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7. Abstract

Collection System Instrumentation and Control System (I&C)

This ATP covers the testing of the three basins, pump start/stops. and all equipment installed therein under ICF KH Contract 5406.

All Instrumentation and Control (I&C) equipment related to the basins will be checked electronically with simulated inputs/outputs when actual input/outputs are unavailable.

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Condensate Treatment Facility, Instrumentation and
Control (I and C) ATP

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**This document was reviewed following the
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ACCEPTANCE TEST PROCEDURE WHC-SD-C018H-ATP-004
 TEST TITLE INSTRUMENTATION AND CONTROL (I&C)
 LOCATION LERF
 PROJECT NUMBER C-018H
 PROJECT TITLE 200 AREA EFFLUENT TREATMENT FACILITY COLLECTION SYSTEM

Prepared by
 Westinghouse Hanford Company
 Richland, Washington

for the U. S. Department of Energy

PROCEDURE APPROVAL

WESTINGHOUSE HANFORD COMPANY (WHC)

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LERF Cog Engineer, ETF	Date	LERF Cog Engineer, 242-A	Date

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Project Management	Date

Line Supervisor for J.W. Kelly
5/25/95

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EXECUTION AND TEST APPROVAL

EXECUTED BY

Test Director/Organization	Date	Test Operator/Organization	Date
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Recorder/Organization	Date
-----------------------	------

WITNESSES

Witness/Organization	Date	QA	Date
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Witness/Organization	Date	Witness/Organization	Date
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WHC APPROVAL

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company

Without exceptions _____	With exceptions resolved _____	With exceptions outstanding _____
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Projects Department	Date	<Title or Department>	Date
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Operations	Date	<Title or Department>	Date
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PREAMBLE

1. General

- a. The Acceptance Test Procedure (ATP) program for Project C-018H Collection System covers all interfaces to and from the Monitor and Control System's (MCS) Local Control Unit (LCU).
- b. The purpose of the ATP is to verify that the system has been constructed in accordance with the construction documents (a prerequisite of ATPs) and to demonstrate that the system functions as required by the Project criteria.
- c. Additional guidance and information are contained in WHC-CM-6-2 "Projects Department Management Manual," Section PM-21 "Projects Closeout."

2. Collection System Instrumentation and Control System (I&C)

This ATP covers the testing of the three basins, pump start/stops, and all equipment installed therein under ICF KH Contract 5406.

All Instrument and Control (I&C) equipment related to the basins will be checked electronically with simulated inputs/outputs when actual input/output signals are unavailable.

END OF PREAMBLE

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3. PURPOSE AND SCOPE

- 1.1 This Acceptance Test Procedure (ATP) has been prepared to demonstrate that the Collection System Instrumentation & Control System for Project C-018H performs according to design. Specifically, this ATP is designed to verify the following overall system requirements:
 - 1.1.1 The input and outputs properly connected to the LCU terminal strips.
 - 1.1.2 The control system software conforms to the configuration specified by the logic diagrams, piping and instrumentation diagrams (P&ID), and the LERF operating philosophy.
- 1.2 Testing will be performed using actual signals. If actual signals are not available, then simulated signals will be used to complete the tests.

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2. REFERENCES

2.1 RELATED TEST PROCEDURES

"Pre-Factory Acceptance Test Procedure for A/S Open System," MICON S.O. 31524, Rev. 0, April 1994.

2.2 DRAWINGS

H-2-88815, Sh 2-6, Rev 0	Instrumentation Sequential Logic Diagram Basin
H-2-88816, Sh 1, Rev 0	Instrumentation Sequential Logic Diagram 242A LVAP
H-2-88817, Sh 1, Rev 0	Elect/Instm Telecommunications 242AL71, 2025E, & 242A
H-2-88817, Sh 2, Rev 0	Electrical Instm Telecommunications EFL TRTMT Facil Instl
H-2-88817, Sh 3, Rev 0	Electrical/Instm Telecommunications 242A Evaporator
H-2-88818, Sh 1, Rev 0	Elect/Instm Elementary Diagram
H-2-88819, Sh 1-3, Rev 0	Electrical/Instrumen- tation Power and Control Plans and Details
H-2-88820, Sh 1, Rev 0	Electrical/Instm Wire Run List
H-2-99059, Sh 13, Rev 1	Instm - Interconn Diagram

2.3 SPECIFICATIONS

Certified Vendor Information

C-018H-P3, Rev. 0 Specification for Collection System
Local Control Unit and MCS Interface Devices.

2.4 ENGINEERING CHANGE NOTICES (ECN)

C-018H-084, C-018H-085, C-018H-086, C-018H-087, C-
018H-088, C-018H-090, C-018H-092, C-018H-094, C-018H-
095, C-018H-095, C-018H-097.

2.5 PROCEDURES

ICF KH Procedure CON 3.5	Performance and Recording of Acceptance Test Procedures
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3. RESPONSIBILITIES

3.1 GENERAL

Each organization participating in this ATP will designate personnel to assume the responsibilities and duties as defined herein for their respective roles. The designees shall become familiar with this ATP and the systems involved to the extent that they can perform their assigned duties.

3.2 WHC PROJECT ENGINEER

- 3.2.1 Designates a Test Director.
- 3.2.2 Coordinates testing with the 242-A Evaporator Control Room.
- 3.2.3 Acts as liaison between the participants in acceptance testing.
- 3.2.4 Distributes the approved testing schedule before start of testing.
- 3.2.5 Schedules and conducts a pretest kickoff meeting with test participants.
- 3.2.6 Notifies the persons performing and witnessing the test 1 day before the start of testing.
- 3.2.7 Schedules a dry run if test director deems necessary.
- 3.2.8 Notifies concerned parties when a change is made in the testing schedule.
- 3.2.9 Signs Execution and Test Approval page when test is approved and accepted.
- 3.2.10 Takes necessary action to clear exceptions to the test.
- 3.2.11 Signs Exception Form when exception has been resolved.
- 3.2.12 Provides a distribution list for the approved and accepted ATP (ATR).

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3.3 TEST DIRECTOR

- 3.3.1 Coordinates and directs acceptance testing.
- 3.3.2 Confirms that field testing and inspection of the system or portion of the system to be tested has been completed prior to start of ATP.
- 3.3.3 Stops any test which, in his or her judgment, may cause damage to the system until the problem has been resolved.
- 3.3.4 After verifying there is no adverse impact, may alter the sequence in which systems or subsystems are tested.
- 3.3.5 Ensures that required environmental conditions are maintained.
- 3.3.6 If a test is to be suspended for a period of time, ensures that the system is left in a safe mode.
- 3.3.7 Before restarting a suspended test, reverifies the test prerequisites.
- 3.3.8 Initiates ECNs to document required changes to the ATP.
- 3.3.9 Reviews recorded data, discrepancies, and exceptions.
- 3.3.10 Obtains information or changes necessary to clear or resolve objections during the performance of the test.
- 3.3.11 Signs Execution and Test Approval page when test has been performed.
- 3.3.12 Signs Exception Form when exception has been resolved.
- 3.3.13 Obtains required signatures on the ATP Master prior to reproduction and distribution.

3.4 WITNESSES (Provided by Participating Organizations.)

- 3.4.1 Witness the tests.
- 3.4.2 Review results of testing.

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- 3.4.3 Assist the Test Director when requested.
 - 3.4.4 Sign Execution and Test Approval page when test has been performed.
 - 3.4.5 Sign Exception Form when exception has been resolved.
- 3.5 RECORDER
- 3.5.1 Prepares a Field copy from the ATP Master.
 - 3.5.2 Records names of all designated personnel on Field copy of ATP prior to start of testing.
 - 3.5.3 Records test instrument identification numbers and calibration expiration dates.
 - 3.5.4 Initials and dates each test step on the Field copy as it is completed next to the step number or on a data sheet, when provided. Records test data. On data sheets where there is not room for both the initial and date, date may be entered at bottom of column.
 - 3.5.5 Records objections and exceptions on an Exception Form. Uses additional Exception Forms as needed. Notifies the Test Director at time the objection/exception is made.
 - 3.5.6 Signs Execution and Test Approval page when test has been performed.
 - 3.5.7 After test is finished, assigns alpha numeric page numbers to added data sheets and Exception Forms. Records page numbers in the Table of Contents.
 - 3.5.8 Transfers Field copy entries for each step to the Master in ink or type, signs, and dates. Transmits the completed Master to the Test Director for approval signature routing. Transmits the Field copy to Construction Document Control for inclusion in the official project file.
 - 3.5.9 Signs Exception Form when exception has been resolved via a retest and transmits to Test Director.

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3.5 TEST OPERATOR

- 3.6.1 Performs test under direction of the Test Director.
- 3.6.2 Provides labor, equipment, and test instruments required for performing tests which have not been designated as being provided by others.
- 3.6.3 Requests in writing from the Test Director those services, materials, or equipment that have been designated as being supplied by others.
- 3.6.4 Confirms that all equipment required for performing the test will be available at the start of testing.
- 3.6.5 Signs the Execution and Test Approval page.

4. CHANGE CONTROL

Required changes to this ATP must be processed on ECNs in accordance with company procedures. If a need for change is discovered in the course of running the test, the test shall be stopped until the ECN is approved. However, this does not prevent the running of another portion of the test unaffected by the change.

5 EXECUTION

5.1 OCCUPATIONAL SAFETY AND HEALTH

Individuals shall carry out their assigned work in a safe manner to protect themselves and others from undue hazards and to prevent damage to property and environment. Facility line managers shall assure the safety of activities within their areas to prevent injury, property damage, or interruption of operation. Performance of test activities shall always include safety and health aspects.

5.2 PERFORMANCE

- 5.2.1 Conduct testing in accordance with ICF KH Procedure CON 3.5 (Performance and Recording of Acceptance Test Procedures).
- 5.2.2 Perform test following the steps and requirements of this procedure.

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6. EXCEPTIONS

6.1 GENERAL

Exceptions to the required test results are sequentially numbered and recorded on individual Exception Forms. This enables case-by-case resolution and approval of each exception.

Errors/exceptions in the ATP itself shall NOT be processed as test exceptions (see Section 4, CHANGE CONTROL).

6.2 RECORDING

6.2.1 Number each exception sequentially as it occurs and record it on the Exception Form.

6.2.2 Enter name and organization of objecting party for each exception.

6.2.3 Enter planned action to resolve each exception when such determination is made.

6.3 RETEST/RESOLUTION

Record the action taken to resolve each exception. Action taken may not be the same as planned action.

6.3.1 When action taken results in an acceptable retest, sign and date Retest Execution and Acceptance section of the Exception Form.

6.3.2 When action taken does not involve a retest, strike out the Retest Execution and Acceptance section of the Exception Form.

6.4 APPROVAL AND ACCEPTANCE

The customer provides final approval and acceptance of exceptions by checking one of the following on the Exception Form:

6.4.1 Retest Approved and Accepted: Applicable when Retest Execution and Acceptance section is completed.

6.4.2 Exception Accepted As-Is: Requires detailed explanation.

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6.4.3 Other: Requires detailed explanation.

The customer signs and dates the Exception Form and obtains other customer internal approvals, if required.

6.5 DISTRIBUTION

A copy of the approved Exception Form is distributed to each participant. The signed original is attached to the ATP Master.

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7. SAMPLE EXCEPTION FORM

EXCEPTION NO.		Project No.		ATP No.		Rev.		
Recorded by			Organization		Date Recorded		ATP Page No.	
Sect No.		Requirement						
Description of Problem								
Objector 1 (Name/ Organization)				Objector 2 (Name/ Organization)				
Planned Action								
Action Taken								
RETEST EXECUTION AND ACCEPTANCE								
Retest Installation Contractor		Date		Recorder		Date		
Witness 1 (Name/ Organization)		Date		Witness 2 (Name/ Organization)		Date		
Field Engineering		Date		Test Director (Name/ Organization)		Date		
Design Engineering (Author of ATP)		Date		A-E Project Engineer		Date		
APPROVAL AND ACCEPTANCE - OPERATING CONTRACTOR								
☐ Retest Approved and Accepted ☐ Exception Accepted-as-is* ☐ Other*								
* Explanation								
Approver 1		Date		Approver 2		Date		
Approver 3		Date		Approver 4		Date		

[illegible]

Project Management Date

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8. PREREQUISITES, EQUIPMENT/INSTRUMENTS, AND ABBREVIATIONS

8.1 PREREQUISITES

The following conditions shall exist at start of testing for that portion of the system being tested.

Initial

8.1.1	Systems have been inspected for compliance with construction documents.	_____
8.1.2	Reference documents (including this ATP) have been verified for correct revision number and outstanding ECNs.	_____
8.1.3	A Pre-job Safety Analysis has been prepared and a Pre-job Safety Meeting has been conducted.	_____
8.1.4	Test instruments have a valid calibration stamp attached. Test instrument identification numbers and calibration expiration dates have been recorded in Section 8.2.	_____
8.1.5	Power is available.	_____
8.1.6	Voice communications are available between the C-018H Collection System LCU the ETF Control Room and the 242-A Control Room.	_____
8.1.7	Open items and exception lists have been verified that there are no hardware deficiencies present that may cause equipment or component damage if the ATP is performed.	_____
8.1.8	Previous ATPs have been completed or performed to the extent that it can be verified that there are no known exceptions or deficiencies present that will cause equipment damage or personnel injury if the steps of this ATP are carried out.	_____
8.1.9	Fans are operational in the LCU cabinets to cool the equipment.	_____
8.1.10	Cabinets, subassemblies, printed circuit boards, wiring between subsystems, and cables are identified and permanently marked.	_____
8.1.11	All documentation, user manuals, and drawings conform to content and format specifications.	_____
8.1.12	Group displays have been preformatted and are available at the console in the ETF Control Room.	_____
8.1.13	The range for each analog input has been determined from equipment specifications and input into the MCS.	_____

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- 8.1.14 Alarm set points, and other setpoints have been determined and entered into the software. _____
- 8.1.15 Local Operator Interface (LOI) group displays have been preformatted and down loaded to the LCU. _____
- 8.1.16 The 242-A Evaporator has been notified _____

8.2 EQUIPMENT / INSTRUMENTS

Supplied by Test Operator unless otherwise noted.

- 8.2.1 Loop Calibrator: Device shall be capable of sourcing a 4-20 mA loop.
Instrument No. _____
Expiration Date _____
- 8.2.2 Shorting Jumpers: Determine length in field. Jumpers shall be capable of connecting 120 V ac power and low voltage signals.
- 8.2.3 Temperature measuring device in °F.
Instrument No. _____
Expiration Date _____
Range _____

8.3

ABBREVIATIONS

ATP	Acceptance Test Procedure
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CSA	Canadian Standards Association
ECN	Engineering Change Notice
ETF	Effluent Treatment Facility
EWS	Engineering Workstation
FM	Factory Mutual Engineering Corp
GPLI	General Purpose LAN Interface
I&C	Instrumentation and Control
LAN	Local Area Network
LCU	Local Control Unit
LOI	Local Operator Interface
MCC	Motor Control Center
MCS	Monitoring and Control System
OCS	Operator Control Station
P&ID	Piping and Instrumentation Diagram
PID	Proportional Integral Derivative
UL	Underwriters Laboratory
UPS	Uninterruptible Power Supply
WHC	Westinghouse Hanford Company

9. STEP BY STEP TEST PROCEDURE FOR INPUT/OUTPUTS

9.1 Input and Output Signals

The following steps will verify that all I&C communication between the ETF Control Room, LCU 17 and the equipment in the field is functional. By inference and previous testing that has been performed, successful execution of these steps will verify that the I&C system field devices have been correctly wired to the LCU. These steps will be performed at the Operator Control Station (OCS) in the ETF Control Room with telephone communication to a person at the LERFs LCU #17 to verify that the equipment functions as intended and to provide field manipulation of the test conditions when required. Signal location is NNS PT where NN is LCU number (55MNN), S is "slot" or "card" number, and PT is point number. For example, 173 32 is located in LCU 55M17, at point 32 of slot 3. In the drawings, the card or slot position is designated A, B, C, etc., instead of 1, 2, 3, etc.

To verify a tag at the Operator Control Station (OCS), display the tag using a group display and verify that the tag value or status is correct. For analog tags, the correct value is any positive number, unless otherwise specified in the step. The value will be recorded, however, for information. For discrete tags, the correct value should be obvious from the action taken (OPEN/CLOSED for valve position, etc.). The signal location for discrete output tags may not be specifically listed in the test but are tested by verification of the resulting actions, i.e. valve position, flow, pump on or off status.

To verify a tag at the LCU's Local Operator Interface (LOI), display the tag on the LOI (this requires that a group display configuration has been downloaded from the OCS) and verify that the tag value or status is correct.

For actions initiated from the OCS, activate the tag and confirm the action by observing the tag given in the "Tagname" column.

Sequentially proceed down the tag list checking each input and output in the manner described.

LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17301	ZI P42_4_1	POSITION LERF VLV	Open valve LV-P42-4-1 by actuating LIC____P42_4_1 from the OCS or LCU. Close valve by actuating tag LIC____P42_4_1		
17302	ZI P43_4_1	POSITION LERF VLV	Open valve LV-P43-4-1 by actuating LIC____P43_4_1 from the OCS or LCU. Close valve by actuating tag LIC____P43_4_1		
17303	ZI P44_4_1	POSITION LERF VLV	Open valve LV-P44-4-1 by actuating LIC____P44_4_1 from the OCS or LCU. Close valve by actuating tag LIC____P44_4_1		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17304	TI 60M302	LCU BLDGTEMP	Compare with room temperature as measured by a thermometer. If the OCS and LCU read the same as the thermometer within 2 degrees, accept.		
17305	LI LCH42	LEACH LV LERF 42	<p>373-2737</p> <p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the leachant level transmitter LT-42-1, disconnect the wires LT-42-1LCH(+) AND LT-42-1(-)</p> <p>Connect the wires to a loop calibrator and set at 12+/-0.2 ma</p> <p>Verify that the level at the OCS and LCU reads 50 +/- 2% of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17306	LI _____ LCH43	LEACH LV LERF 43	<p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the leachant level transmitter LT-43-1, disconnect the wires LT-43-1LCH(+) AND LT-43-1(-)</p> <p>Connect the wires to a loop calibrator and set at 12 ± 0.2 ma</p> <p>Verify that the level at the OCS and LCU reads $50 \pm 2\%$ of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		
17307	LI _____ LCH44	LEACH LV LERF 44	<p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the leachant level transmitter LT-44-1, disconnect the wires LT-44-1LCH(+) AND LT-44-1(-)</p> <p>Connect the wires to a loop calibrator and set at 12 ± 0.2 ma</p> <p>Verify that the level at the OCS and LCU reads $50 \pm 2\%$ of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17308	LI_____ BSN42	BASIN LV LLERF 42	<p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the basin level transmitter LT-42-2, disconnect the wires LT-42-2LCH(+) AND LT-42-2(-)</p> <p>Connect the wires to a loop calibrator and set at 12 ± 0.2 ma</p> <p>Verify that the level at the OCS and LCU reads $50 \pm 2\%$ of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		
17309	LI_____ BSN43	BASIN LV LLERF 43	<p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the basin level transmitter LT-43-2, disconnect the wires LT-43-2LCH(+) AND LT-43-2(-)</p> <p>Connect the wires to a loop calibrator and set at 12 ± 0.2 ma</p> <p>Verify that the level at the OCS and LCU reads $50 \pm 2\%$ of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17310	LI_____ BSN44	BASIN LV LLERF 44	<p>Notify 242-A Evaporator Control Room (Tel: 373-4391) of loss of level signal.</p> <p>At the basin level transmitter LT-44-2, disconnect the wires LT-44-2LCH(+) AND LT-44-2(-)</p> <p>Connect the wires to a loop calibrator and set at 12+/-0.2 ma</p> <p>Verify that the level at the OCS and LCU reads 50 +/- 2% of range.</p> <p>Restore level transmitter to original (as found) configuration</p> <p>Verify with 242-A Evaporator that signal is restored.</p>		
17326	JA_____ 60M302	PWR ALARM LERF LCU	<p>Turn off LCU power at bottom of LCU cabinet circuit CB-1.</p> <p>Verify that the power supply alarm is present at both the OCS and LCU.</p> <p>Turn power back on circuit CB-1</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17327	LIC____ P42-4-1	SURGE TK LEVL CMD	Place loop LIC____P42_4_1 into MANUAL MODE and stroke the valve up and down while verifying at the control valve LV42-4-1 that the valve follows the output signal from the LCU. Verify at both the LCU and the OCS. Return the valve to 0 % output at completion of test.		
17328	LIC____ P43-4-1	SURGE TK LEVL CMD	Place loop LIC____P43_4_1 into MANUAL MODE and stroke the valve up and down while verifying at the control valve LV43-4-1 that the valve follows the output signal from the LCU. Verify at both the LCU and the OCS. Return the valve to 0 % output at completion of test.		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17329	LIC____ P44_4_1	SURGE TK LEVL CMD	Place loop LIC____P44_4_1 into MANUAL MODE and stroke the valve up and down while verifying at the control valve LV44-4-1 that the valve follows the output signal from the LCU. Verify at both the LCU and the OCS. Return the valve to 0 % output at completion of test.		
17331	JA6017__ VAC	AC ALARM LERFPOND	Notify 242-A Evaporator of possibility of leak detector alarms. Tel: 373-4391 or 373-2737. Turn off power to the UPS in the LCU at panel A and verify that AC alarm shows at OCS and LCU. Turn power back on to UPS and notify 242-A Control Room.		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17332	JA6017 VDC	DC ALARM LERFPOND	<p>Notify 242-A Evaporator of possibility of leak detector alarms. Tel: 373-4391 or 373-2737.</p> <p>Turn off power to the UPS in the LCU at panel A and verify that AC alarm shows at OCS and LCU.</p> <p>Also turn off CB-1 at back of LCU.</p> <p>Leave power off for about an hour to allow UPS batteries to discharge down sufficiently to trip the alarm.</p> <p>Turn on CB-1 at back of LCU.</p> <p>Turn power back on to UPS and notify 242-A Control Room.</p>		
17504	LDS BSN42	LEAK DET LERF 42	<p>Notify 242-A Evaporator Control Room of ensuing leak detector alarm.</p> <p>Disconnect the leads at the leak detector and verify that the alarm shows at the OCS and LCU.</p> <p>Reconnect leads and notify 242-A Control Room.</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17505	LDS_____ BSN43	LEAK DET LERF 43	Notify 242-A Evaporator Control Room of ensuing leak detector alarm. Disconnect the leads at the leak detector and verify that the alarm shows at the OCS and LCU. Reconnect leads and notify 242-A Control Room.		
17506	LDS_____ BSN44	LEAK DET LERF 44	Notify 242-A Evaporator Control Room of ensuing leak detector alarm. Disconnect the leads at the leak detector and verify that the alarm shows at the OCS and LCU. Reconnect leads and notify 242-A Control Room.		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17513	YS _____ P42	PMP CONF LERF 42	<p>Lift the output leads from the motor starter relay to the pump.</p> <p>Energize MCC.</p> <p>Actuate HS _____ P42_4_3 (pump start) and verify that confirm tag YS _____ P42 shows on the OCS and LCU.</p> <p>Shut down pump by actuating tag HS _____ P42_4_3 again.</p> <p>Deenergize MCC.</p> <p>Restore wiring.</p>		
17514	YS _____ P43	PMP CONF LERF 43	<p>Lift the output leads from the motor starter relay to the pump.</p> <p>Energize MCC.</p> <p>Actuate HS _____ P43_4_3 (pump start) and verify that confirm tag YS _____ P43 shows on the OCS and LCU.</p> <p>Shut down pump by actuating tag HS _____ P43_4_3 again.</p> <p>Deenergize MCC.</p> <p>Restore wiring.</p>		

LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17515	YS _____ P44	PMP CONF LERF 44	<p>Lift the output leads from the motor starter relay to the pump. Energize MCC.</p> <p>Actuate HS _____ P44_4_3 (pump start) and verify that confirm tag YS _____ P44 shows on the OCS and LCU.</p> <p>Shut down pump by actuating tag HS _____ P44_4_3 again. Deenergize MCC. Restore wiring.</p>		
17604	FAL _____ P42_4_1	LOW FLOW LERF 42	<p>Remove cover from FSL P42-4-1 at pipe at LERF Basin 42 and actuate flapper bar and verify alarm clears.</p> <p>Verify that the low flow alarm actuates when bar is released and indicates ALARM on the LCU and OCS.</p> <p>Reinstall low flow alarm cover in the pipeline.</p>		

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LERF LCU SIGNAL VERIFICATION TABLE

Signal Location	Tagname	Tag Descriptor	Verify that tag changes value at LOI and OCS after taking the following action	Verify at LOI	Verify at OCS
17605	FAL_____ P43_4_1	LOW FLOW LERF 43	Remove cover from FSL P43-4-1 at pipe at LERF Basin 43 and actuate flapper bar and verify alarm clears. Verify that the low flow alarm actuates when bar is released and indicates ALARM on the LCU and OCS. Reinstall low flow alarm cover in the pipeline.		
17606	FAL_____ P44_4_1	LOW FLOW LERF 44	Remove cover from FSL P44-4-1 at pipe at LERF Basin 44 and actuate flapper bar and verify alarm clears. Verify that the low flow alarm actuates when bar is released and indicates ALARM on the LCU and OCS. Reinstall low flow alarm cover in the pipeline.		

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10.0 STEP BY STEP TEST PROCEDURES FOR LOGIC

10.1. LERF Operational Philosophy

LERF PUMPS P-42-4, P-43-4 and P-44-4:

Pumps are turned on by the operator input (HS P4* 4 3) where * = 2, 3 or 4. They are stopped by operator input, Surge Tank High Level (LAH 60A013 or LSH 60A012), or various leak detectors. The FAL signal is set at 35 gpm and initiated by a flow switch in the primary transfer line. It is wired to the MCC within a variable time delay to enable the pump to buildup the flow. Pumps are prevented from starting by any of several leak detector signals. To start a pump with a leak detected alarm requires an override. Tag HS60A OVERRIDE will allow overriding a leak detector leak signal. Pumps are permitted to operate by valve confirm open signal, ZSO60A055 or valve open confirm signal ZSO60A056. An operator initiated override (tag HS60A055 OVERRIDE) is provided to allow pumping from basin to basin and thus

not through one of the ETF Surge Tank inlet valves.

Operator initiated EMERGENCY STOP will stop any pump simultaneously (P-4*-4).

Pumps are rated for 175 gpm.

The pump start will initiate the flow control valve opening at 16% per second slew rate. Pumps are delayed from starting until the flow control valve is open 35% or more which takes 2 seconds to reach.

Pumps are stopped by an alarm from any of the following signals:

- LAH 60A012
- LSH60A013
- LDA60M01A/B/C/D
- LDS BSN 4*
- EMERGENCY STOP

LOW FLOW SWITCH, FAL-P4*-4-1:

The low flow switches are set to activate at less than 35 gpm.

LEVEL CONTROL VALVE, LV P4*-4-1

These valves are control valves which are used to control the SURGE TANK level, at a controlled set point, in automatic mode of operation. The level signal from the SURGE TANK comes from LT60A012. Valve position is governed by the LIC P4*-4-1 setting.

The valve has the normal 0 to 100% range when the pump is off. As soon as the pump is turned on, the output range for the valve is shifted back to the 40 to 100% output range which protects the pump from deadheading.

The 40% open minimum setting accommodates 55 gpm flow which is the minimum the pump must operate at. Thus, whenever the pump is on, the valve will be open a minimum of 40%. When the pump is turned off, the level control valve will close all the way, because the low output limit for the valve then returns to 0%.

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LEAK DETECTORS

Leak detectors are located in the 4" transfer line which connects the three LERF basins to the ETF through catch basin 44. Leak detectors are also positioned in the interbasin transfer lines and catch basins. Leak detectors monitor secondary containment for leaks in the primary transfer lines, they will interlock any basin pumps and have to be overridden to effect a transfer between basins (to allow the emptying of a leaking basin).

BASIN LEVEL INDICATORS:

Level indicators are used to monitor the main basin levels (LI BSN4*).

Level is also indicated on basin leachate level as LI LCH4*.

LEACHATE PUMP:

Leachate pump on/off status is indicated by tags YS _____ P4* 4 1

BASIN PUMPS:

Basin pumps will receive a 10 second pulse start or stop. As soon as the pump software switch is activated, the associated control valve will start to slew open to 40% (over a 2.5 second period). As soon as the valve passes 35% open mark, the pump will be allowed to start, provided that none of various interlock signals have been activated.

When the pump shuts down, the valve will slew closed at 16% per second rate.

During normal operation, the valve will respond to surge tank level input and attempt to control the level in the surge tank at the selected point.

The valve cannot close beyond 40% open if the pump is on. Therefore, the ETF Surge tank level can eventually reach the high level set point, which will shut down the pump, if less than 55 gpm flow out of the surge tank is maintained long enough.

To reset the pump, the ESTOP4 has to be turned on and then off.

FLOW TOTALIZATION

The control program is set up to calculate the amount of feed to the ETF. The totalizer accumulates the flow information in tag VA17302. This total is manually reset by actuating tag TOTRESET. Any transfer pump going on and off will not affect the totalization program.

LERF POND LEVEL

The LERF basin level is displayed as both feet of liquid and also in total volume in gallons for inventory purposes. The LERF basin volume is displayed in tag VA173XX.

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10.2. LERF Pump and Valve Verification

10.2.1 SETUP

Lift the output leads from the motor starter relay to the pump.
Energize MCC.

Ensure that the following interlock tags that are involved in the pump logic not in the alarm state:

LDA-60M01A
LDA-60M01B
LDA-60M01C
LDA-60M01D
LDS-BSN42
LDS-BSN43
LDS-BSN44
LSH60A013
LAH60A012
ESTOP4

One of the two valve confirms (ZS060A055 or ZSO60A056) from the ETF Surge tank must be received in the "1" state (Surge Tank valve open) to proceed or the override (HS60A055OVERRIDE) must be ON (in the "1" state).

Low Flow Switch FAL-P4*-4-1 will be activated to simulate flow conditions.

10.2.2 VALVE PERFORMANCE TEST

Observe loop LIC-P4*_4_1 while actuating HS-P*_4_3 (PUMP P-4*-4 where * is either 2,3 or 4 for either of the LERF basin pumps). The initial output range for the valve should be 0 to 100 %. After actuating the pump tag, observe the low output range for the valve. It should change to 40%. The flow control valve should not go lower than 40 %, regardless of the setting.

Set the loop LIC-P4*_4_1 to AUTO and set the level set point above the current ETF Surge tank level as shown by VA17301 (LT60A012). This will open up the flow control valve.

Actuate the pump tag HS-P4*_4_3 which will engage the pump contactor. Verify that the pump contactor closed as indicated by the confirm tag YS-P4* (pump auxiliary contacts).

Valve performance test completed successfully.

_____ Date

_____ Date

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10.2.3 PUMP INTERLOCK TEST

Confirm that any of the following interlocks can deactivate the pump by disconnecting one signal at a time in sequence:

TAG	TS Number	POINT NUMBER
LDA-60M01A	F	6
LDA-60M01B	F	9
LDA-60M01C	F	11
LDA-60M01D	F	13
LDS-BSN42	E	4
LDS-BSN43	E	5
LDS-BSN44	E	6

The following software tags are implemented into software because their inputs will not be available at the time of this test. They are in the main ETF database which will not be accessible:

LSH60A012	software tag
LAH60A013	software tag

The emergency stop (ESTOP) is a software stop tag and thus can be actuated from the OCS.

PUMP INTERLOCK CHECKOUT TEST

SIMULATED LERF ALARM ON	PUMP P42 STATUS	PUMP P43 STATUS	PUMP P44 STATUS
LDA-60M01A			
LDA-60M01B			
LDA-60M01C			
LDA-60M01D			
LDS-BSN42			
LDS-BSN43			
LDS-BSN44			
LSH60A012			
LAH60A013			
ESTOP4			
OVERRIDE			