302C-2, set flow as required, functional test to verify proper indication of flow and total flow at MCS/PLC, verify chemical addition pump responds to flow signal with proportional pump flow.

7.8.4 Operate the system and verify that applicable system instrumentation (PLC and MCS) indicate expected normal operating

values for system parameters (pressure, differential pressure, flow, electric current, etc.)

7.9 Flow Transmitter: FE/FT-302C-2

Perform a functional test of the flow transmitter and verify; (1) that proper flow rate and total flow is indicated at the designated MCS/PLC display.

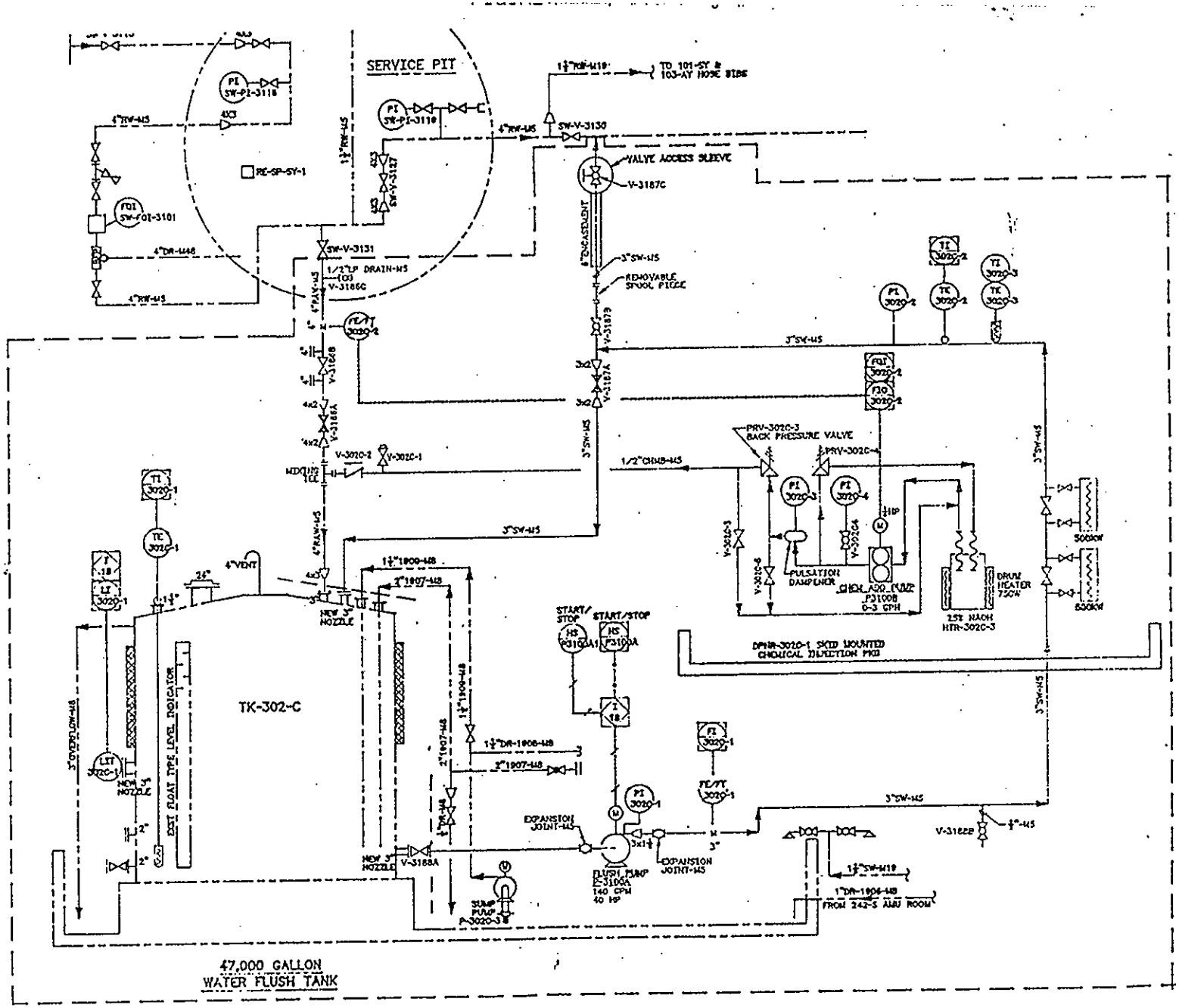
7.10 Service Water System

7.10.1 Determine maximum flow rate that can be provided.
7.10.2 Operate the system and verify instrumentation (PLC and MCS) indicate expected normal operating values for system parameters (flow rate).

8.0 Integrated Test Objectives

Integrated testing is not anticipated. Acceptance and preoperational tests verify design requirements.

FIGURE A1-1, Boundary #1



1.0 Scoping Boundary

Boundary A2: Cross Site Slurry Transfer Header 3160

2.0 Boundary Description

The Transfer Header boundaries are shown on Figures A2-1 - A2-2 and is designated boundary #2A. The boundary excludes 244A and SY-A and B.

3.0 Test Procedures

Preoperational Testing, Slurry transfer Header, HNF-SD-W058-POTP-004

4.0 Startup Testing

Preoperational testing will be performed on transfer header 3160, in dry conditions (no water testing).

Operational testing of Transfer Header 3160 with water will be performed as part of the closed circuit operational test and include testing and operation of the booster pumps.

5.0 System/Facility Conditions

Construction acceptance testing on components within and including the test boundary has been completed and all deficiencies have been resolved. The Startup Group has accepted control of components, subsystems, and systems within and including the boundary. Access to the Diversion Box and the Vent Station will be required to perform this testing.

6.0 Interfacing Systems

Instrument Air Systems
The Diversion Box Instrument Air System and the Vent Station Instrument Air System must be able to supply air to their respective transfer header loads.

Monitoring and Control (MCS/PLC)
The Monitoring and Control System is connected and operational.

Electrical Power Service and Distribution
The Electrical Power Distribution System is installed and available to supply power to switchboards SB-1 and DP-1.

7.0 Preoperational Testing Objectives/Specifications

7.1 Pressure Transmitters: PT-3125A, PT-3125B, PT-3125C, PT-3125D, PT-3126B, PT-3103, PT-3101, PT-842

7.1.1 Verify MCS/PLC indication, alarms and interlocks.

7.2 Pressure Switches: PSH-3183, PSH-3173, PSH-3168, PSH-3167.

7.2.1 Verify MCS /PLC indication, alarms and interlocks.

7.3 Transfer Header Valve Operation

7.3.1 Cycling of all valves, verification of proper valve operation and valve position indication is performed in ATP testing and will not be repeated in this preoperational test.

7.4 Transfer Header Mode Selection

7.4.1 Select each transfer mode and verify proper valve positioning for each mode. Verify activation of alarms and interlocks for misalignment of valves.

8.0 Integrated Test Objectives

8.1 Operate the system within boundary #2A and verify that applicable instrumentation (PLC and MCS) indicate expected normal operating values for system parameters (temperature, pressure, differential pressure, flow, electric current, etc.).

8.2 Booster Pump P-3125A and P-3125B.

8.2.1 Conduct performance test of booster pumps. Verify booster pump performance at sufficient operating points (head/flow) to verify the performance curve and to document system effects.

8.2.2 Verify proper operation of pump instrumentation.

8.2.3 Verify alarm activation at proper setpoint and activation of pump trips and applicable interlocks.

FIGURE A2-1, Boundary #2A

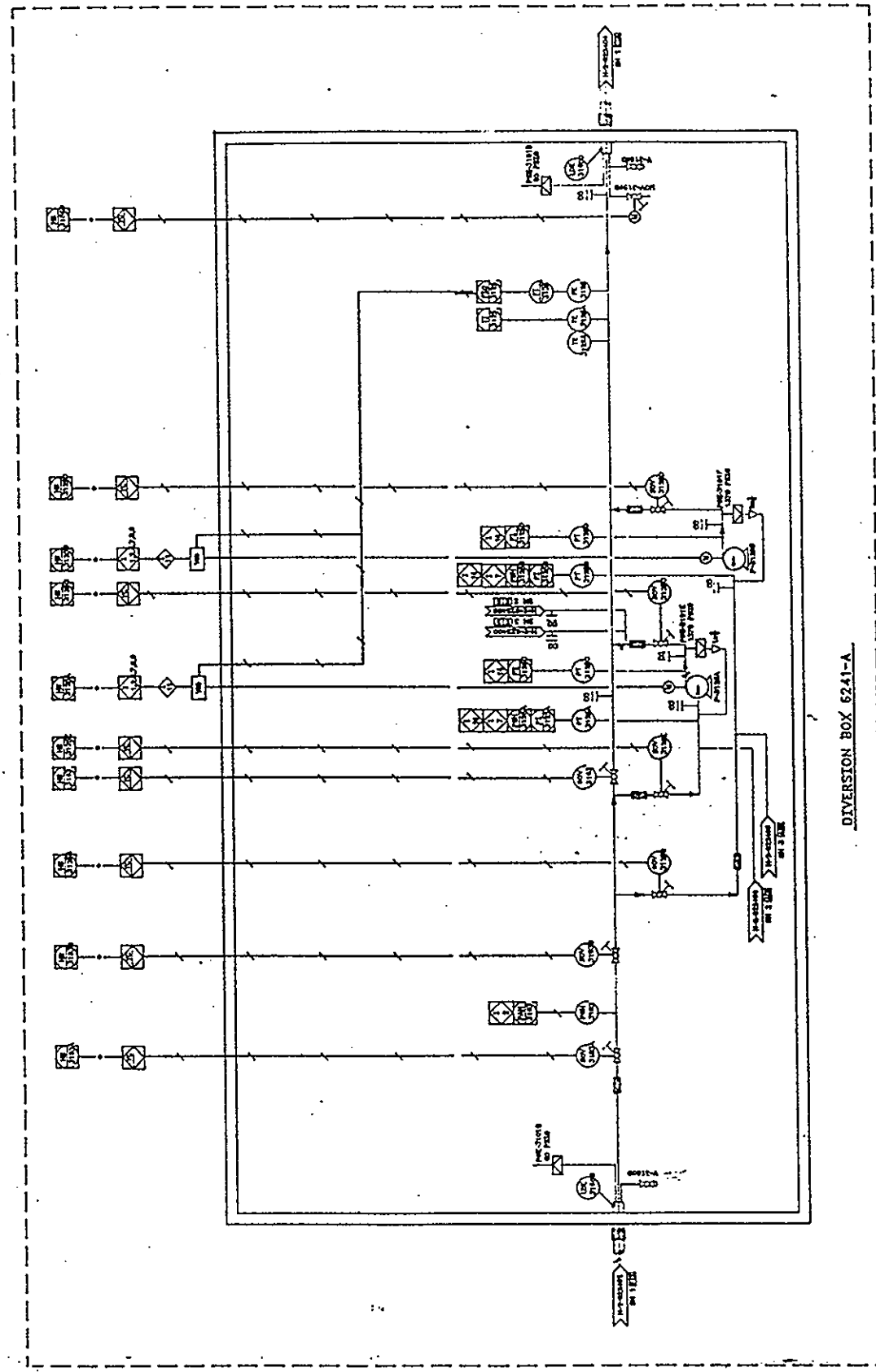
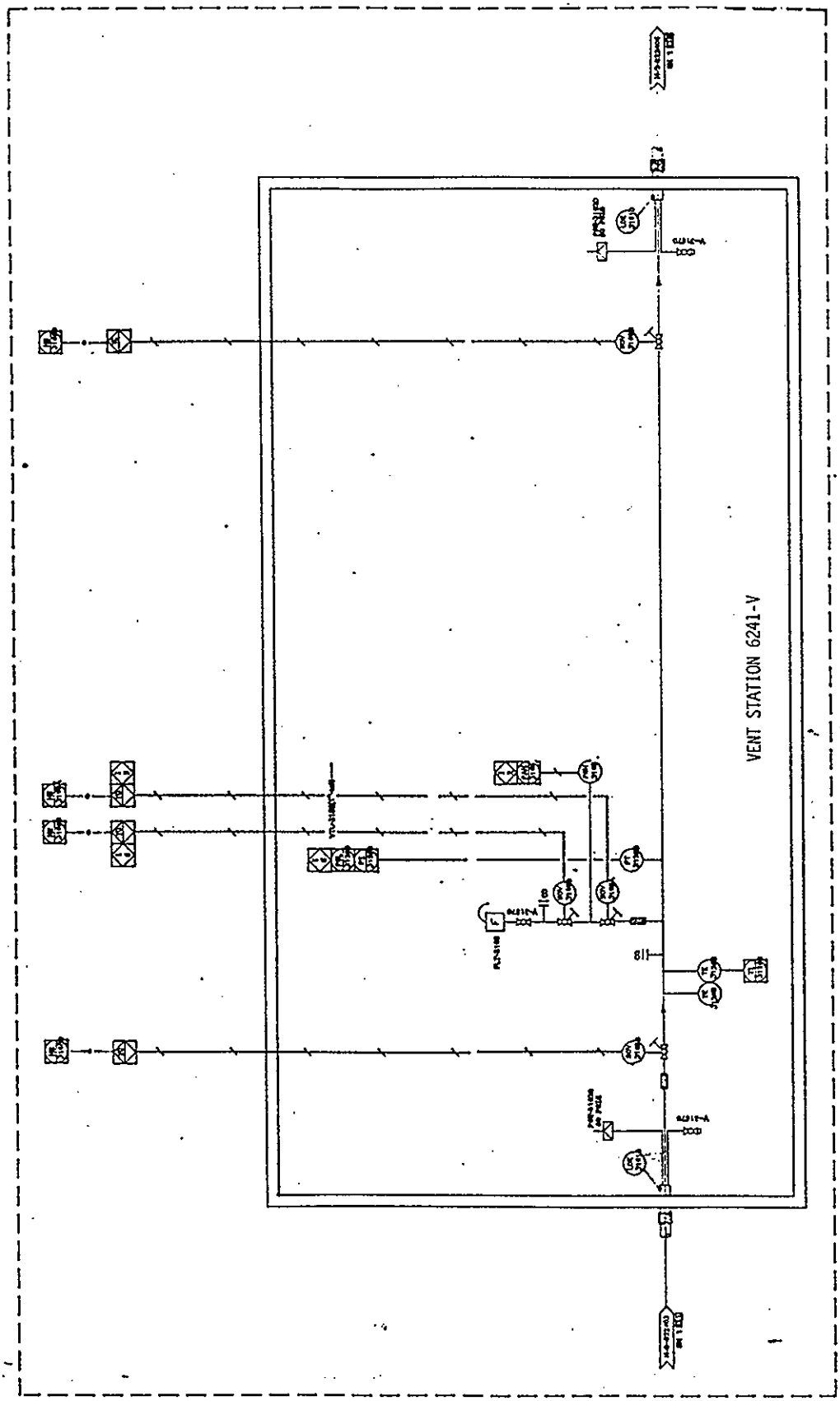


FIGURE A2-2, Boundary #2A



1.0 Scoping Boundary
Boundary 3: Cross Site Supernate Transfer Header 3150

2.0 Boundary Description
The Transfer Header boundaries are shown on Figures A3-1 - A3-4 and is designated boundary #2B. The boundary excludes 244A and SY-A and B.

3.0 Test Procedures
Preoperational Testing, Supernatant Transfer Header, HNF-SD-W058-POTP-005

4.0 Startup Testing
Preoperational testing will be performed on the transfer header 3150, in dry conditions (no water testing).

Operational testing of Transfer Header 3150 with water will be performed as part of the closed circuit operational test.

5.0 System/Facility Conditions
Construction acceptance testing on components within and including the test boundary has been completed and all deficiencies have been resolved. The Startup Group has accepted control of components, subsystems, and systems within and including the boundary. Access to the Diversion Box and Vent Station will be required to perform this testing.

6.0 Interfacing Systems

Instrument Air Systems
The Diversion Box Instrument Air System and the Vent Station Instrument Air System must be able to supply air to their respective transfer header loads.

Monitoring and Control (MCS/PLC)
The Monitoring and Control System is connected and operational.

Electrical Power Service and Distribution
The Electrical Power Distribution System is installed and available to supply power to switchboards SB-1 and DP-1.

7.0 Preoperational Testing Objectives/Specifications

7.1 Pressure Transmitters: PT-3125E, PT-3126A, PT-3102, PT-3101, PT-841.

7.1.1 Verify MCS/PLC indication, alarms and interlocks.

7.2 Pressure Switches: PSH-3113, PSH-3182, PSH-3173, PSH-3185, PSH-3167B.

7.2.1 Verify MCS /PLC indication, alarms and interlocks.

7.3 Diversion Box 6241-A Sump Pump and Leak Detection, and Liner Wash Down System

7.3.1 Conduct sump pump performance test. Verify sump pump performance at sufficient operating points (head/flow) to verify the performance curve and to document system effects.

7.3.2 Verify sump level leak detector operation and activation of high level alarm.

7.3.3 Verify sump pump discharge valve interlock operation.

7.3.4 Verify sump pump discharge pressure interlock operation.

7.3.5 Verify operability of liner washdown system with water

7.4 Vent Station 6241-V Sump Pump and Leak Detection, and Liner Washdown System

7.4.1 Conduct sump pump performance test. Verify sump pump performance at sufficient operating points (head/flow) to verify the performance curve and to document system effects.

7.4.2 Verify sump level leak detector operation and activation of high level alarm.

7.4.3 Verify sump pump discharge valve interlock operation.

7.4.4 Verify sump pump discharge pressure interlock operation.

7.4.5. Verify operability of liner washdown system with water

7.5 Encased Pipe Leak Detection

7.5.1 Functional testing of the leak detectors for both transfer headers and verification that alarms are activated on the MCS/PLC when leakage is present, is performed as part of acceptance test HNF-SD-W058-ATP-001, Transfer Header leak Detection System.

7.6 Lift Station 244-A Leak Detection

7.6.1 Functional testing of the leak detection will be performed to ensure communication with the MCS

7.7 Transfer Header Valve Operation

7.7.1 Cycling of all valves, verification of proper valve operation and valve position indication is performed as part of acceptance testing (HNF-SD-W058-ATP-002, Diversion Box/Vent Station Instrumentation) and will not be repeated in the preoperational test.

7.8 Transfer Header Mode Selection

7.8.1 Select each transfer mode and verify proper valve positioning for each mode. Verify activation of alarms and interlocks for misalignment of valves.

8.0 Integrated Test Objectives

8.1 Operate the system within boundary #2B and verify that applicable instrumentation (PLC and MCS) indicate expected normal operating values for system parameters (temperature, pressure, differential pressure, flow, electric current, etc.).

Figure A3-1, Boundary #2B

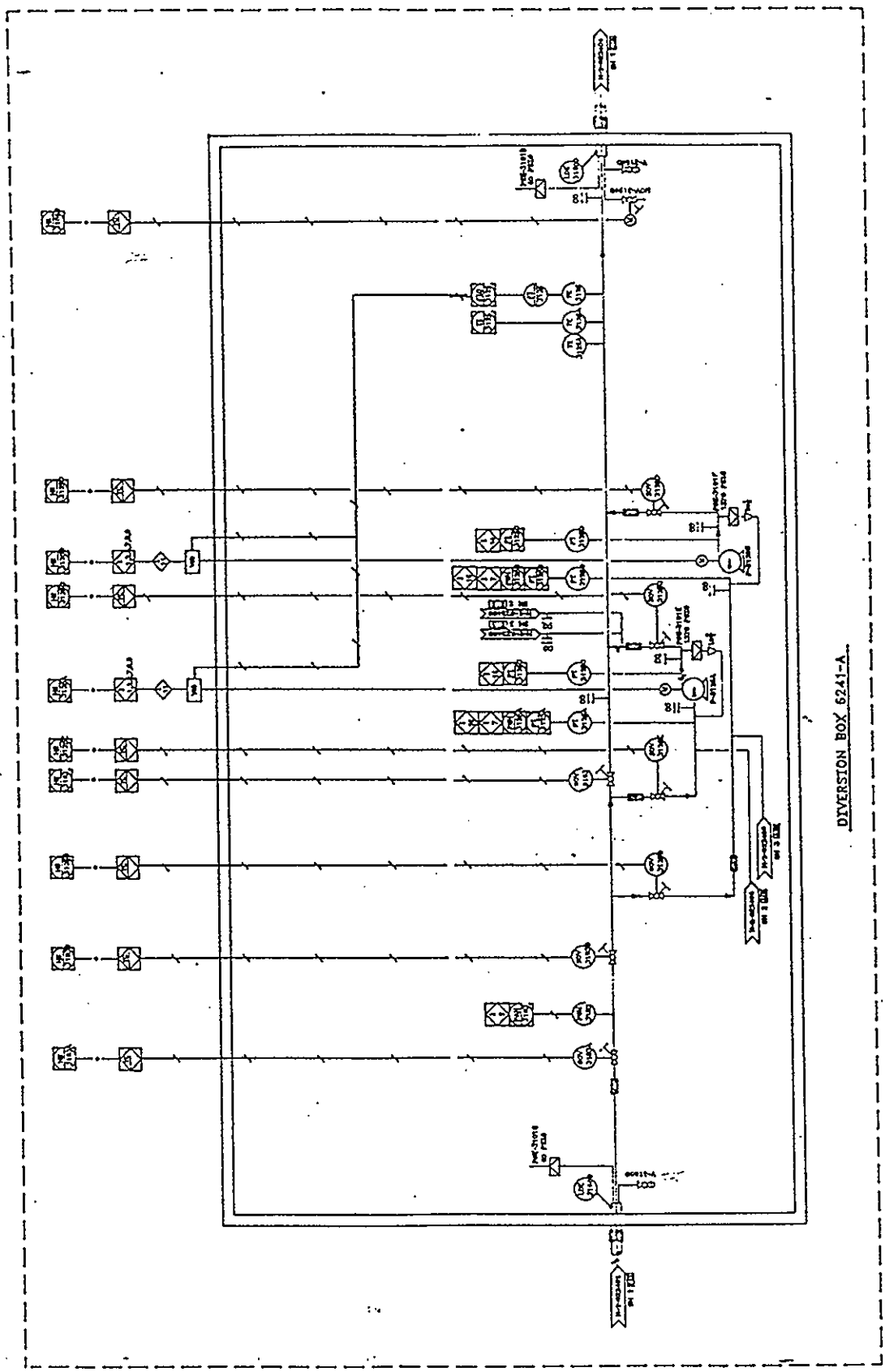
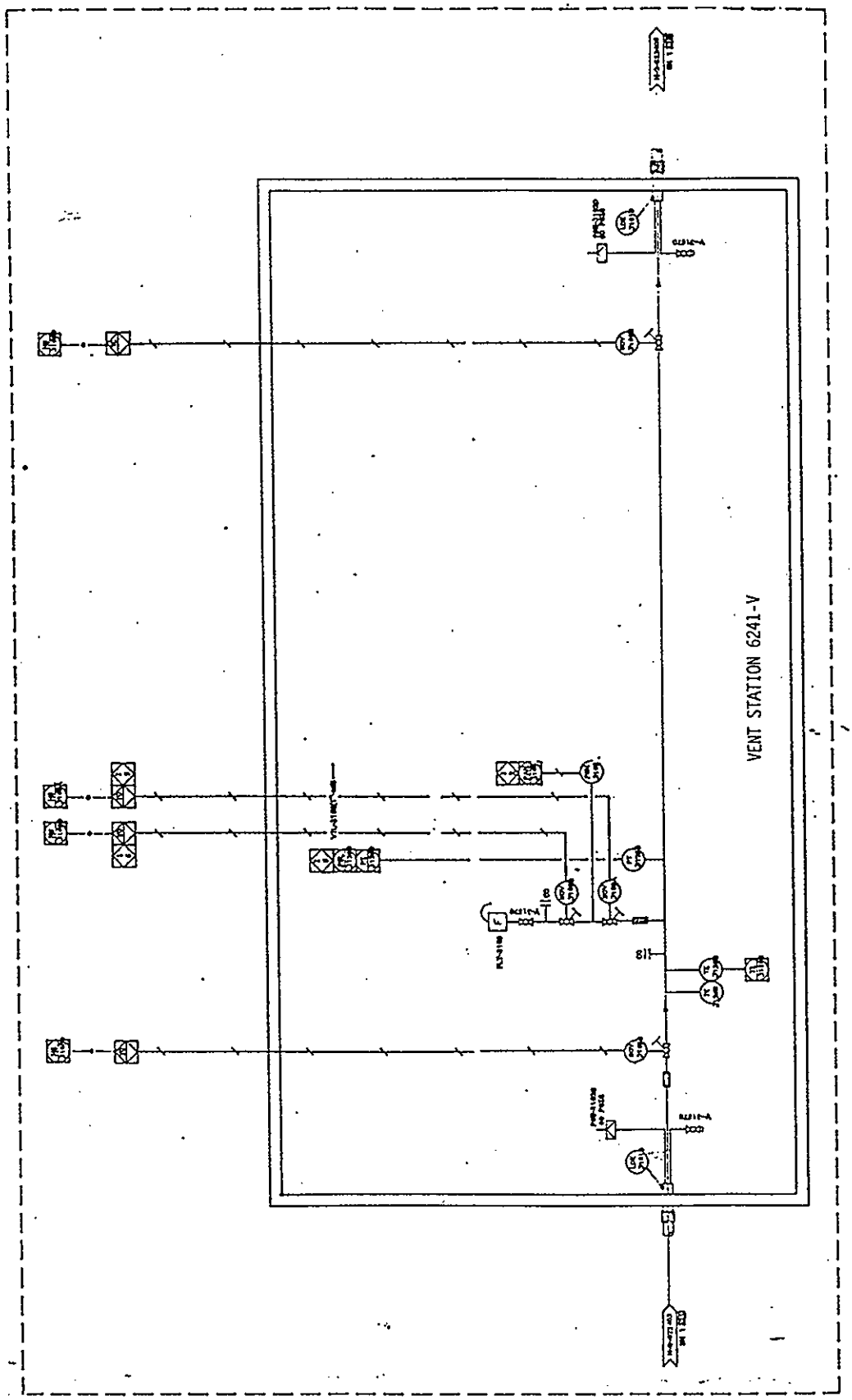


Figure A3-2, Boundary #2B



1.0 Scoping Boundary

Boundary 4: Diversion Box Instrument Air System

2.0 Boundary Description

The Diversion Box Instrument Air System boundaries are shown on Figure A4-1 and is designated as Boundary #4.

3.0 Test Procedures

Preoperational Testing, Diversion Box Instrument Air System, HNF-SD-W058, POTP-002

4.0 Startup Testing

Preoperational testing will be performed on components as identified in Section 7.0. Specific test objectives for each component are also listed.

Operational testing of the Diversion Box Instrument Air System is not required as acceptance and preoperational testing will fully demonstrate all design functions and requirements.

5.0 System/Facility Conditions

The compressed air package for Diversion Box 6241-A is installed and connected to the associated instrument air system piping. The associated instrument air piping is complete to all components in the diversion box.

Construction ATP's on components within and including the test boundary has been completed and all deficiencies have been resolved. The startup Group has accepted control of components and subsystems within and including the boundary. Access to the Diversion Box will be required for this testing.

6.0 Interfacing Systems

6.1 Electrical Power and Distribution

6.1.1 The electrical system must be capable of supplying power to the compressed air package.

6.2 Monitoring and Control system

6.2.1 The Monitoring and Control System is connected and operational.

7.0 Preoperational Testing Objectives/Specifications

7.1 Perform functional test on pressure instruments and verify 1) proper pressure is indicated locally , and 2) a low pressure alarm is actuated on the MCS/PLC.

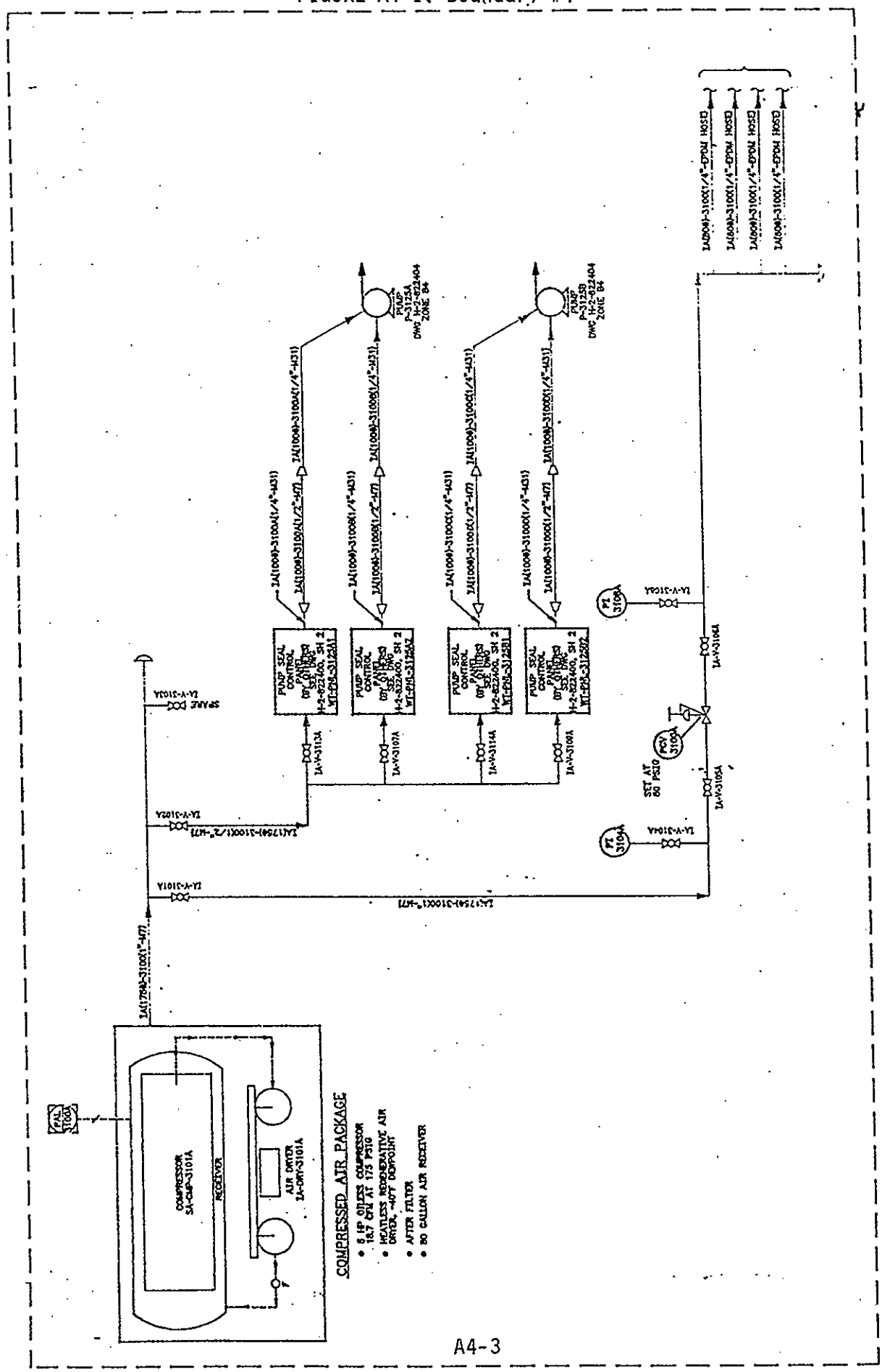
7.2 Operate system and verify instrumentation indicate expected values. Verify proper operation of pressure control valve. Verify air dryer provides air with a dewpoint of -40°F or below at approximately 50% system load.

7.3 Demonstrate the ability of the Instrument Air System to provide air to each associated load.

8.0 Integrated Test Objectives

8.1 Further testing is not required. The system will be operated in conjunction with the transfer headers. A separate test procedure will not be issued.

FIGURE A4-1. Boundary #4



1.0 Scoping Boundary

Boundary 5: Vent Station Instrument Air System

2.0 Boundary Description

The Vent Station Instrument Air System boundaries are shown on Figure A5-1 and is designated as Boundary #5.

3.0 Test Procedures

Preoperational Testing, Vent Station Instrument Air System, HNF-SD-W058-POTP-003

4.0 Startup Testing

Preoperational testing will be performed on components as identified in Section 7.0. Specific test objectives for each component are also listed.

Operational testing of the Vent Station Instrument Air System is not required as acceptance and preoperational testing will fully demonstrate all design functions and requirements.

5.0 System/Facility Conditions

The compressed air package for Vent Station 6241-V is installed and connected to the associated instrument air system piping. The associated instrument air piping is complete to all components in the Vent Station.

Construction ATP's on components within and including the test boundary has been completed and all deficiencies have been resolved. The Startup Group has accepted control of components and subsystems within and including the boundary. Access to the Vent Station will be required for this testing.

6.0 Interfacing Systems

6.1 Electrical Power and Distribution

6.1.1 The electrical system must be capable of supplying power to the compressed air package.

6.2 Monitoring and Control system

6.2.1 The Monitoring and Control System is connected and operational.

7.0 Preoperational Testing Objectives/Specifications

7.1 Perform functional test on pressure instruments and verify 1) proper pressure is indicated locally , and 2) a low pressure alarm is actuated on the MCS/PLC.

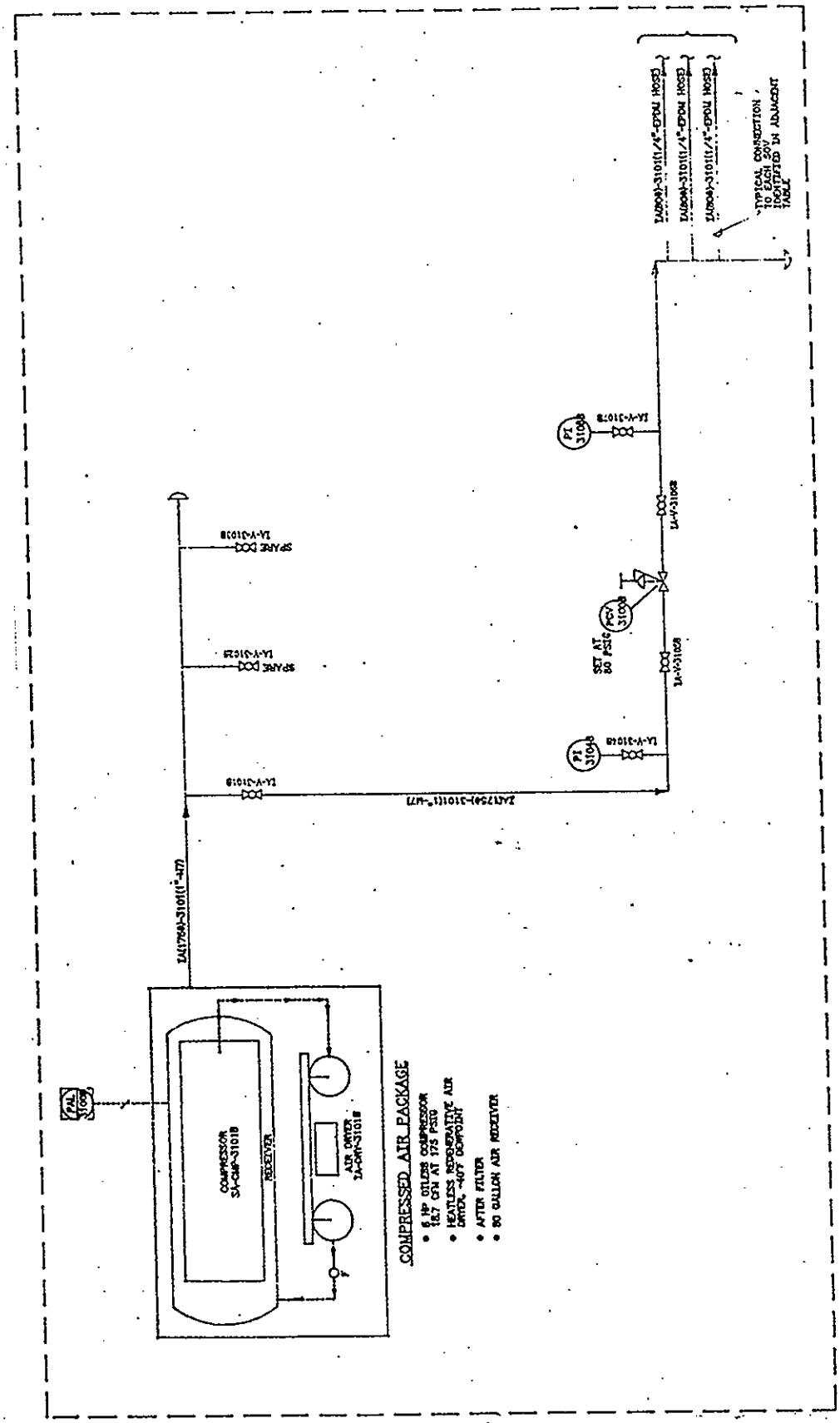
7.2 Operate system and verify instrumentation indicate expected values. Verify proper operation of pressure control valve. Verify air dryer provides air with a dewpoint of -40°F or below at approximately 50% system load.

7.3 Demonstrate the ability of the Instrument Air System to provide air to each associated load.

8.0 Integrated Test Objectives

8.1 Further testing is not required. The system will be operated in conjunction with the transfer headers. A separate test procedure will not be issued.

FIGURE A5-1, Boundary #5



1.0 **Scoping Boundary**
Boundary 6: Vent Station and Diversion Box Ventilation

2.0 Boundary Description

The Diversion Box Ventilation System boundaries are shown on Figure A6-1 and is designated as Boundary #6A &6B.

3.0 Test Procedures

Preoperational Testing, Vent Station and Diversion Box Ventilation.
HNF-SD-W058-POTP-006

4.0 Startup Testing

Preoperational testing will be performed the Vent Station and Diversion Box Ventilation.

Operational testing of the Diversion Box Instrument Air System is not required as acceptance and preoperational testing will fully demonstrate all design functions and requirements.

5.0 System/Facility Conditions

All construction work on the Vent Station and Diversion Box will have to be completed prior to running this test. Each facility will have to be closed up per normal conditions to allow leak checking of the facility.

Construction ATP's on components within and including the test boundary have been completed and all deficiencies have been resolved. The startup Group has accepted control of components and subsystems within and including the boundary. Access to the Diversion Box will be required for this testing.

6.0 Interfacing Systems

6.1 Electrical Power and Distribution

6.1.1 The electrical system must be capable of supplying power to the Vent Station and Diversion Box.

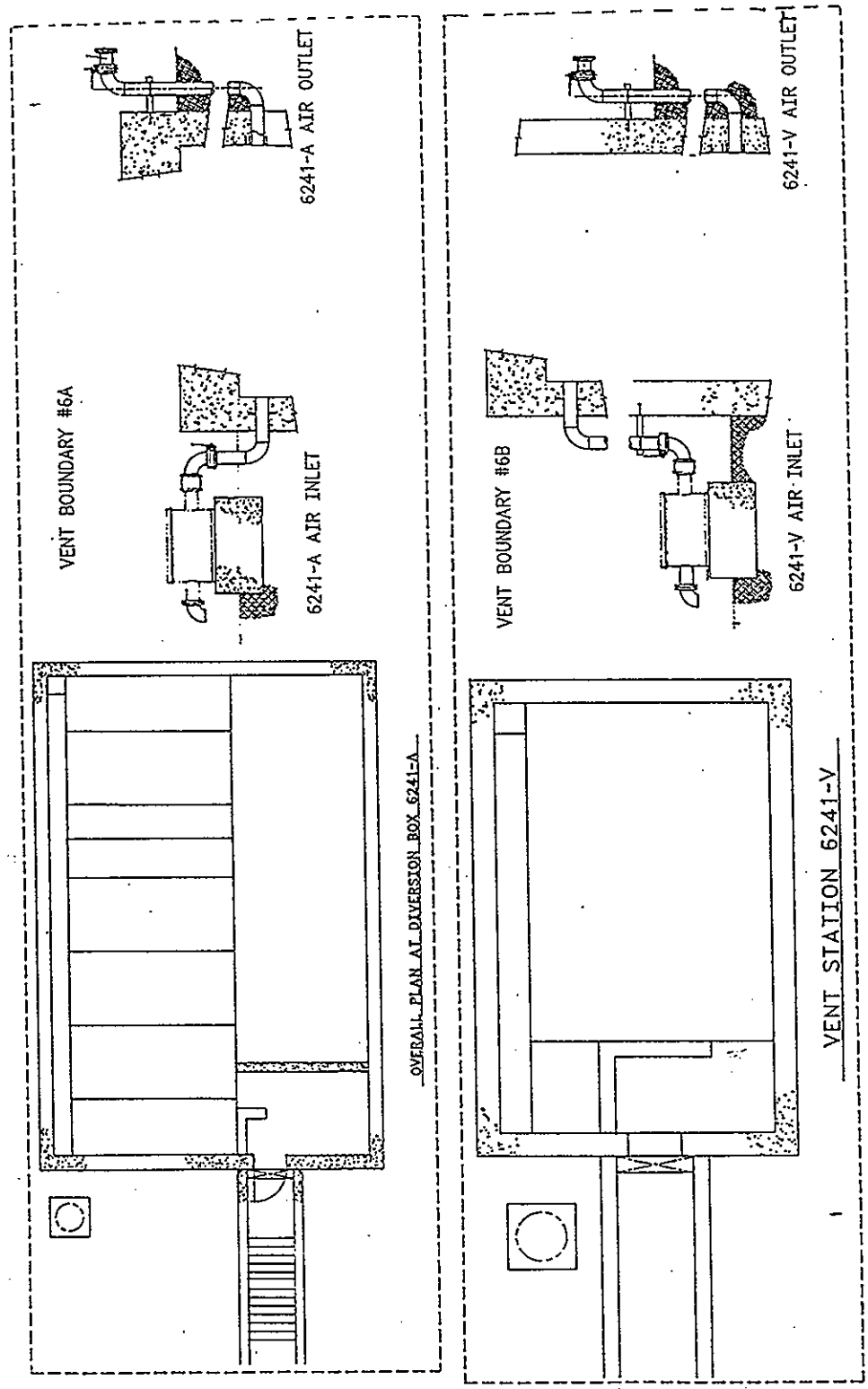
7.0 Preoperational Testing Objectives/Specifications

7.1 Functionally test the Vent Station and Diversion Box Ventilation to verify that under positive pressure conditions, 90% of the air vented from the facilities passes through the HEPA filters in the facility line.

8.0 Integrated Test Objectives

8.1 Further testing is not required. Acceptance and preoperational tests verify all design requirements.

FIGURE A6-1, Boundary #6



1.0 Scoping Boundary

Boundary 7: Integrated closed circuit Preoperational Test

2.0 Boundary Description

Figure A7-1 is included for boundary definition. (for detailed system information see P&IDs listed in reference 7.5). The boundary includes both headers between the diversion box and vent station, and their respective instrument air systems.

3.0 Test Procedures

Preoperational Testing, Integrated Closed Circuit Test, (HNF-SD-W058-POTP-007).

4.0 Startup Testing

Tests will demonstrate correct operation of both headers with water within boundary #7 prior to system jumper installation.

5.0 System/Facility Conditions

The system is not connected to the waste tanks. All prior sub-system preoperational testing is completed.

The headers will be filled and circulated through a closed circuit, using a temporary water supply and collection system, and temporary jumpers located in the diversion box and vent station.

Water will be fed to the slurry header at the booster pumps inlet by a temporary jumper from the temporary water supply.

The slurry line and supernate line will be interconnected by a second temporary jumper located at the vent station.

A third temporary jumper located at the diversion box and connected to the supernate header will allow return of the water to the temporary water supply.

6.0 Interfacing Systems

NONE

7.0 Preoperational Testing Objectives/Specifications

7.1 Perform final adjusting and tuning of system controllers as needed.

7.2 Fill each cross site transfer header (3150 & 3160).

7.3 Operate each booster pump at design flowrates from MCS.

7.3.1 Conduct performance test of booster pumps. Verify booster pump performance at sufficient operating points (head/flow) to verify that they are within the boundaries of the vendor performance curve, and to document system effects.

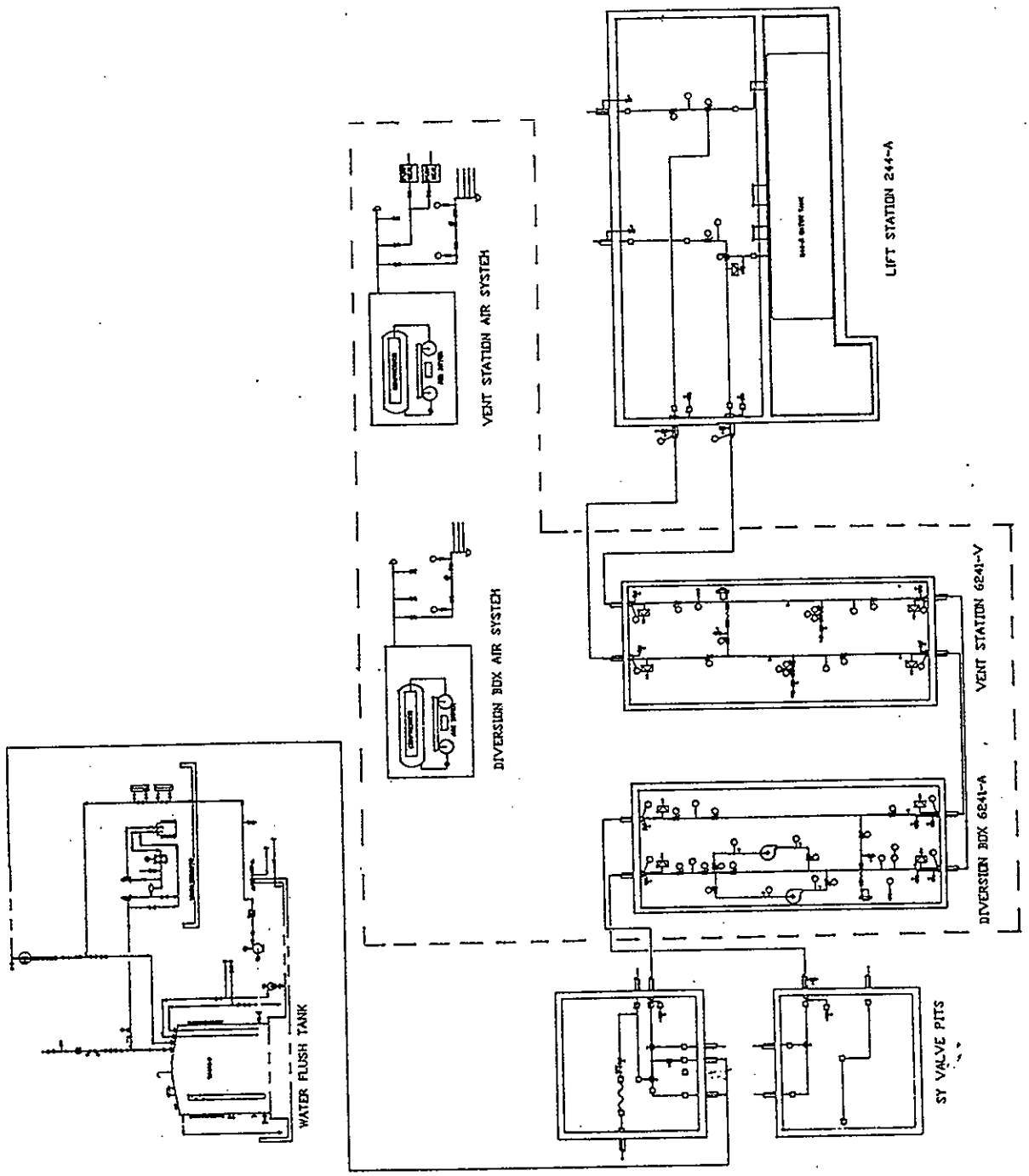
7.3.2 Verify proper operation of pump instrumentation.

7.3.3 Verify alarm activation at proper set points and activation of pump trips and applicable interlocks.

7.4 Perform transfer header 3160 & 3150 drain and vent.

7.5 System response to loss of utilities (air, power).

FIGURE A7-1, Boundary #7



Typical Testing Interface Diagram

Legend
CONST: Construction - Fabrication and Installation, Inspection, and Strength Integrity Phase
STARTUP: Startup System Testing Phase (Pre-tie-in)
OPERATIONS: Operations - Hot Run Testing Phase (Post-tie-in)

P: Perform. This appears in the column of the responsible party who will perform the test/checkout and the type of test/checkout that is required, e.g., for Loop Calibration, a "P" is in the Construction/Constr. Test column. Thus indicating that it is a Construction Test for Construction to perform.

V: Verify. This appears in the column of the responsible party who will verify the performance of a test/checkout by another party, e.g., again using Loop Calibration as an example, a "V" in the Facility Startup/Startup Test column indicates that Startup will verify the Construction performance of the Loop Calibration. This verification may be after performance and can be either visual or by document review. The verification will most probably be part of prerequisites required by the associated startup test.

W: Witness. This appears in the column of the responsible party who will be present to witness a test/checkout performed by another party. The requirement to witness a test/checkout will imply a hold point on that test checkout. Operations has prime responsibility for performing activity.

V/W: Verify/Witness. Where this appears means that the party to which it applies may choose, at their discretion, to verify or witness the performance of another party for that particular test/checkout. In this case the witness choice should not imply a hold point.

S: Support. This appears in the column of the responsible party who will support the performance of a test/checkout by another party, e.g., operations will be expected to provide support (power operators to operate compressors, etc.) to Startup in the performance of Startup tests.

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
ELECTRICAL				
Install all trays, conduit, cable & elec. equip.	N/A	N/A	N/A	Original Build
Perform all hi-pot testing on initial installation of power cable		V		Commodity integrity test. Not required for cables rated at 600V or less.
Perform meggering as needed to support cable installation	P	V		Commodity integrity test
Initial termination of all cables	P			Original Build
Point-to point continuity check of field cables	P			Commodity integrity test
Motor Bump/Run-In/Vibration Check (uncoupled)	P	V		Checks wiring from breaker to motor for proper phasing, checks that motor mounting and installation are proper and adequate, final check that bearings are undamaged from storage and verification of original build.
UPS Testing		P	S	
Elec . Heat Trace Test		P	S	
Scheme Check	P			Wiring check to "as designed" schematic drawing.
Weld Receptacle Checkout	P			Performed with permanent power.
Lightning Protection & Grounding Systems Test	P			
Lighting and Receptacle Circuit Verification	P			Commodity integrity and configuration test.
CIRCUIT BREAKERS - 480V AND BELOW				

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
Install	P			Original Build
Alignment Check	P	V		This testing will identify the manufacturing defects and/or installation damage.
Mechanical Trips	P			
Calibrate protective relays	P			
Electrical Trip Tests	P	V		
Calibrate Electrical Meters	P			
CT/PT Testing Involved with Breakers	P			
TRANSFORMERS (OIL FILLED)				
Installation, oil fill & perform vendor test	N/A	N/A	N/A	Commodity integrity test.
Witness vendor tests	N/A	N/A	N/A	
Initial Energization	P			Performed by site elec. utilities.
	CONST	S/U	OPS	
INITIAL ENERGIZATION SYSTEM - 480V AND BELOW				
STANDBY POWER				
Install	P			GFE
Test Manual Transfer		P	S	After system is energizing.
FAT	P			After A-E.
MOTOR OPERATED VALVES (MOV's)				
Stroke - No Load	P	V		Initial stroke is an integration of check, manual valve check, setting switches, controls and etc. Involves de-bugging of MOV under no flow conditions.
Stroke - With Load		N/A	N/A	Must be checked with system conditions established (loaded).
INSTRUMENTATION & CONTROLS				
Install all instrumentation and controls	P	V		Original Build
Install all piping/tubing to control boards, instruments	P	V		Original Build
Perform pre-installation check of instruments	P			
Initial Bench Calibration of instruments (both elec. & instrumentation.)	P	V		Where required by ATP.
Point-to-Point verification, I&C Cable Term and Tubing	P			Commodity integrity test.

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
Functional Checks	P	V		To include loop calibration 3-point check.
Loop calibration (5-point check)		P	S	Check the loop against a known input signal and verify design. Verify scheme and debug loop.
HVAC Instr. Tube/Pipe Leak Test	P	V		Commodity integrity test.
Computer & Peripheries checkout	P	V	S	
Plant Security Checkout				
UPS Testing	N/A	N/A	N/A	
DCS CHECKOUT				
UPS Testing		P	S	
Digital/Analog peripheral (Up D/A Cards)	P	V		Check the loop against a known input signal and verify design. Verify scheme and de-bug loop.
Calibration of signal conditioning cards	P			
Software verifications	P	S	S	Includes de-bugging. By Vendor
FAT	P	V		
SAT	P	V	S	ATP by vendor.
Initially Energize & Try Digital Control Circuits	P	V	S	
Initially Energize & Test Analog loops	P	V	S	
Annunciator Response during Loop Test		P	S	
PIPING				
Install all plant pipe	P	V		Original Build
Install all vents, drains, traps & etc.	P	V		Original Build
Perform all pipe alignment	P	V		Original Build
Install all hangers	P	V		Original Build
Clean, inspect all piping to constr. cleanliness standards.	P	V		Original Build
Perform initial hydro's	P	V		Commodity integrity test.
Perform air leak test	P	V		Commodity integrity test.
Install/remove temp. pipe, equipment and supports for flushing	P	V		
Install strainers	P	V		

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
Perform system flushing	P	V		Contractor to dispose of flush water. Coordinate permission.
Install and/or remove orifices to support Startup program	S	P	S	If Required.
Install all manual valves	P	V		Original Build
Test and calibrate relief valves	P	V		Relief valves require calibration prior to placing in service.
Operate flushing equipment (non-perm plant)	P	V	S	Construction to operate temp equipment when assigned task. Operations to operate all other times.
Operate flushing equipment (permanent plant)	S	V	P	Operations to operate equipment when assigned.
Test backflow prevention devices	P	V		Site water purveyor to designate procedures (state-approved).
Disposal of flushing fluids and misc. consumables. (non-Startup)	P		V	
Perform In-Service Leak Testing per Design Requirements	W	S	P	Construction to witness.
FIRE PROTECTION SYSTEMS	P			
FIRE PROTECTION INTERFACE	P			Fire Dept. to witness.
UPS Testing		P	S	
MECHANICAL				
ROTATING EQUIPMENT RUN-IN				
Align & couple (cold)	P	V		If Required.
Initial run-in/vibration check	P	W	S	Identifies manufacturing and/or installation deficiencies (i.e., lack of grouting, bad bearing, etc.).
HVAC				
Install HVAC		V		Original Build
Pressure and structural testing of ventilation ducts.	P	V		Commodity integrity test.
Cycle dampers (no flow)	P	V		Identify and resolve/report installation deficiencies/interfaces, original build, obstruction check.

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
Fan & coil unit testing	P	V		Identify and resolve manufacturing and/or installation deficiencies.
Manual stroking of auto and manual dampers	P	V		
Fire Damper Testing	P	W		
Flow Damper Testing	P	W		
Isolation Damper Testing	P	W		
Water balancing to support HVAC	P	V		If required.
Initial HVAC balancing	P	W		Identify and resolve total HVAC deficiencies.
Final HVAC balancing	P	S		Part of system functional test (OTP).
HVAC Systems Functional Testing	S	P	S	
Room/zone confinement barrier isolation and integrity testing	S	P	S	Part of system functional test.
HEPA & CHARCOAL FILTERS				
Loading	P	W	S	
Testing	P	W	S	
MAINTENANCE OF EQUIPMENT				
PREVENTIVE (PRIOR TO TURNOVER)				
Service/adjust/tube/rotate; check on routine basis	P			Original Build
PREVENTIVE (AFTER TURNOVER)				
Implement PM Program to T/O to		P	S	PM Program to begin at T/O to Startup from
Obtain equipment nameplate data to		P	S	Periodic throughout project phases as required.
CORRECTIVE MAINTENANCE				
Prior to turnover	P			Original Build
After turnover		P	S	
STARTUP SYSTEM TESTING				
Manual operation	S	P	S	
Automatic operation	S	P	S	

ACTIVITY				CLARIFICATION/REMARKS
	CONST	S/U	OPS	
Alternate or secondary mode of control	S	P	S	Operation & verification test to demonstrate expected operations following loss of power sources and failures of components for which the systems are design to remain in operation.
VERIFICATION OF:				
Proper functioning of I&C Permissive & prohibit interlocks	S	P	S	
Equipment protective devices whose malfunctions or premature actuation may unnecessarily shutdown or defeat the operation of systems or equipment.	S	P	S	
Integrated System Testing	S	P	S	
MISCELLANEOUS				
Initial system chemical loading	P	V/W		
Chemistry lab support				If required.
SCHEDULE VENDORS				
To support construction	P			Original Build - to satisfy original purchase order.
To support Startup		P		
Provide Startup spare parts		P		
Perform safety walkdowns (OSHA)	P			
Tag/Label components	P	V	V	Facility and Project to agree on scope.

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution		Date 10/28/97
Project Title/Work Order		EDT No. N/A
Replacement Cross-Site Transfer System		ECN No. 644602

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
R.J. Brown, LMHC	T4-08				
W.G. Brown, LMHC	T4-07				
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