NRC Research and/or Technical Assistance Report

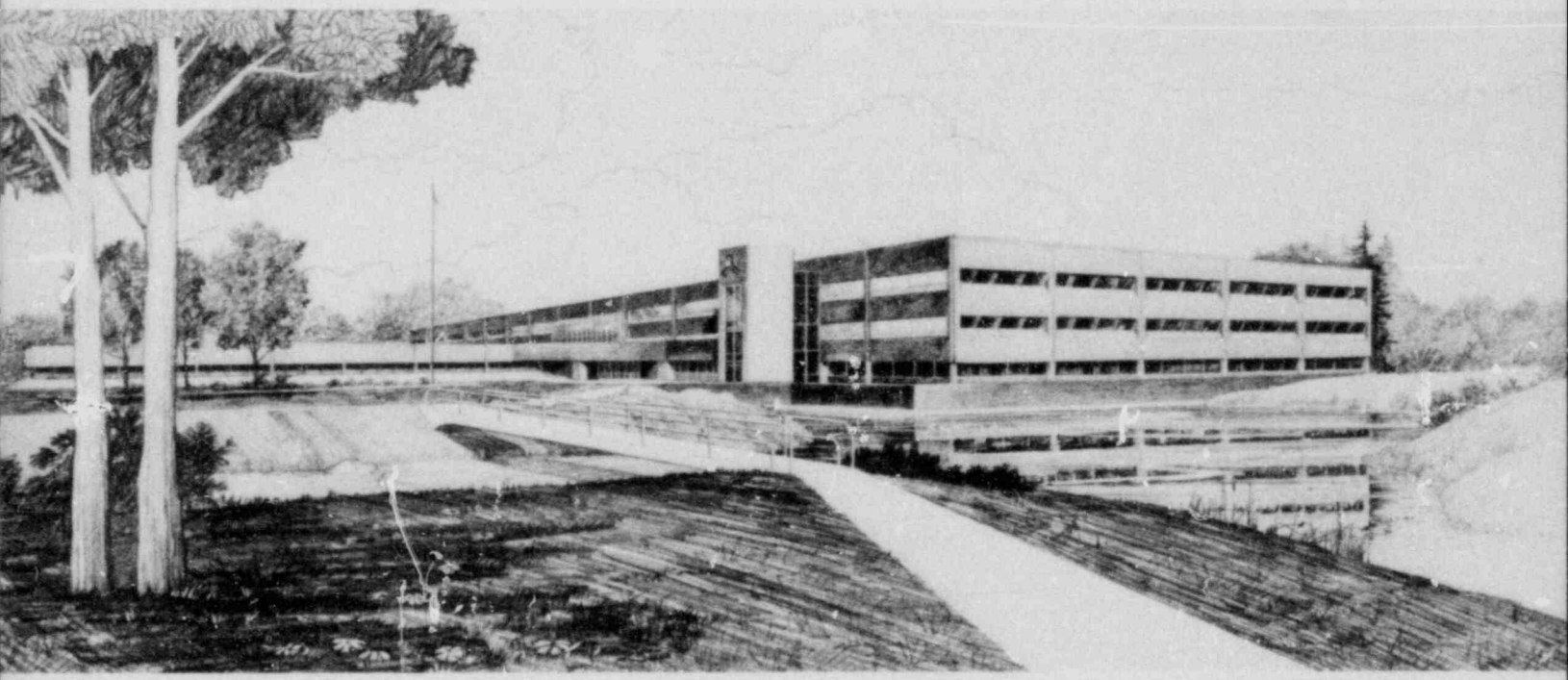
EGG-LOFT-5436
NE L5 Series
EOS L5-1

LOFT EXPERIMENT OPERATING SPECIFICATION

INTERMEDIATE BREAK TEST SERIES L5

TEST L5-1

U.S. Department of Energy
Idaho Operations Office • Idaho National Engineering Laboratory



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INTERIM REPORT

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INTERMEDIATE BREAK TEST SERIES L5
TEST L5-'

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FOREWORD

This document provides the programmatic information required by the LOFT Facility Division (LFD) to develop the Experiment Operating Procedure (EOP) for Test L5-1. It is also to be used as the basis of information for both the Experiment Prediction (EP) and Experiment Safety Analysis (ESA).

Parameter specifications throughout this Experiment Operating Specification (EOS) are based upon actual process instrumentation indications, those which would directly influence operator action. References to technical specification limits include no correction for error margin or instrument error.

Specifications are subject to revision according to constraints of the Experiments Safety Analysis (ESA).

CONTENTS

FIGURES

TABLES

NOMENCLATURE

BST	Blowdown Suppression Tank
CE	Combustion Engineering
CHF	Critical Heat Flux
DAVDS	Data Acquisition and Visual Display System
DDAPS	Digital Data Acquisition and Processing Subsystem
DDAS	Digital Data Acquisition Subsystem
DOE	Department of Energy
ECCS	Emergency Core Cooling (System)
EOP	Experiment Operating Procedure
EOS	Experiment Operating Specification
ESA	Experiment Safety Analysis
HPIS	High-Pressure Injection System
JEG	Joint Experiment Group
LECS	LOFT Experiment Control System
LOCA	Loss-of-Coolant Accident
LOCE	Loss-of-Coolant Experiment
LOFT	Loss-of-Fluid Test (Facility)
LPIS	Low Pressure Injection System
LPWR	Large Pressurized Water Reactor
MLHGR	Maximum Linear Heat Generation Rate
NRC	Nuclear Regulatory Commission
ODDS	Operational Diagnostic and Display System
PCCS	Primary Component Cooling System

PCP	Primary Coolant Pump
PCS	Primary Coolant System
PLSS	Plant Log and Surveillance System
POM	Plant Operating Manual
PPS	Plant Protection System
PSMG	Primary System Motor-Generator (Sets)
QOBV	Quick-Opening Blowdown Valve
SCS	Secondary Coolant System
SG	Steam Generator

LOFT EXPERIMENT OPERATING SPECIFICATION
INTERMEDIATE BREAK TEST SERIES L5
TEST L5-1

1. INTRODUCTION

Test L5-1 will simulate some aspects of the rupture of a single 14-in. accumulator line (one-of-four) in a commercial four-loop pressurized water reactor (PWR). The test will be initiated from specified conditions at 16 kW/ft. The PCPs will be tripped at indication of reactor scram.

The ECC injection line break size, defined as an intermediate break, lies between the hydrostatically controlled small breaks (6 inches or less) and the inertially dominated large breaks (greater than 18 inches) which have been investigated extensively in both LOFT and Semiscale. The intent of this experiment is to provide data to characterize the system hydraulic response and core thermal behavior for a break size which is equivalent in diameter to the largest PCS penetrations in a number of commercial PWR's. The experiment is initiated by the opening of the broken loop cold leg QOBV. A rapid subcooled blowdown immediately occurs, dropping the PCS pressure to 1600 psia. Nominal accumulator injection is predicted to occur approximately 100 seconds subsequent to transient initiation.

However, instead of an accumulator initiation pressure of 600 psia, accumulator injection will be delayed until the system pressure reaches 232 psia. The intent of this portion of the transient is to induce a core uncovery at relatively high decay heat levels. A scaled flow ECC (i.e., high and low pressure injection, and accumulator injection) will be delivered to the system. Therefore, the L5-1 experiment will also address the effectiveness of degraded ECC performance in mitigating the severity of an intermediate break Loss-of-Coolant Accident (LOCA).

The experiment will be terminated following bundle reflood and break isolation. The plant will be stabilized in a long term cooling mode.

All systems will be operated per the Technical Specifications. Deviations from the Plant Operating Manual (POM) may occur and will be noted.

2. EXPERIMENT OBJECTIVES

The principal programmatic objectives of Test L5-1 are to identify and evaluate the LOFT system thermal-hydraulic response during an intermediate break Loss-of-Coolant Experiment. Programmatic and test specific objectives are provided in the listing below (Reference 2).

2.1 Programmatic Objectives

1. Determine the effectiveness of degraded ECC systems in an intermediate size break loss-of-coolant accident (LOCA). High pressure injection systems are effective for small breaks and accumulators are effective for large breaks. The question is how effective are the systems for break size where the high pressure injection is not sufficient, but the pressure stays at or above the accumulator injection setpoint.

2. Determine and understand the core cooling and system hydraulic behavior for an intermediate size break which may include characteristics from both small breaks and large breaks as well as characteristics unique to breaks of this size.

3. Evaluate the capability of RELAP5 to predict pumps off behavior in an intermediate sized break. Adequate prediction of this behavior would alleviate the need to run a pumps on experiment for the intermediate size break.

4. Evaluate the adequacy of two-phase liquid level measurements in the upper plenum and core regions for this type of transient.

5. Prove that LOFT results are applicable by scaling (with RELAP5) to a large plant for an intermediate size break.

2.2 Test Specific Objectives

The test specific objectives are defined as those which may be evaluated shortly after the conduct of the L5-1 test. Analysis, other than required for data qualification, will not be required to assess the degree of completion of these objectives.

1. Obtain sufficient data to characterize the prevalent phenomena caused by an ECCS injection line rupture.

2. Generate applicable data for use as a baseline in the future planning of the intermediate size LOCEs.

3. Provide data for the evaluation of the transient identification algorithms contained in the Operational Diagnostic and Display System (ODDS).

4. Provide data to assess the analytical techniques used to model the principal phenomena of an intermediate break.

3. GENERAL TEST DESCRIPTION

The proposed experiment is characterized as constituting two distinct regimes, each of which address concerns of the licensing branch of the NRC. It is the specific intent of this experiment to provide data characterizing the initial intermediate sized LOCE for the investigation and evaluation of reactor safety systems.

The initial portion of the experiment will provide the basic blowdown (~ 107 seconds) data for a scaled ECC injection line rupture. Based on the experiment scoping calculations, the transient is initiated by an extremely rapid (< 0.5 sec.) subcooled blowdown, dropping the system pressure to approximately 1600 psia. At this pressure, the fluid conditions in the reactor vessel and primary coolant system become saturated. The PCPs, tripped at indication of reactor scram, complete a coastdown within 37.5 seconds. The two-phase mixture level in the reactor vessel decreases sharply during the initial few seconds and then falls at a constant rate of approximately 0.8 inches per second. At the conclusion of this portion of the experiment, the two-phase level is slightly higher than the top of the fuel bundles. Because of this, a heatup of the fuel was not calculated.

The second portion of the transient is designed to provide data for the description of a slow core uncovery, possible fuel temperature excursion, and the system recovery using a degraded ECC. The two-phase mixture level continues to decrease in the reactor vessel, reaching the upper portion of the fuel rods at approximately 135 seconds. The falling liquid level is arrested at the bundle midplane (205 seconds) by a scaled accumulator and LPIS flow injection at 220 and 206 psig, respectively. The fuel rods are expected to undergo a moderate temperature excursion, rising to 120°F above saturation before the bundles are reflooded. With the accumulator and LPIS injection, the top of the bundles is recovered by a

low quality mixture by 240 seconds. The transient is defined as terminated at a time of either 8 minutes after LPIS flow initiation, or 50°F subcooling in the intact loop hot leg (Reference 1).

Figures 1 and 2 of this EOS illustrate the pressure and vessel two-phase mixture level behaviors.

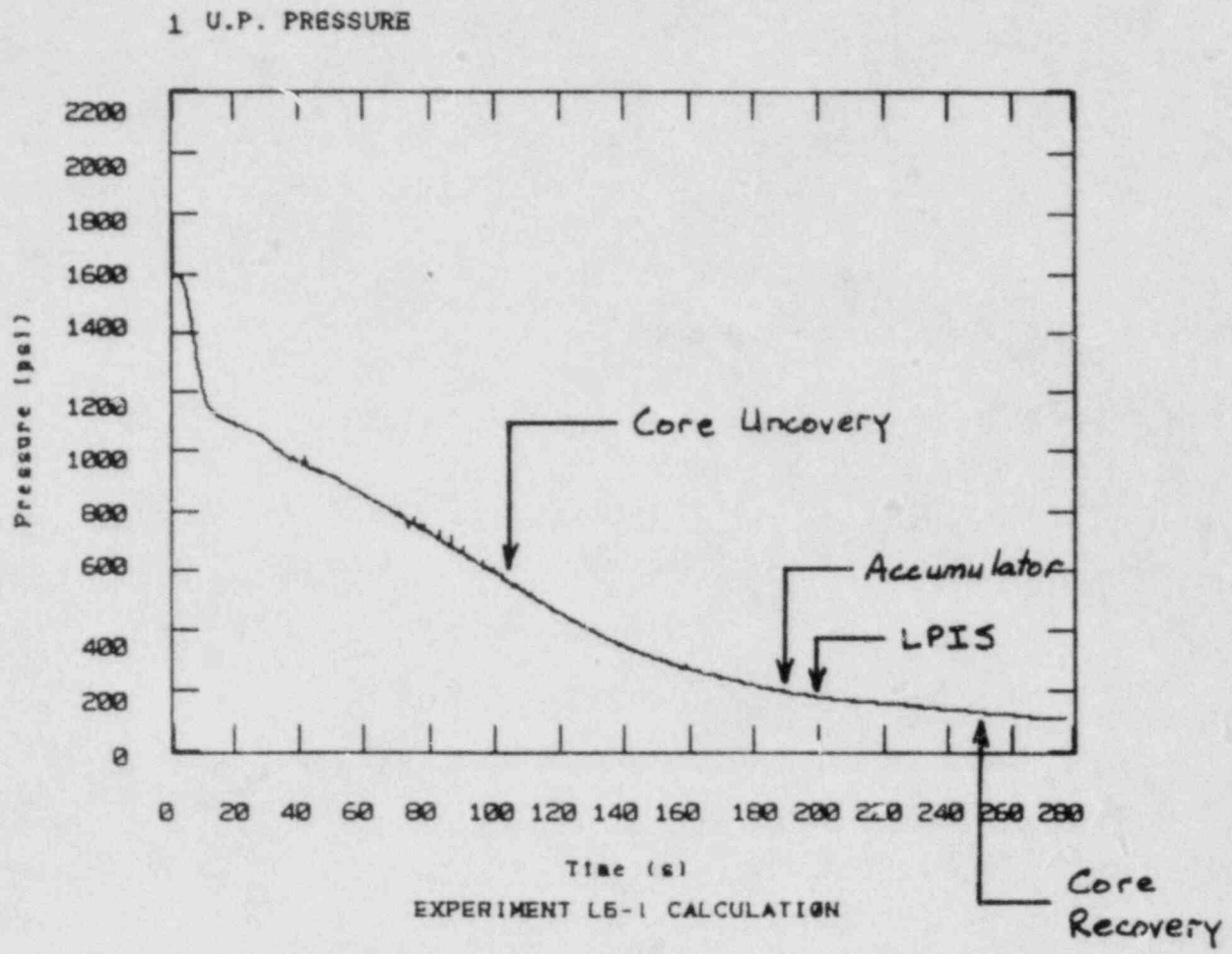


Figure 1. Test L5-1 Pressure History

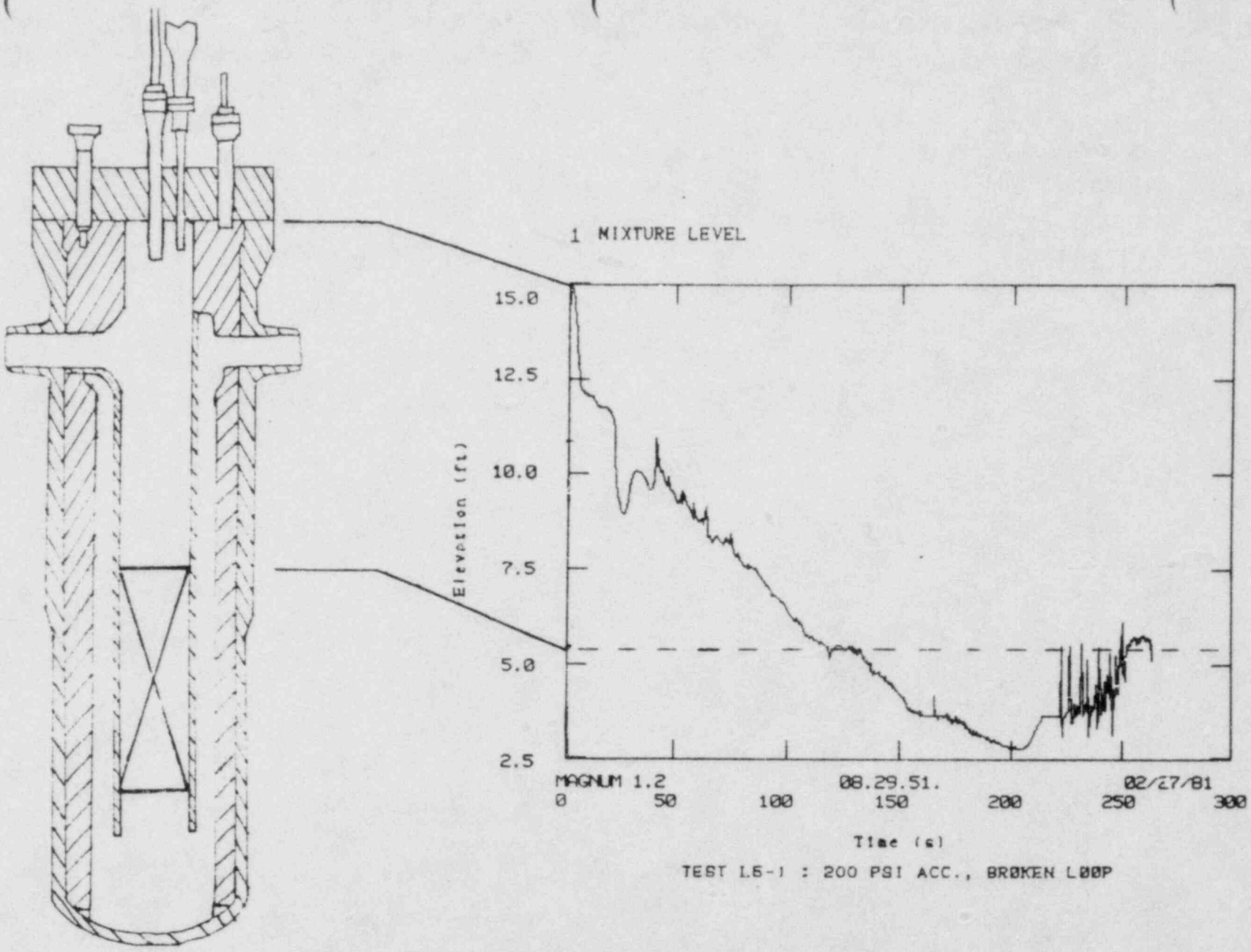


Figure 2. Test L5-1 Calculated Vessel Mixture Level

4. TEST PREREQUISITES

The following prerequisites must be completed prior to initiating Tests L5-1.

1. Complete the Experiment Safety Analysis and incorporate all required EOS changes into the Experiment Operating Procedures (EOP).

2. Complete the Experiment Prediction and review for logic and credibility.

3. Check out the DAVDS software using predefined functional and configuration tests.

4. Perform a one point end-to-end check of the process instruments identified in Table 1 within 60 days of the tests. If a problem is indicated, recalibrate the instrument.

5. Verify the location and orientation of accessible experimental instruments and piping.

6. Complete a cold accumulator blowdown at 435 $\pm$ 35 psig through the the broken loop cold leg piping assembly to checkout the operation of the instrumentation.

7. Early in the pre-blowdown power run, compare a DAVDS data listing with the control room instrument readings and resolve any discrepancies. As a minimum, compare those instruments identified in Table 1.

8. Verify PCS leak rate (less than approximately 2.0 gpm) within 3 hours of the anticipated blowdown initiation.

9. Determine the system steady state heat losses to the environment at normal operating temperature and pressure conditions prior to reactor startup.

10. Complete the pre-blowdown calibration requirements specified in Section V, and DOP 87-005 "DAVDS Experimental Measurements Test Procedure."

11. Verify that the Operational Diagnostic and Display System (ODDS) is operational, as required.

12. The LPIS "A" discharge orifice XRO-64 has been sized to 0.495 $\pm$ 0.0005 inches diameter.

TABLE 1. PROCESS INSTRUMENTS REQUIRING CALIBRATION PRIOR TO TESTS

Instrument	Parameter Measured
FT-P4-12	Steam Flow
FT-P4-72-2	Feedwater Flow
FT-P120-36-1	Accumulator A Flow - High Range
FT-P120-36-5	Accumulator A Flow - Low Range
FT-P120-85	LPIS A Flow
FT-P128-104	HPIS A Flow
FT-P139-27-1	Primary Coolant Flow
FT-P139-27-2	Primary Coolant Flow
FT-P139-27-3	Primary Coolant Flow
PT-P141-22	PCCS Flow
LT-P4-8A	Steam Generator Liquid Level - Narrow Range
LT-P4-8B	Steam Generator Liquid Level - Wide Range
LIT-P120-44	Accumulator A Liquid Level - Wide Range
LT-P138-33	BST Liquid Level
LT-P138-58	BST Liquid Level
LT-P139-7	Pressurizer Liquid Level
PT-P4-10A	Steam Generator Pressure
PT-P120-43	Accumulator A Pressure
PT-P120-61	ECC Cold Leg Injection Pressure
PT-P139-2	Hot Leg Pressure
TE-P138-170	Broken Loop Cold Leg Warmup Line Temperature
TE-P138-171	Broken Loop Hot Leg Warmup Line Temperature
TE-P139-29	Intact Loop Hot Leg Temperature
TE-P139-32-1	Intact Loop Cold Leg Temperature
TE-P141-94	PCCS Temperature
TE-P141-96	PCCS Temperature

5. TEST REQUIREMENTS

5.1 Test Sequence

The following items will be performed by the LOFT Facility Division prior to the test initiation. There is no programmatic requirement as to their sequence.

1. Complete the prerequisites established in Section 4.0 of this EOS.

2. Complete DAVDS instrument calibrations as discussed in Section 6.1 of this EOS.

3. Program and checkout the LOFT Experiment Control System (LECS).

4. Establish the initial conditions as required in Section 5.3 of this EOS (deviation from POM).

5. Operate at power to establish the required decay heat level of at least 732 kW at 1000 seconds subsequent to scram.

6. Obtain water samples from the primary coolant system, blowdown suppression tank, and steam generator secondary as per Section 5.3.9 of this EOS.

7. Initiate BST recirculation flow.

8. Isolate the purification system.

9. Secure steam generator continuous blowdown.

The following actions should be performed in sequence:

1. Lower PCS flow to the required initial condition level (deviation from POM).

2. Reduce accumulator pressure to 220 psig (deviation from POM).

3. Isolate the cold leg blowdown warmup line.

4. Initiate the DAVDS.

5. Initiate PCP injection flow.

6. Initiate the LOCE from the LECS.

7. Monitor the fuel thermocouple response to ensure that ESA limits are not violated.

8. When the criteria of Section 5.4.9 are met, recover the plant as per EOP requirements.

5.2 System Configuration

5.2.1 Primary Coolant System

The components of the primary coolant system (intact loop, steam generator, PCPs, pressurizer) will remain in the standard LOFT configuration for a cold leg break experiment. The spool piece piping used in Tests L3-5, L3-6, L3-3, and L9-1 should be removed so that flow during the test may only be permitted in the required configuration.

5.2.2 Blowdown System

For Tests L5-1, the steam generator and pump simulators will be isolated from the loop by means of a blind flange at the FL-1 location. This reduction in the blowdown system volume is not expected to influence the transient response.

The break plane nozzle location in the cold leg is specified as 52 inches downstream of the BL-1 instrumentation port (Reference 3). It will be incorporated into the 8" sch 160 spool piece already existing in the cold leg. Suitable pressure drop measurements along and across the break plane nozzle will be made (Reference 4, 5). A schematic of the break plane with the associated measurements may be found in Figure 3. Table 2 lists the throat diameter of the break plane nozzle.

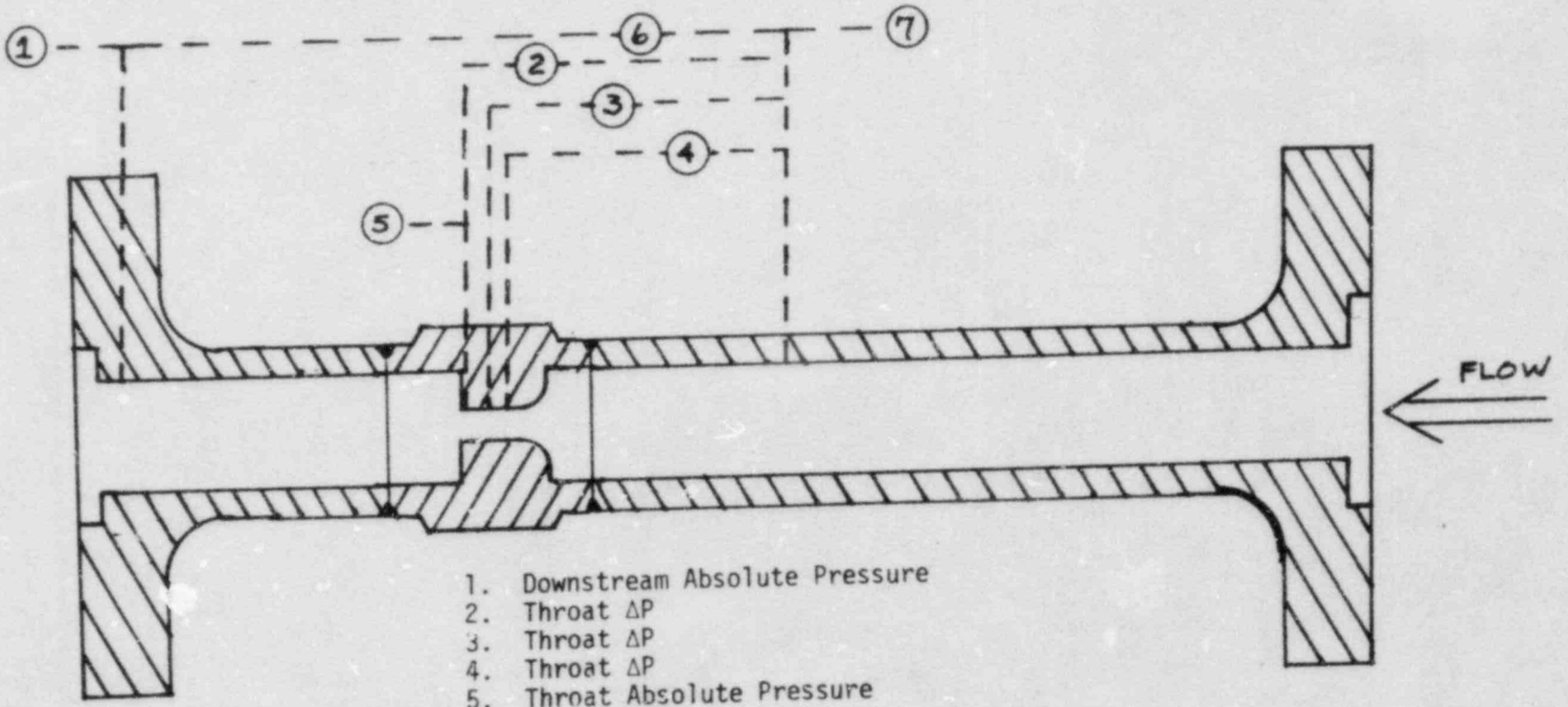
The remainder of the blowdown system configuration will remain as presently configured. The initial conditions are provided in Table 3.

5.2.3 Emergency Core Cooling System

The HPIS "A" initiation will be set at 1896 $\pm$ 27 psig (13.2 $\pm$ 0.2 MPa). It will be lined up to provide injection into the intact loop cold leg at the flow rate specified in Figure 4. Unless emergency conditions prevail, the maximum HPIS "A" flow should not exceed 11 gpm (0.83 l/s).

The LPIS "A" stop valve opening will be set at 296 $\pm$ 8 psig (2.13 $\pm$ 0.06 MPa gauge). The required orifice (XRO-64) diameter is set at 0.495 $\pm$ 0.0005 inches. The other orifice requirements may be found in Table 2. The LPIS "A" injection routing should terminate in the intact loop cold leg.

The accumulator "A" will be pressurized at transient initiation to 220 psig (1.60 MPa). The variable position standpipe will be set at 96.54 inches to ensure that no more than 8.6 ft^3 of fluid will be injected from the accumulator tank to the intact loop cold leg (Reference 6). The remaining accumulator "A" initial conditions are provided in Table 3.



1. Downstream Absolute Pressure
2. Throat ΔP
3. Throat ΔP
4. Throat ΔP
5. Throat Absolute Pressure
6. Break Plane ΔP
7. Upstream Absolute Pressure

Figure 3: L5-1 Break Plane Spool Piece Schematic

TABLE 2. ORIFICE AND NOZZLE SIZES FOR TEST L5-1[a]

Location	Test L5-1 and L8-2
1. Broken Loop Cold Leg Nozzle	1.847 ± 0.0005 in.[b]
2. LPIS Orifice XRO-64[c]	0.495 ± 0.0005 in.

a. Orifices shall be bored straight through with square edges on both faces on the plate, except as noted. Standard EG&G maching shop tolerances and practices shall be used, except as noted.

b. The break plane nozzle shall be designed and constructed as per References 3, 4, and 5.

c. As per Reference 6.

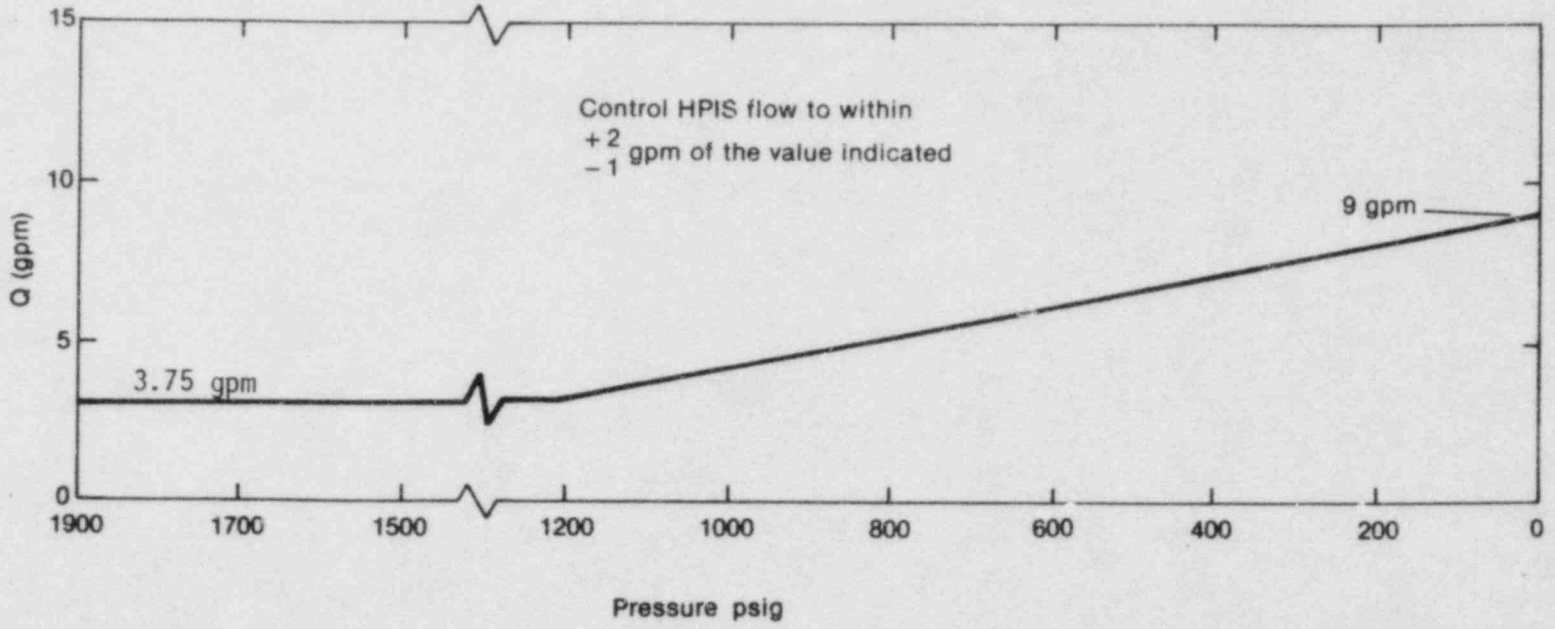


Figure 4. Scaled HPIS Flowrate

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The ECC system "B" will be configured and have initial conditions as specified in the Experiment Safety Analysis.

The remainder of the ECCS will be in the standard configuration and initial conditions for Test L5-1.

5.2.4 Secondary Coolant System

No configuration changes are required for Test L5-1.

5.3 Initial Conditions

5.3.1 Controllable Parameters

A summary of Test L5-1 controllable initial conditions is given in Table 3. Prior to experiment initiation, the initial conditions set forth in this table will be established. Systems or controllable parameters not identified in the table or set forth below shall be operated as per POM requirements.

5.3.2 Operating History

The reactor shall be operated at a specified power level for a duration sufficient to establish a decay heat level not less than that corresponding to 732 kW at 1000 seconds after shutdown. Decay powers larger than this are acceptable.

Should a reactor trip occur during the power run to establish decay heat, the down time must be considered when computing required reactor operating time after reactor startup to achieve the specified minimum decay power.

TABLE 3. INITIAL CONDITIONS

Parameter	Condition[a]	Tolerance
Primary Coolant System		
Power Level (MW)	50	± 1
Flowrate[b] ($\times 10^6$ lbm/hr)	2.65	± 0.05
Pressure (psig)	2156	± 15
Pressurizer Level (in.)	44	± 2
Control Rod Position (in.)	54.0	± 0.5
PCP Injection Flow (both PCPs, gpm)	1.25	± 0.25
Vessel Inlet Temperature (°F)	534	± 2
Vessel ΔT (°F)	52	± 3
Emergency Core Cooling System		
HPIS Flowrate Setting (gpm)	See Figure 3	+ 1 - 1
HPIS Initiation (psig)	1896	± 27
LPIS Pump Initiation (psig)	296	± 8
Accumulator Liquid Level (in.)	94.79	± 0.25
Accumulator Pressure (psig)	220	± 5.0
Accumulator Temperature (°F)	90	± 5
Blowdown Suppression Tank		
Liquid Level (in.)	50	± 2
Liquid Temperature (°F)	See Figure 5	--
Pressure (psig)	See Figure 5	--
Recirculation (gpm)	Full Pump Capacity	--

TABLE 3. (Continued)

Parameter	Condition[a]	Tolerance
Secondary Coolant System		
Programmed Level (100% Power) (in.)	10	± 2
Auxiliary Systems		
BWST Temperature (°F)	85	± 5

a. Values shown are indicated values.

b. The PCS flow will be as required to maintain the required ΔT of 52°F across the core. The flowrate listed above should serve as only an indication of the magnitude of the true initial PCS flowrate.

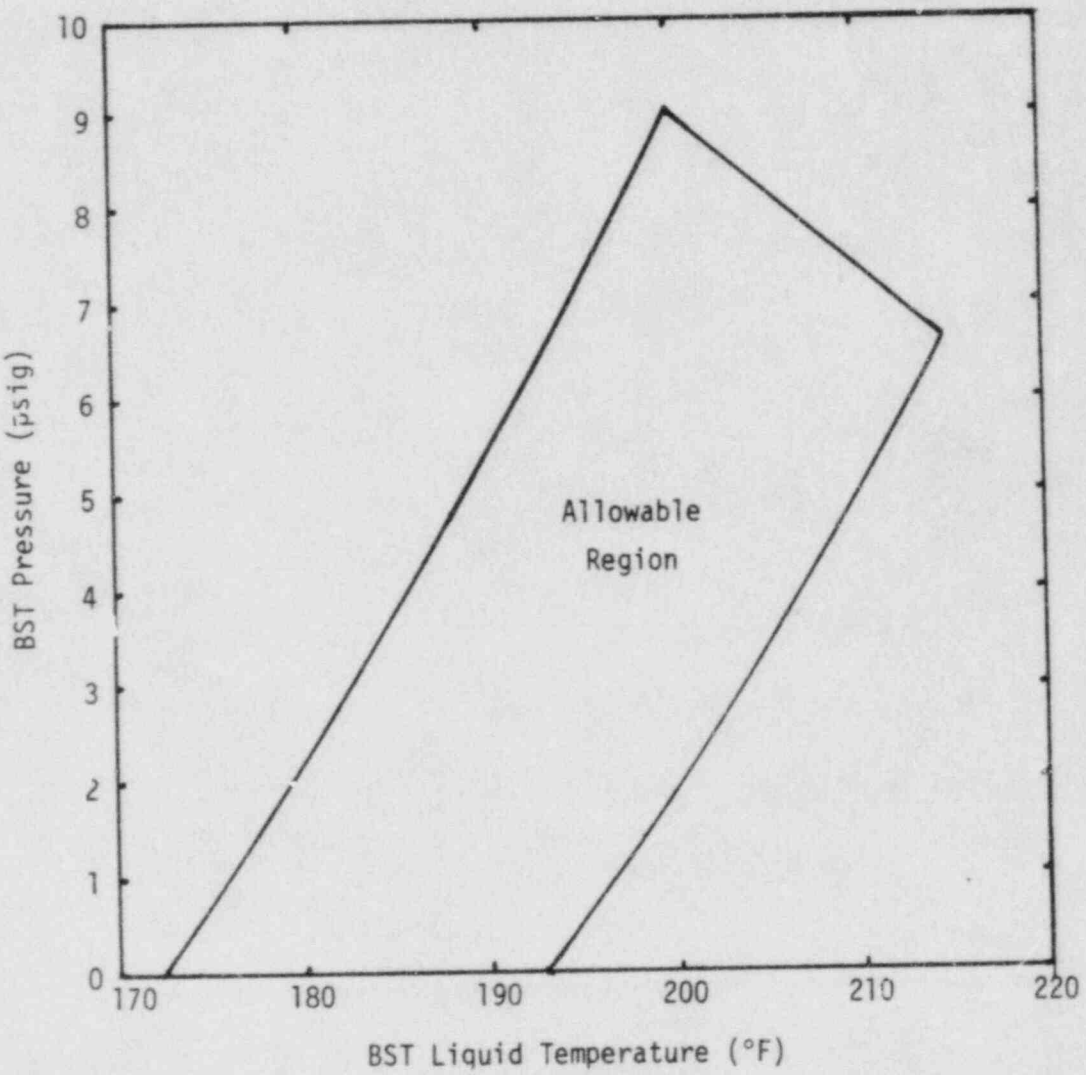

Figure 5. BST Initial Conditions

5.3.3 Pressurizer Heaters and Spray

The pressurizer heater control switch (backup and cycling) shall be placed in automatic. The spray control switch shall be placed in automatic.

5.3.4 Broken Loop Hot Leg Heaters

Power to the broken loop hot leg (BLHL) heat tracing shall be energized to maintain a BLHL temperature not greater than 575°F. This requirement is applicable to only the piping between the reactor vessel and pump simulator.

5.3.5 Purification System

The purification system shall be isolated from the primary system prior to test initiation.

5.3.6 BST Recirculation

BST recirculation shall be established at full spray pump capacity by taking suction at the BST bottom and discharging through the spray headers.

5.3.7 Reflood Assist Bypass Valves (RABVs)

The RABVs shall be inhibited from opening through the LECS during the conduct of the combined tests except for emergency test termination.

5.3.8 Primary Coolant Pump Injection

A combined primary coolant pump injection of 1.25 $\pm$ 0.25 gpm (0.079 $\pm$ 0.016 L/s) to the pumps will be established prior to pump trip. This injection will continue until 60 s following pump trip.

5.3.9 Water Sampling Requirements

Within 24 hours prior to blowdown initiation, a liquid sample will be obtained from the primary coolant system, the secondary coolant system, and the blowdown suppression tank. None of the pre-blowdown analyses need be completed prior to initiating the blowdown.

The primary coolant system sample will be analyzed for lithium concentration in addition to the normal daily analysis. The secondary coolant system sample will be analyzed per the Plant Operating Manual (POM) requirements for a steaming steam generator.

Prior to recirculating the liquid in the blowdown suppression tank after the test, a liquid sample will be obtained and analyzed. Additionally, the sample will be analyzed for I-131, I-133 and total gas, and a gamma spectrometric analysis will be performed.

5.3.10 Broken Loop Cold Leg Warmup Line

The two inch warmup line leading from the intact loop to the broken loop cold leg will be isolated at a time prior to test initiation so that the broken loop cold leg temperature remains within 25°F of the intact loop cold leg.

5.4 Required Operator Actions

5.4.1 Control Rod Trip

The reactor will automatically be tripped on the primary coolant low pressure setpoint of 2046 psig.

5.4.2 Primary Coolant Pumps

When indication of the successful control rod trip is received, power to the primary system motor generators will be tripped, allowing the primary coolant pumps to coastdown under the influence of the installed flywheel system. Manual verification of the PSMG feed breaker trip must be performed. PCP injection will be terminated 60 s after pump trip.

The pump trip may be automatic if desired.

5.4.3 High Pressure Injection System

When system pressure reaches 1896 $\pm$ 27 psig, the LOFT Experiment Control System will initiate HPIS "A" flow to the intact loop cold leg. The HPIS "A" flow will be controlled per Figure 3 until break isolation. It may then be used in accordance with the POM to assist in plant recovery.

5.4.4 Low Pressure Injection System

The LPIS "A" flow stop valve will be opened by the LOFT Experiment Control System at a primary system pressure of 296 psig. The flow will be routed to the intact loop cold leg injection location. Subsequent to break isolation, the LPIS "A" may be used as per the POM to assist in plant recovery.

5.4.5 Secondary Coolant System

There are no programmatic required operator actions for the secondary system.

5.4.6 Measurement of Vessel Liquid Level

As currently planned, cathode ray tube terminals will be set up to display data for the determination of real time liquid level. Representatives appointed by LOFT management will monitor the screens.

5.4.7 Determination of Core Uncovery

An increase of 20°F above saturation in either the upper core cladding thermocouples or the core outlet fluid thermocouples above the center fuel module shall be taken as the principal indication of initial core uncovery. A representative, appointed by LOFT Management, will monitor the appropriate instrumentation and transmit pertinent information to the JEG.

5.4.8 Break Isolation

The broken loop cold leg QOBV shall be closed and the break isolated as specified by the EOP.

5.4.9 Test Termination

Test L5-1 will be programmatically defined as terminated with the isolation of the break.

Data recording may be terminated following the break isolation.

5.4.10 Pressurizer Heaters

The pressurizer heaters will be turned off prior to the pressurizer indicated level reaching 18 inches.

5.5 Abnormal Conditions

This section covers system failures and unplanned events that could take place prior to and during a test.

5.5.1 Unplanned Events Prior to Blowdown Initiation

5.5.1.1 DAVDS Recording Failure. IF a DAVDS recording system or tape deck fails prior to initiating the transient, the test should be placed on "Hold" until the system is repaired or until a coordinated JEG decision is reached to proceed with the experiment.

5.5.1.2 Reactor and Associated Systems Abnormalities. There are no LOFT Program experimental requirements for operator actions taken to mitigate any casualty condition occurring prior to initiating a blowdown. Should a casualty and recovery take place, the initial conditions of this EOS shall be reestablished prior to initiating the blowdown.

5.5.2 Unplanned Events After Test Initiation

5.5.2.1 DAVDS Recording Failure. Since the DAVDS recording is expected to last 500 to 900 seconds, the experiment should continue until it is determined that the DAVDS cannot be repaired unless experimental measurements required for test monitoring are lost. In that case the experiment should be terminated and the EOP should be used for recovery.

5.5.2.2 Reactor and Associated System Abnormalities. The test should be terminated if any condition occurs that causes loss of control of the experiment. Loss of control shall be considered as loss of instruments used to monitor test progression; loss of control shall also be defined as the loss of effective operator actions to control or guide the plant during system recovery. If any cladding temperature determination exceeds 1100 °F at any time, terminate the test.

6. MEASUREMENT AND CALIBRATION REQUIREMENTS

6.1 Measurement Requirements

Measurements required for the L5-1 experiment are identified on the Data Acquisition Requirements Lists to be published prior to the test.

DDAPS, analogs, and DDAS recording will be required from T_o - 5 minutes until the plant is stable at the conditions identified in Section 5.4.9. Due to test duration uncertainty, a minimum of 2 hours recording time should be provided. PLSS will be required to test termination.

Instruments that fail prior to test initiation should be repaired if possible. If a failed instrument(s) cannot be repaired, the JEG shall determine the course of action.

To assist the JEG with determining their course of action the critical measurements list is provided in Table 4. The list identifies measurements which are considered essential for each experiment.

6.2 DAVDS Calibration Requirements

Prior to initiating the test, the following measurement calibrations are required.

(1) Perform an accumulator blowdown through the intact loop cold leg injection location to the suppression tank via the broken loop cold leg.

Submit the recorded data to the LOFT Data Analysis Branch (LDAB) for review. Wait until verification from the LDAB has been received and failed instruments identified before proceeding with heatup.

TABLE 4. CRITICAL MEASUREMENTS LIST

1. Liquid Properties Broken Loop, Cold Leg

   DE-BL-1A, B, C (Any 2 of A, B, or C)
   DE-BL-1D
   PE-BL-1
   TE-BL-1B
   ME-BL-1A, B, or C
   ME-BL-1D, E, or F

2. Liquid Properties Intact Loop, Cold Leg

   DE-PC-1A, B, C (Any 2 of A, B, or C)
   DE-PC-1D
   PE-PC-5 or PE-PC-6
   TE-PC-1A, B, or C
   ME-PC-1A, B, or C
   FE-PC-1A, B, or C

3. Liquid Properties Intact Loop, Hot Leg

   DE-PC-2A, B, C (Any 2 of A, B, or C)
   DE-PC-2D
   TE-PC-2A, B, or C
   PE-PC-2
   ME-PC-2A, B, or C
   FE-PC-2A, B, or C

4. Upper Plenum

   PE-1UP-1A1 or PE-1UP-1A

   PDE-RV-5
   TE-1UP-001 or TE-3UP-003
   TE-2UP-001 or TE-4UP-003
   TE-4UP-001 or TE-4UP-003
   TE-5UP-001, 2, 3, 4, 5, 6, 7, or 8
   TE-6UP-001 or TE-6UP-003

5. Lower Plenum

   PE-1ST-1A or PE-2ST-1A
   TE-1LP-001 or TE-3LP-001
   TE-5LP-001 or TE-5LP-004

TABLE 4. (continued)

6. Core and Downcomer Region

   LE-1ST-001 or LE-2ST-001
   LE-1ST-002 or LE-2ST-002
   LE-3F10 or LE-1F10

7. ECCS

   FT-P128-85
   FT-P128-104
   FT-P120-72
   FT-P120-85
   FT-P120-36-1
   FT-P120-36-5
   LIT-P120-44
   LE-ECC-01A
   PT-P120-43
   PT-P120-61

8. Steam Generator Conditions

   TE-SG-1
   TE-SG-2
   PE-SGS-1

9. Miscellaneous

   RPE-PC-1
   RPE-PC-2
   PDE-PC-27
   PDE-PC-28
   PDE-SV-1 or PDE-SV-2
   PE-SV-55 or PE-SV-60
   TE-SV-10, 11, or 12

10. Cladding thermocouples will be required to monitor core uncovery. The determination that sufficient cladding thermocouples are operable to monitor core uncovery and ensure test safety will be made by the JEG and the Reactor Systems Branch.

11. The real time liquid level determination will require a predetermined array of in-vessel instrumentation. The determination that sufficient instrumentation is operable to monitor liquid level in real time will be made by the JEG and the LOFT Data Analysis Branch.

(2) For the PCS low temperature calibration:

(a) With system pressure 500 psig (3.5 MPa) run a DAVDS calibration check.

(b) With no flow, record 20 seconds of data at the approximate pressures of approximately 200, 500, 1000, 1500, 2000, 2250 psig (1.5, 3.5, 7.0, 10.4, 13.9, and 15.6 MPA) in both increasing and decreasing directions (11 points).

(c) Start the pumps and take 20 seconds of data at 0, 15, 20, 30 40, 50 and 60 Hz (pressure as specified by LOFT Facility) in both increasing and decreasing directions (13 points).

Submit the recorded data to the LOFT Data Analysis Branch (LDAB) for review. Wait until verification from the LDAB has been received and failed instruments identified before proceeding with heatup.

(3) Raise primary system temperature to 300 $\pm$ 5°F (422 $\pm$ 3 K). When the temperature has stabilized within the error bands, and the pressure is that specified by the EOP:

(a) Record 20 seconds of data at the steady state flow and temperature.

(b) Record 20 seconds of data at the no flow condition.

(c) With the pumps off, vary system pressure and take 20 seconds of data at approximately 200, 500, 1000, 1500, 2000, and 2250 psig (1.5, 3.5, 7.0, 10.4, 13.9, and 15.6 MPa) in both increasing and decreasing directions (11 points).

(d) Start the pumps and record 20 seconds of data at 0, 15, 20, 30, 40, 50, and 60 Hz in both increasing and decreasing directions (13 points).

Submit the recorded data to the LOFT Data Analysis Branch (LDAB) for review. Wait until verification from the LDAB has been received and failed instruments identified before proceeding with heatup.

(4) Raise primary system temperature to 420 $\pm$ 5°F (489 $\pm$ 3 K). When the temperature has stabilized within the error bands and pressure is that specified by the EOP:

(a) Record 20 seconds of data at the steady state temperature and then shut the pumps off, recording coastdown data.

(b) Record 20 seconds of data at the no flow condition.

(c) With the pumps off, vary system pressure and take 20 seconds of data at approximately 2250, 2000, 1800, 1600, 1400, 1000, and 500 psig (15.6, 13.9, 12.5, 11.1, 7.0, and 3.5 MPa) in both increasing and decreasing directions (13 points).

(d) Start the pumps and record 20 seconds of data at 0, 15, 20, 30, 40, 50, and 60 Hz in both increasing and decreasing directions (13 points).

Submit the recorded data to the LOFT Data Analysis Branch (LDAB) for review. Wait until verification from the LDAB has been received and failed instruments identified before proceeding with heatup.

(5) Raise primary system temperature to 540 ± 5°F (556 ± 3 K). When temperature has stabilized within the error bands and pressure is that specified by the EOP:

(a) Record 20 seconds of data at the steady state temperature and then shut the pumps off, recording coastdown data.

(b) Record 20 seconds of data at the no flow condition.

(c) With the pumps off, vary system pressure and take 20 seconds of data at approximately 2156, 2000, 1800, 1600, and 1400 psig (14.9, 13.9, 12.5, 11.1, and 9.7 MPa) in both increasing and decreasing directions (9 points).

(d) Start the pumps and record 20 seconds of data at 0, 15, 20, 30, 40, 50, and 60 Hz in both increasing, and decreasing directions (13 points).

(e) With system pressure at ~ 2156 psig (14.9 MPa) and 540°F (556 K) run a DAVDS calibration check.

Submit the recorded data to the LOFT Data Analysis Branch (LDAB) for review. Wait until verification from the LDAB has been received and failed instruments identified before proceeding with heatup.

(6) At approximately 2 hours prior to T_0 run a DAVDS calibration check.

6.3 Post-Test Calibration Requirements

After a test has been completed (within 2 weeks) calibrate the Blowdown Suppression Tank liquid level detectors. Perform an accumulator blowdown through the cold leg broken loop to recheck the break flow instrumentation.

7. REFERENCES

1. R. P. Jordan, letter to E. A. Harvego, "Programmatic Termination of Tests L5-1/L8-2", RPJ-6-81, April 28, 1981.

2. R. P. Jordan, Experiment Definition Document, Nuclear Test L5-1, EGG-LOFT-5361, June 1981.

3. LOFT Drawing No. 212211.

4. R. P. Jordan, letter to Distribution, "Test L5-1/L8-2 Nozzle Location, Description, and Instrumentation", RPJ-3-81, April 8, 1981.

5. ASME Power Test Codes, Flow Measurement: Instruments and Apparatus, PTC 19.5; 4-1959, 1959.

6. D. D. Miller, letter to R. P. Jordan, "LPIS "A" Orifice XRO-64 Scaling for Test L5-1", DDM-1-81, June 12, 1981.

7. Appendix A (criterion 35) and K (parts C, D), Code of Federal Regulations, Number 10 (Energy), Part 50, revised January 1, 1978.

FORM EG&G-1844
(Rev. 04-80)

DOCUMENT REVISION REQUEST

(1) OPER. NO. _____

PAGE 1 OF ____

(2) REQUESTER	(3) DRR DATE	(4) DRR NO.
M. D. Peters	9/11/81	L-4946

(5) DOCUMENT NO. (IF APPLICABLE)	DOCUMENT TITLE	DOCUMENT ISSUE DATE
EGG-LOFT-5436	EOS for LS-1	July, 1981

(6) CHECK APPLICABLE BLANK
PERMANENT CHANGE X TEMPORARY CHANGE ____ BULLETIN ____

(7) MANAGER APPROVAL: C W Solberg for I P Peak DATE: 9/17/81

(8) PRINT OR TYPE PROPOSED CHANGE — NUMBER EACH CHANGE SEQUENTIALLY IN 1ST COLUMN AND RECORD PAGE AND STEP OR PARAGRAPH NUMBER FOR EACH CHANGE

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			— CHANGE 1 — (see page 2 for itemized changes)

USE CONTINUATION SHEET AS REQUIRED

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(10) JUSTIFICATION: (REASON FOR CHANGE — NUMBER TO CORRESPOND TO ITEM NO. ABOVE)

(see page 2)

(11) OTHER DOCUMENTATION AFFECTED:

DOC. NO.	DRR NO.	DATE COMPLETED
EOP for LS-1		

(12) ORIGINATING DRR NO: L-4946

(13) REVIEW

NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	ORG.	DATE
E. L. Johnson *	LFD	9/17/81	D. J. Hanson *	LMD	9/17/81		QUALITY DIV.	
T. F. Quinton *	LTSD	9/17/81					SAFETY DIV.	
C W Solberg	LPD	9/17/81					PRAC	

(14) COMMENTS: * TELECON w/ M D Peters

(15) ADDITIONAL DRRS IN THIS DOCUMENT REVISION

(16) DOCUMENT CONTROLLER	(17) RELEASE DATE	(17) DRR COMPLETED DATE
LOFT Program Division	9/17/81	

ORIGINAL

DOCUMENT REVISION REQUEST

(CONTINUATION SHEET)

OPER. NO. _____

PAGE 2 OF 2

FORM EG&G-1844A
(Rev. 5-77)

DRR NO. L-4946

DOCUMENT NO. (IF APPLICABLE)	DOCUMENT TITLE	DOCUMENT ISSUE DATE
EGG-LOFT-5436	EOS for LS-1	JULY, 1981

PRINT OR TYPE PROPOSED CHANGE — NUMBER EACH CHANGE ITEM SEQUENTIALLY IN 1ST COLUMN AND RECORD PAGE AND STEP OR PARAGRAPH NUMBER FOR EACH CHANGE

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1	5	—	REVISED PER ATTACHED COPY	
2	6	-	LEFT INTENTIONALLY BLANK	
3	10	#13	ADDED NEW PREREQUISITE TO VERIFY XRD-66 (ACC. "A")	
4	11	—	CORRECTED TE-F141-5L TO "TE-D141-95"	
5	15	-	REVISED ACCUM. "A" VOLUMES PER ATTACHED COPY	
6	20	-	REVISED INITIAL CONDITIONS PER ATTACHED COPY	
7	23	5.3.8	DELETED LAST SENTENCE SOTHAT INJECTION FLOW WILL NOT BE STOPPED AT 6 OSEC.	
8	24	5.3.10	REVISED PARAGRAPH TO CLARIFY MEANING & REDUNDANCY	
9	25	5.4.2	DELETED LAST SENTENCE TO ALLOW CONTINUOUS INJECTION PUMP OPERATION.	
10	25	5.4.3	THIRD SENTENCE - CHANGED "BREAK ISOLATION" TO "TEST TERMINATION".	
11	26	5.4.7	DELETED SECTION SINCE NO OPERATOR ACTIONS ON CORE UNCOVERY.	
12	26	5.4.8	REVISED TEST TERMINATION CRITERIA PER ATTACHED COPY.	
13	30	#8	DELETED STEAM GENERATOR TEMPS FROM CRIT. MEAS. LIST.	
14	3	2.1	REVISED OBJECTIVES FOR CLARIFICATION PER ATTACHED COPY.	

JUSTIFICATION FOR CHANGES

The EOS for LS-1 was issued in JULY '81. Since then, numerous revisions have occured as a result of resolving descrepencies in some scaling criteria for ECCS flow. These changes and other editorial and typographical changes are reflected in the attached Change 1 pages.

2. EXPERIMENT OBJECTIVES

The principal programmatic objectives of Test L5-1 are to identify and evaluate the LOFT system thermal-hydraulic response during an intermediate break Loss-of-Coolant Experiment. Programmatic and test specific objectives are provided in the listing below (Reference 2).

2.1 Programmatic Objectives

1. Determine the effectiveness of degraded ECC systems for the most limiting commercial plant design conditions in an intermediate size break loss-of-coolant accident (LOCA). High pressure injection systems are effective for small breaks and accumulators are effective for large breaks. The question is how effective are ECC systems for break size where the high pressure injection is not sufficient, and accumulator injection is delayed due to the slower system depressurization. The most limiting conditions are found with accumulator pressures of ~200 psig. This is representative of that used in several Combustion Engineering PWR designs.

2. Determine and understand the core cooling and system hydraulic behavior for an intermediate size break which may include characteristics from both small breaks and large breaks as well as characteristics unique to breaks of this size.

3. Evaluate the capability of RELAP5 to predict pumps off behavior in an intermediate sized break. Adequate prediction of this behavior would alleviate the need to run a pumps on experiment for the intermediate size break.

4. Evaluate the adequacy of two-phase liquid level measurements in the upper plenum and core regions for this type of transient.

5. Demonstrate the applicability of LOFT results by scaling (with RELAP5) to a large plant for an intermediate size break.

3. GENERAL TEST DESCRIPTION

The experiment will provide system response data for a scaled ECC injection line rupture. Based on the experiment scoping calculations, the transient is initiated by an extremely rapid (< 0.5 sec.) subcooled blowdown, dropping the system pressure to approximately 1600 psia. At this pressure, the fluid conditions in the reactor vessel and primary coolant system become saturated. The PCPs, tripped at indication of reactor scram, complete a coastdown within 40 seconds. The two-phase mixture level in the reactor vessel decreases sharply during the initial few seconds and then falls at a constant rate of approximately 0.6 inches per second. At the conclusion of this portion of the transient, the collapsed liquid level is slightly below the bottom of the fuel bundles. Because of this, the fuel cladding temperature rise was calculated to be about 5°F/second until mitigated by accumulator injection. The fuel rods are expected to achieve a peak temperature o. 800-900°F before the bundles are reflooded, when core cladding temperature are returned to a subcooled condition and stable.

Figures 1 and 2 of this EOS illustrate the pressure and vessel two-phase mixture level behaviors.

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9. Determine the system steady state heat losses to the environment at normal operating temperature and pressure conditions prior to reactor startup.

10. Complete the pre-blowdown calibration requirements specified in Section V, and DOP 87-005 "DAVDS Experimental Measurements Test Procedure."

11. Verify that the Operational Diagnostic and Display System (ODDS) is operational, as required.

12. The LPIS "A" discharge orifice XRO-64 has been sized to 0.495 $\pm$ 0.0005 inches diameter.

13. The accumulator "A" discharge orifice XRO-66 will be 2.5 $\pm$ 0.005 inches in diameter.

TABLE 1. PROCESS INSTRUMENTS REQUIRING CALIBRATION PRIOR TO TESTS

Instrument	Parameter Measured
FT-P4-12	Steam Flow
FT-P4-72-2	Feedwater Flow
FT-P120-36-1	Accumulator A Flow - High Range
FT-P120-36-5	Accumulator A Flow - Low Range
FT-P120-85	LPIS A Flow
FT-P128-104	HPIS A Flow
FT-P139-27-1	Primary Coolant Flow
FT-P139-27-2	Primary Coolant Flow
FT-P139-27-3	Primary Coolant Flow
PT-P141-22	PCCS Flow
LT-P4-8A	Steam Generator Liquid Level - Narrow Range
LT-P4-8B	Steam Generator Liquid Level - Wide Range
LIT-P120-44	Accumulator A Liquid Level - Wide Range
LT-P138-33	BST Liquid Level
LT-P138-58	BST Liquid Level
LT-P139-7	Pressurizer Liquid Level
PT-P4-10A	Steam Generator Pressure
PT-P120-43	Accumulator A Pressure
PT-P120-61	ECC Cold Leg Injection Pressure
PT-P139-2	Hot Leg Pressure
TE-P138-170	Broken Loop Cold Leg Warmup Line Temperature
TE-P138-171	Broken Loop Hot Leg Warmup Line Temperature
TE-P139-29	Intact Loop Hot Leg Temperature
TE-P139-32-1	Intact Loop Cold Leg Temperature
TE-P141-94	PCCS Temperature
TE-P141-95	PCCS Temperature

The accumulator "A" will be pressurized at transient initiation to 220 psig (1.60 MPa). The variable position standpipe will be set at 8.5 inches to inject 62.6 ft^3 of liquid from the accumulator tank to the intact loop cold leg. The remaining accumulator "A" initial conditions are provided in Table 3.

TABLE 3. INITIAL CONDITIONS

Parameter	Condition[a]	Tolerance
Primary Coolant System		
Power Level (MW)	47	± 1
Flowrate ($\times 10^6$ lbm/hr)	2.65	(note b)
Pressure (psig)	2156	± 15
PCP Injection Flow (both PCPs, gpm)	1.25	± 0.25
Vessel Inlet Temperature (°F)	534	± 2
Vessel ΔT (°F)	52	± 3
Emergency Core Cooling System		
HPIS Flowrate Setting (gpm)	See Figure 3	+ 2 - 1
HPIS Initiation (psig)	1896	± 27
LPIS Pump Initiation (psig)	296	± 8
Accumulator Liquid Level (in.)	58.5	± 1.0
Accumulator Pressure (psig)	220	± 5.0
Accumulator Temperature (°F)	90	± 5
Blowdown Suppression Tank		
Liquid Level (in.)	50	+ 5 - 0
Liquid Temperature (°F)	See Figure 5	--
Pressure (psig)	See Figure 5	--
Recirculation (gpm)	Full Pump Capacity	--

5.3.3 Pressurizer Heaters and Spray

The pressurizer heater control switch (backup and cycling) shall be placed in automatic. The spray control switch shall be placed in automatic.

5.3.4 Broken Loop Hot Leg Heaters

Power to the broken loop hot leg (BLHL) heat tracing shall be energized to maintain a BLHL temperature not greater than 575°F. This requirement is applicable to only the piping between the reactor vessel and pump simulator.

5.3.5 Purification System

The purification system shall be isolated from the primary system prior to test initiation.

5.3.6 BST Recirculation

BST recirculation shall be established at full spray pump capacity by taking suction at the BST bottom and discharging through the spray headers.

5.3.7 Reflood Assist Bypass Valves (RABVs)

The RABVs shall be inhibited from opening through the LECS during the conduct of the combined tests except for emergency test termination.

5.3.8 Primary Coolant Pump Injection

A combined primary coolant pump injection of 1.25 $\pm$ 0.25 gpm (0.079 $\pm$ 0.016 L/s) to the pumps will be established prior to pump trip.

5.3.9 Water Sampling Requirements

Within 24 hours prior to blowdown initiation, a liquid sample will be obtained from the primary coolant system, the secondary coolant system, and the blowdown suppression tank. None of the pre-blowdown analyses need be completed prior to initiating the blowdown.

The primary coolant system sample will be analyzed for lithium concentration in addition to the normal daily analysis. The secondary coolant system sample will be analyzed per the Plant Operating Manual (POM) requirements for a steaming steam generator.

Prior to recirculating the liquid in the blowdown suppression tank after the test, a liquid sample will be obtained and analyzed. Additionally, the sample will be analyzed for I-131, I-133 and total gas, and a gamma spectrometric analysis will be performed.

5.3.10 Broken Loop Cold Leg Warmup Line

The warmup line leading from the intact loop to the broken loop cold leg will be isolated prior to test initiation.

5.4 Required Operator Actions

5.4.1 Control Rod Trip

The reactor will automatically be tripped on the primary coolant low pressure setpoint of 2046 psig.

5.4.2 Primary Coolant Pumps

When indication of the successful control rod trip is received, power to the primary system motor generators will be tripped, allowing the primary coolant pumps to coastdown under the influence of the installed flywheel system. Manual verification of the PSMG feed breaker trip must be performed.

The pump trip may be automatic if desired.

5.4.3 High Pressure Injection System

When system pressure reaches 1896 ± 27 psig, the LOFT Experiment Control System will initiate HPIS "A" flow to the intact loop cold leg. The HPIS "A" flow will be controlled per Figure 3 until test termination. It may then be used in accordance with the POM to assist in plant recovery.

5.4.4 Low Pressure Injection System

The LPIS "A" flow stop valve will be opened by the LOFT Experiment Control System at a primary system pressure of 296 psig. The flow will be routed to the intact loop cold leg injection location. Subsequent to break isolation, the LPIS "A" may be used as per the POM to assist in plant recovery.

5.4.5 Secondary Coolant System

There are no programmatic required operator actions for the secondary system.

5.4.6 Measurement of Vessel Liquid Level

As currently planned, cathode ray tube terminals will be set up to display data for the determination of real time liquid level. Representatives appointed by LOFT management will monitor the screens.

5.4.7 Determination of Core Uncovery

No operator action.

5.4.8 Break Isolation

The broken loop cold leg QO8V shall be closed and the break isolated after test termination as specified by the EOP.

5.4.9 Test Termination

Test L5-1 will be programmatically defined as terminated when core cladding temperatures are returned to saturation and stable following LPIS injection.

Data recording may be terminated at this time. PLSS may be terminated following the break isolation.

5.4.10 Pressurizer Heaters

The pressurizer heaters will be turned off prior to blowdown initiation.

TABLE 4. (continued)

6. Core and Downcomer Region

LE-1ST-001 or LE-2ST-001
LE-1ST-002 or LE-2ST-002
LE-3F10 or LE-1F10

7. ECCS

FT-P128-85
FT-P128-104
FT-P120-72
FT-P120-85
FT-P120-36-1
FT-P120-36-5
LIT-P120-44
LE-ECC-01A
PT-P120-43
PT-P120-61

8. Steam Generator Conditions

None

9. Miscellaneous

RPE-PC-1
RPE-PC-2
PDE-PC-27
PDE-PC-28
PDE-SV-1 or PDE-SV-2
PE-SV-55 or PE-SV-60
TE-SV-10, 11, or 12

10. Cladding thermocouples will be required to monitor core uncovery. The determination that sufficient cladding thermocouples are operable to monitor core uncovery and ensure test safety will be made by the JEG and the Reactor Systems Branch.

11. The real time liquid level determination will require a predetermined array of in-vessel instrumentation. The determination that sufficient instrumentation is operable to monitor liquid level in real time will be made by the JEG and the LOFT Data Analysis Branch.

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(R. 04-80)

DOCUMENT REVISION REQUEST

(1) OPER. NO. _____

PAGE 1 OF 1

(2) REQUESTER	(3) DRR DATE	(4) DRR NO.
M D PETERS	9-23-81	L-4947

(5) DOCUMENT NO. (IF APPLICABLE)	DOCUMENT TITLE	DOCUMENT ISSUE DATE
EGG-LOFT-5836	EOS FOR LS-1	JULY, 1981

(6) CHECK APPLICABLE BLANK
PERMANENT CHANGE X TEMPORARY CHANGE _____ BULLETIN _____

(7) MANAGER APPROVAL C W Solberg for MD Peters DATE 9/23/81

(8) PRINT OR TYPE PROPOSED CHANGE — NUMBER EACH CHANGE SEQUENTIALLY IN 1ST COLUMN AND RECORD PAGE AND STEP OR PARAGRAPH NUMBER FOR EACH CHANGE.

(9) FOR WRITER'S USE

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1	20	-	CHANGE POWER LEVEL SPECIFICATION TO "50 $^{+0}_{-4}$ MN"

— CHANGE 2 —

USE CONTINUATION SHEET AS REQUIRED
NEXT ANTICIPATED NEED FOR DOCUMENT WITH THIS REVISION INCORPORATED: DATE/EVENT _____

(10) JUSTIFICATION (REASON FOR CHANGE — NUMBER TO CORRESPOND TO ITEM NO. ABOVE)

1. The existing "47 ±1" should have actually appeared as "47 $^{+3}_{-1}$" to be consistant with EOD. The same range will be preserved by expressing as "50 $^{+0}_{-4}$" and the original desired power level of 50 MN will be implied clearly in the proposed change.

(11) OTHER DOCUMENTATION AFFECTED

DOC. NO.	DRR NO.	DATE COMPLETED
EOD for LS-1		

lmm

(12) ORIGINATING DRR NO. _____

(13) REVIEW

NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	ORG.	DATE
E L Johnson	LFO	9/23/81	C W Solberg	6400	9/23/81		QUALITY DIV	
→ [illegible]	LDD	9/23/81					SAFETY DIV.	
[illegible]	AMD	9/23/81					PRAC	

(14) COMMENTS: * TELECON w/ Tom Miller

(15) ADDITIONAL DRRS IN THIS DOCUMENT REVISION

(16) DOCUMENT CONTROLLER
LOFT PROGRAM DIVISION

(17) RELEASE DATE: September 24, 1981

(18) DRR COMPLETED DATE:

ORIGINAL

TABLE 3. INITIAL CONDITIONS

Parameter	Condition[a]	Tolerance
Primary Coolant System		
Power Level (MW)	50	+0 -4
Flowrate ($\times 10^6$ lbm/hr)	2.65	(note b)
Pressure (psig)	2156	± 15
PCP Injection Flow (both PCPs, gpm)	1.25	± 0.25
Vessel Inlet Temperature (°F)	534	± 2
Vessel ΔT (°F)	52	± 3
Emergency Core Cooling System		
HPIS Flowrate Setting (gpm)	See Figure 3	+ 2 - 1
HPIS Initiation (psig)	1896	± 27
LPIS Pump Initiation (psig)	296	± 8
Accumulator Liquid Level (in.)	58.5	± 1.0
Accumulator Pressure (psig)	220	± 5.0
Accumulator Temperature (°F)	90	± 5
Blowdown Suppression Tank		
Liquid Level (in.)	50	+ 5 - 0
Liquid Temperature (°F)	See Figure 5	--
Pressure (psig)	See Figure 5	--
Recirculation (gpm)	Full Pump Capacity	--

(1) OPER. NO. _____

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(Rev. 5-77)

DOCUMENT REVISION REQUEST

PAGE 1 OF 1

(2) REQUESTER	(3) DRR DATE	(4) DRR NO.
M.D. PETERS	9-24-81	L-4949

(5) DOCUMENT NO. (IF APPLICABLE)	DOCUMENT TITLE	DOCUMENT ISSUE DATE
E64-LOFT-5436	EOS for LS-1	JULY, 1981

(6) CHECK APPLICABLE BLANK
PERMANENT CHANGE X TEMPORARY CHANGE _____ BULLETIN _____

(7) MANAGER APPROVAL J.P. Leach DATE 9/24/81

(8) PRINT OR TYPE PROPOSED CHANGE — NUMBER EACH CHANGE SEQUENTIALLY IN 1ST COLUMN AND RECORD PAGE AND STEP OR PARAGRAPH NUMBER FOR EACH CHANGE.

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ITEM	PAGE	STEP OR PARA.	INSTRUCTIONS: REWRITE PARAGRAPH; OR FOR EXTENSIVE CHANGES ATTACH REVISED COPY AND STATE "REVISE PER ATTACHED COPY". FOR NEW DOCUMENT, ATTACH ROUGH DRAFT AND STATE "PREPARE NEW (SP, DOP, ETC.) PER ATTACHED DRAFT".
			CHANGE 3
1	9	8	deleted "less than approx. 2gpm"

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(10) JUSTIFICATION: (REASON FOR CHANGE — NUMBER TO CORRESPOND TO ITEM NO. ABOVE):

This specification is redundant with the LOFT Tech. Spec. limit - Tech. Spec. is the controlling document.

(11) OTHER DOCUMENTATION AFFECTED:

DOC. NO.	DRR NO.	DATE COMPLETED
	NONE	

(12) ORIGINATING DRR NO: LMD

(13) REVIEW

NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	ORG.	DATE	NAME/SIGNATURE	(14) REVIEW CODE	ORG.	DATE
[signature]	LPD	9/24/81	[signature]	LFO	9/24/81			QUALITY DIV	
[signature]	LMD							SAFETY DIV.	
[signature]	LTSD							[illegible]AC	

(15) COMMENTS:

(16) ADDITIONAL DRRS IN THIS DOCUMENT REVISION

(17) DOCUMENT CONTROLLER	(18) RELEASE DATE	(19) DRR COMPLETED DATE:
LOFT Program Div.	9/24/81 [signature]	

Change 3

4. TEST PREREQUISITES

The following prerequisites must be completed prior to initiating Tests L5-1.

1. Complete the Experiment Safety Analysis and incorporate all required EOS changes into the Experiment Operating Procedures (EOP).

2. Complete the Experiment Prediction and review for logic and credibility.

3. Check out the DAVDS software using predefined functional and configuration tests.

4. Perform a one point end-to-end check of the process instruments identified in Table 1 within 60 days of the tests. If a problem is indicated, recalibrate the instrument.

5. Verify the location and orientation of accessible experimental instruments and piping.

6. Complete a cold accumulator blowdown at 435 $\pm$ 35 psig through the the broken loop cold leg piping assembly to checkout the operation of the instrumentation.

7. Early in the pre-blowdown power run, compare a DAVDS data listing with the control room instrument readings and resolve any discrepancies. As a minimum, compare those instruments identified in Table 1.

8. Verify PCS leak rate within 3 hours of the anticipated blowdown initiation.