ARKANSAS POWER & LIGHT COMPANY

ARKANSAS NUCLEAR ONE

STEAM ELECTRIC STATION

UNIT TWO

STARTUP REPORT

TO THE

U.S. NUCLEAR REGULATORY COMMISSION

LICENSE NUMBER NFP-6

DOCKET NUMBER 50-368

SUPPLEMENT 1

PERIOD ENDING OCTOBER 31, 1979

1592 244

FORWARD

This Startup Report for Arkansas Nuclear One Unit 2 covers the period from August 1, 1979 until October 31, 1979. It is being submitted in accordance with Unit 2 Technical Specification 6.9.1.1 and Regulatory Guide 1.16, "Reporting of Operating Information - Appendix "A" Technical Specifications." The latter requires a startup report to be submitted within 90 days following completion of the startup test program or within 9 months following initial criticality, whichever is earliest, and a subsequent report every 90 days until the startup test program is completed.

TABLE OF CONTENTS
FOR
SUPPLEMENT 1

SECTION PAGE

6.2 20% THRU 50% POWER PLATEAU

1592 246

6.2 20% thru 50% POWER PLATEAU

INTRODUCTION

Upon completion of a maintenance outage which followed 20% power testing, the reactor was returned to criticality on June 6, 1979 in preparation for the escalation to 50% power. During the escalation, testing was performed at 30% power and 40% power. The 50% plateau was achieved on June 24, 1979.

Sections 6.2.1 thru 6.2.24 provide a detailed description of the tests performed during the ascension to and while at 50% power. During this period a phenomenon involving variations in hot leg temperatures was discovered. The phenomenon, referred to as the T_H anomaly is described in Attachment A.

6.2.1 NUCLEAR AND THERMAL POWER CALIBRATION TESTS

6.2.1.1 Purpose

The purpose of this test was to adjust the Excore Linear Power Calibrate potentiometers and the CPC addressable constants (KCAL and TPC) relating to the core level to agree with the COLSS secondary calorimetric power.

6.2.1.2 Test Method

The Nuclear and Thermal Power Calibration Test was performed at the 50% power plateau as part of the power ascension test sequence. For each safety channel, the input to the High Linear Power Bistable and the CPC values, PHICAL (calibrated neutron flux power) and BDT (static thermal power) were recorded and compared to the COLSS secondary calorimetric power. Adjustment of the Excore Linear Power Calibrate potentiometers, and/or the addressable CPC constants KCAL or TPC was necessary if the High Linear Power, PHICAL or BDT readings varied from the COLSS secondary calorimetric power by more than ± 0.2% of Rated Thermal Power.

For each safety channel (one at a time) the following adjustments were performed as necessary.

A. The Excore Linear Power Calibrate potentiometer was adjusted so that the input to the High Linear Power Bistable, as monitored by an external DVM at the PPS cabinet, equaled the following value:

$$\text{DVM Reading} = \% \; \frac{\text{Power x 5 Volts}}{100} \pm 0.005\text{V}$$

1592 248

B. The CPC addressable constants KCAL and TPC were adjusted as follows:

$$\text{KCAL (NEW)} = \% \frac{\text{Power} \times \text{KCAL (OLD)}}{\text{PHICAL (OLD)}}$$

$$\text{TPC (NEW)} = \% \frac{\text{Power} \times \text{TPC (OLD)}}{\text{BDT (OLD)}}$$

After the initial adjustments were performed, readings from all four channels for High Linear Power, PHICAL, and BDT were taken and compared to the COLSS secondary calorimetric power. If any of the readings varied from the COLSS secondary calorimetric power by more than ± 0.2% of Rated Thermal Power, the adjustments were repeated until the ± 0.2% criteria were met.

6.2.1.3 Test Results

This test was performed four times during the 50% power plateau. These four runs are briefly described below:

Run #1 was the initial Nuclear and Thermal Power Calibration Test performed at the 50% power plateau.

Run #2 was performed following the input of a new shape annealing matrix to the CPC's.

Run #3 was performed following the return to 50% power from a reduced power level for condenser tube repair, but prior to achieving equilibrium Xenon.

Run #4 was performed after achieving 50% power equilibrium Xenon.

6.2.1.4 Conclusion

At the 50% power plateau, the Excore Linear Power Calibrate potentiometers and the CPC addressable constants KCAL and TPC were adjusted such that the High Linear Power, PHICAL, and BDT readings for all safety channels agreed with the COLSS secondary calorimetric power to within ± 0.2% of Rated Thermal Power.

1592 249

6.2.2 NSSS CALORIMETRIC TESTS

6.2.2.1 Purpose

The purpose of this test was to:

A. Determine core thermal power by means of a secondary plant heat balance;

B. Verify the COLSS core thermal power calculations;

C. Verify that OP 2103.16 (Heat Balance Calculation) will provide a satisfactory indication of core power.

6.2.2.2 Test Method

Plant parameters were maintained essentially constant while steam generator data and reactor power information was collected over a three-hour period. This data along with the energy input and loss terms measured during the RCS Heat Loss Test was used to calculate the core thermal output.

The calculated core thermal power was compared to the COLSS secondary calorimetric power (BSCAL) to verify the accuracy of the algorithm. It was also compared to the COLSS primary calorimetric power (BDELT) and adjustments were made as necessary to the ΔT Power Gain Factor (in the BDELT algorithm) to provide agreement between BDELT and BSCAL. OP 2103.16 (Heat Balance Calculation) was completed concurrently and compated to the calculated core thermal power to verify its accuracy.

6.2.2.3 Test Results

This test was performed a total of six times at the 50% plateau. The first four were unsatisfactory for varying reasons. After performing this test for the fourth time, inconsistencies were discovered in the feedwater flow venturi constants. This was corrected, and the test was rerun with satisfactory results which are shown in Table 6.2.2.1.

6.2.2.4 Conclusions

The plant computer secondary calorimetric was found to be within the acceptable limits. Also, OP 2103.16 (Heat Balance Calculation) was found to provide acceptable results.

TABLE 6.2.2.1

RESULTS OF NSSS CALORIMETRIC

	DATE PERFORMED	CALCULATED CORE THERMAL POWER	BSCAL (BEFORE ADJUSTMENT)	BDELT (BEFORE ADJUSTMENT)	RESULTS OF OP 2103.16	CALCULATED VALUE FOR ΔT POWER GAIN	BSCAL (AFTER ADJUSTMENT)	BDELT (AFTER ADJUSTMENT)
TEST RUN #1 (3)	6/25/79	46.27%	46.19%	46.68%		1.012	(1)	(1)
TEST RUN #2 (3)	6/27/79	47.16%	47.28%	50.58%		1.020	(2)	(2)
TEST RUN #3 (3)	7/2/79	48.33%	48.54%	51.61%	47.20%	1.026	48.94%	48.79%
TEST RUN #4 (3)	7/4/79	49.01%	49.29%	49.33%	48.1%			
TEST RUN #5	7/12/79	50.49%	50.65%	49.65%	50.40%	1.04435	50.49%	50.60%
TEST RUN #6	9/3/79	50.93%	50.93%	51.52%		1.0325	50.71%	50.91%

NOTES:

(1) Test aborted prior to this step due to reactor trip.

(2) ΔT Power Gain not set due to work being performed on temperature instrumentation.

(3) Unsatisfactory test run. Test to be repeated.

6.2.3 RCS CALORIMETRIC FLOW MEASUREMENT TESTS

6.2.3.1 Purpose

The purpose of this test was to determine the reactor coolant flow rate based upon the computer secondary plant calorimetric and the measured primary pressure and temperatures (T_c and T_h) and to provide guidance for adjustment of the CPC and COLSS flow algorithm constants if necessary.

While this method yields more accurate results at higher power levels, it was performed at lower power levels to provide additional information. No adjustments are made below 80% of rated power.

6.2.3.2 Test Method

Calculation of the reactor coolant mass flow rate was based upon secondary plant calorimetric power and primary pressure and temperatures. Over a specified period, plant conditions were maintained essentially constant, RCS data was recorded from both the CPC's and the plant computer. Following this collection period, the average enthalpy rise of the reactor coolant was determined and used with secondary calorimetric power to calculate the mass flow rate of the reactor coolant.

The calculated coolant mass flow rate was compared to CPC's and COLSS values for RCS flow. New values were calculated for the constants in the CPC and COLSS algorithms to provide the desired agreement.

6.2.3.3 Test Results

Average core thermal power during this test was 49.99% (COLSS secondary calorimetric power). The average enthalpy rise of the reactor coolant across the core as determined from CPC data was 35.36 Btu/lbm. Hence, the reactor coolant mass flow rate was calculated to be 1.3581×10^8 lbm/hr. This translates to 112.8% of the base mass flow rate (120.4×10^6 lbm/hr). By comparison, all four CPC channels indicated approximately 113.5% of base flow and COLSS indicated 112.7% of base flow. More detailed results are shown in Table 6.2.3.1.

New values were calculated for the COLSS flow bias constants and for the CPC flow constants and for the CPC thermal power (BDT) scaling constants (TPC). These values are shown in Table 6.2.3.2 and are the values required to make the CPC and COLSS flow rates agree with the measured coolant flow rate and to offset the change to CPC ΔT power caused by changing CPC calculated flow. Since this test was performed for information only at this power level, none of the new constants are entered.

6.2.3.4 Conclusions

The calculated RCS flow was within acceptable limits.

1592 252

TABLE 6.2.3.1

REACTOR COOLANT MASS FLOW VALUES

INDICATION	VALUE (1)
Calculated (2)	112.8%
CPC A	113.57%
CPC B	113.56%
CPC C	113.58%
CPC D	113.58%
COLSS (3)	112.67%

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(1) All values are given as percent of base flow (120.4 x 10^6 lbm/hr).

(2) As calculated using COLSS secondary calorimetric power and coolant enthalpy rise across the core.

(3) COLSS calculated flow is based on a volumetric flow rate instead of a mass flow rate.

TABLE 6.2.3.2

COLSS AND CPC FLOW ADJUSTMENT FACTORS

	CPC VALUES			COLSS VALUES			
	Flow Constants		Thermal Power Constant				
	FC 1	FC 2	TPC	D15(1)	D15(2)	D15(3)	D15(4)
Previous Values:							
CPC A	1.1224	0	0.96080	-	-	-	-
CPC B	1.1215	0	0.94555	-	-	-	-
CPC C	1.1223	0	1.0114	-	-	-	-
CPC D	1.1216	0	1.0112	-	-	-	-
COLSS	-	-	-	0.0	0.0	0.0	0.0
Calculated Values:							
CPC A	1.1148	0	0.93097	-	-	-	-
CPC B	1.1140	0	0.91312	-	-	-	-
CPC C	1.1146	0	1.0609	-	-	-	-
CPC D	1.1139	0	1.0442	-	-	-	-
COLSS	-	-	-	(1)	(1)	(1)	(1)

NOTES:

(1) Calculation not performed.

1592 254

6.2.4 LINEAR POWER SUBCHANNEL CALIBRATION TESTS

6.2.4.1 Purpose

The purpose of this test was to adjust the Linear Power Subchannel gains. In addition the test provided for the adjustment of the 200% Linear Calibrate potentiometers, the Excore Linear Power potentiometers, and the CPC addressable constants (KCAL and TPC) relating to the core power level.

6.2.4.2 Test Method

The reactor was stabilized at approximately 50% power and an NSSS Calorimetric was performed. Following completion of the calorimetric, baseline power data was obtained from the PPS and all four CPC channels.

A single PPS channel was selected and the High Linear Power, High Local Power Density, and Low DNBR trips were bypassed. The Excore Linear Subchannel amplifier of each of the three excore detectors was then adjusted utilizing the calorimetric power and appropriate signal frations. Next, the 200% Linear Calibrate potentiometer was adjusted and proper amplifier operation was verified by inputting a simulated neutron signal. Finally, the Excore Linear Power potentiometer and the CPC addressable constants KCAL and TPC were adjusted as necessary to provide agreement between calorimetric power, excore linear power, CPC Calibrated Neutron Power (PHICAL) and CPC ΔT Power (BDT).

The above process was repeated for the remainder of the PPS channels and "as left" power data was recorded from all four CPC and PPS channels.

6.2.4.3 Test Results

All Linear Power Subchannel amplifiers were adjusted to the NSSS calorimetric value. The 200% Linear Calibrate potentiometer and the Excore Linear Power potentiometers were successfully adjusted for all four channels. KCAL and TPC adjustments were performed as described in the body of the test.

6.2.4.4 Conclusions

All necessary adjustments were made to the Linear Subchannel gains, the Excore Linear Power Potentiometers, the 200% Linear Calibrate Potentiometers, and the CPC addressable constants relating to core power level (KCAL and TPC).

6.2.5 PROCESS VARIABLE INTERCOMPARISON TESTS

6.2.5.1 Purpose

The purpose of this test was to compare Process Instrumentation readings obtained from the Plant Computer, Plant Protection System, Core Protection Calculators, and various console meters to verify proper agreement between systems.

6.2.5.2 Test Method

After establishing steady state RCS conditions (not necessarily equilibrium Xenon), data was recorded for the following process variables:

1. RCS cold leg temperature,
2. RCS hot leg temperature,
3. RCP differential pressure,
4. RCP speeds,
5. RCS pressure,
6. Pressurizer level,
7. Steam Generator levels, and
8. Steam Generator pressures.

Common process variable readings for each system were then intercompared against preset acceptance criteria to assure the accuracy of process loop calibrations and system signal processing.

6.2.5.3 Test Results

All intercomparisons were within the allowed tolerance with the exception of several hot leg temperatures.

6.. 5.4 Conclusions

The out of tolerance temperature intercomparisons can be attributed to the temperature profile as observed in the hot legs at 50% power. These out of tolerance intercomparisons are not felt to be an instrument deficiency.

6.2.6 CHEMISTRY AND RADIOCHEMISTRY TESTS

6.2.6.1 Purpose

The purpose of this test was to conduct chemistry tests with the intent of establishing baseline corrosion data and activity buildup with power level. As a result of this, procedures for sample collection analysis were verified. Also, this test was used to verify the calibration of the process radiation monitor.

6.2.6.2 Test Method

A. Primary System

Sample and analysis procedures were performed using the CE Chemistry Manual (CENPD-28) as a guide. Three sets of RCS chemistry analyses were performed at the 50% plateau. The analyses included the following tests:

a. pH

b. Conductivity

c. Cl

d. F^-

e. Dissolved Oxygen

f. Suspended Solids

g. Boron

h. Lithium

i. Dissolved Hydrogen

j. Gamma Spec. Analysis (gas)

k. Degassed Gross Beta

l. Crud Activity

m. Tritium

n. Iodine Ratio

o. Iodine Dose Equivalent

p. Gamma Spec. Analysis (liquid)

q. Total Gas (primary coolant)

B. Secondary System

Sampling and analysis procedures were performed using CENPD-28 as a guide. Five sets of secondary chemistry analyses were performed at the 50% plateau. Each set of analyses included the following tests:

a. pH

b. Conductivity

c. Cation Conductivity

d. Dissolved Oxygen

e. Hydrazine

f. Ammonia

g. Silica

h. Sodium

i. Iron

j. Copper

C. Process Radiation Monitor

A sample was taken downstream of the Process Radiation Monitor. Laboratory results of the Gross Gamma Coolant Analysis were compared to the Process Radiation Monitor analysis for verification of proper Process Radiation Monitor function.

6.2.6.3 Test Results

The required radiochemistry and secondary samples were obtained and analyzed. The process radiation monitor readings were not within the required band of laboratory analysis results. Baseline activities for the 50% plateau were established.

6.2.6.4 Conclusions

It was demonstrated that primary and secondary sampling and analysis can be performed in accordance with Technical Specifications and CENPD-28. Baseline activities for the RCS were recorded. The Process Radiation Monitor calibration has not been verified at the 50% power plateau, however, recalibration has been performed and additional data will be taken upon return to the 50% plateau.

6.2.7 CORE PERFORMANCE RECORD TESTS

6.2.7.1 Purpose

The purpose of this test was to record core performance data from incore detectors, and to specify the acceptance criteria for comparison of the measured results with predicted core operating parameters.

6.2.7.2 Test Method

A. While the reactor was being maintained at 50% steady state power, with equilibrium Xenon, incore detector data was collected for analysis.

B. The measured results were then compared to predicted values in the following manner:

  a. The comparison of the measured power distribution with the predicted radial power distribution is a root mean squared statistical comparison of the relative radial power density distribution for each of the 177 fuel assemblies.

  b. The comparison of the measured axial power distribution with the predicted axial power distribution is a root mean squared statistical comparison of the relative axial power distribution for each of the 100 axial nodes.

  c. The measured values of total planar radial peaking factor (Fxy), total integrated radial peaking factor (Fr), core average axial peak (Fz), and core 3-D power peak (Fq) were compared to predicted values.

6.2.7.3 Test Results

Results of the statistical comparisons and peaking factors are summarized in Tables 6.2.7.1 and 6.2.7.2.

6.2.7.4 Conclusions

All acceptance criteria have been met for the comparisons between predicted values and measured results. As shown in Tables 6.2.7.1 and 6.2.7.2, the predictions were acceptable for determining core operating parameters.

TABLE 6.2.7.1

	Measured Results (RMS)	Acceptance Criteria (RMS)
Power Density Distribution	1.5593	≤ 5
Axial Power Distribution	2.6168	≤ 5

TABLE 6.2.7.2

	Measured	Predicted	% Difference	Acceptance Criteria
Fxy	1.4145	1.3543	4.45	≤ 10%
Fr	1.4000	1.2543	3.37	≤ 10%
Fz	1.30347	1.285	1.44	≤ 10%
Fq	1.8433	1.740	5.94	≤ 10%

1592 260

6.2.8 CPC/COLSS VERIFICATION TESTS

6.2.8.1 Purpose

The CPC/COLSS Verification Tests were performed to accomplish the following objectives:

A. Verify that the CPC/COLSS DNBR and LPD calculations are correct.

B. Evaluate the effect of process input noise on the CPC/COLSS system.

C. Evaluate the effect of electromagnetic interference on the CPC system.

6.2.8.2 Test Method

At 50% power, radiated and conducted emissions were measured both in the control room and the CPC room.

At 50% power with ARO and Xenon equilibrium, the process input noise was measured. Plant computer reports containing information on the CEAC's, CPC's and COLSS were obtained for use in the verification of the CPC/COLSS DNBR and LPD calculations. The CPC/COLSS data was compared to the results of the CEDIPS* computer code and the incore detector analysis results.

6.2.8.3 Test Results

The electromagnetic interference and process noise data from the 50% plateau was recorded. The data required for verification of CPC/COLSS DNBR and LPD calculations was collected and compared to the results of the CEDIPS* computer code. All data was transmitted to CE-Windsor, Ct., for review.

6.2.8.4 Conclusions

The CPC output parameters were compared to the CEDIPS* code and were found to be acceptable. The COLSS DNBR and LPD related calculations were reviewed by CE-Windsor and found to be adequate. The electromagnetic interference test results were also reviewed by CE-Windsor and found to be acceptable.

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*CEDIPS is a FORTRAN program for statistical analysis of effects of process inputs upon the CPC system.

6.2.9 VARIABLE TAVG TESTS

6.2.9.1 Purpose

The objective of this test was to determine the Isothermal Temperature Coefficient (ITC) and Power Coefficient.

6.2.9.2 Test Method

Two methods were used to determine the Isothermal Temperature and Power Coefficients; one method was performed with no CEA movement, and the other was performed with center CEA movement. These two approaches are described in more detail below.

A. No CEA Movement

With the reactor at steady state and equilibrium or near equilibrium Xenon and CEA group 6 at 120 inches withdrawn, a small step change in the turbine control valve position is made and then adjusted to establish a new coolant inlet temperature. This change produces a small turbine load-reactor power mismatch. The temperature change results in a reactivity feedback and a resultant power change. The power change produces an opposite reactivity feedback and the reactor settles out at a new power and temperature condition. The cycle is then reversed by making a small step change in the turbine control valve position in the opposite direction. The ITC is calculated iteratively using the resultant power and temperature changes along with an assumed power coefficient. The Moderator Temperature Coefficient (MTC) is then calculated by subtracting the predicted Fuel Temperature Coefficient (FTC) from the measured Isothermal Temperature Coefficient.

B. With Center CEA Movement

a. Isothermal Temperature Coefficient

With the reactor at steady state and equilibrium Xenon and CEA group 6 at 120 inches withdrawn, CEA 6-1 is withdrawn a specified amount. This reactivity change produces a change in reactor power which in turn causes a change in coolant temperature. The change in coolant temperature results in a reactivity feedback to offset the rod movement. Eventually the system stabilizes at a new power and coolant temperature. The ITC is calculated iteratively knowing the power and temperature changes along with the center CEA integral worth and by using the test predictions as initial guesses for the Isothermal Temperature and Power Coefficients. The MTC is calculated as described previously.

b. Power Coefficient

A reactivity insertion is made using the center CEA, resulting in a change in reactor power. Average coolant temperature is held constant by changing turbine load to match reactor power. The reactor settles out at a new power when the reactivity feedback due to change in power is equal and opposite to the CEA reactivity insertion. The Power Coefficient is calculated iteratively in a manner similar to the ITC calculation.

6.2.9.3 Test Results

The Variable TAVG Test was performed at the 50% power plateau as part of the power ascension test program. During the ITC measurement with no CEA movement, Tcold was varied approximately ± 3°F about the Tcold at 50% power of 552.0°F.

The Isothermal Temperature Coefficient measurement with center CEA movement was performed by withdrawing CEA 6-1 from 120" withdrawn (the group average position) to 135" withdrawn, and noting the change in reactor power. The reactor power was then decreased by approximately twice the amount determined above by inserting CEA 6-1. Reactor power was cycled four times during the performance of this measurement.

The final ITC and Power Coefficient values were the average values of the runs conducted. The measured values, test predictions, and acceptance criteria for the 50% power plateau are shown in Table 6.2.9.1.

It should be noted that the original 50% power physics test predictions for ITC, Power Coefficient, and integral rod worth curve for CEA 6-1 were calculated at a core average burnup of 50 MWD/T as opposed to the actual core average burnup or approximately 950 MWD/T. This accounts for additional uncertainties associated with the physics test predictions and explains in part the discrepancy between the 50% power ITC's as measured by the two methods. At 20% power the two methods yielded essentially the same result.

1592 263

6.2.9.4 Conclusion

The measured values for the Isothermal Temperature Coefficient and Power Coefficient compared well with the predicted values. Agreement between measurement and prediction was well within the uncertainties associated with each parameter.

TABLE 6.2.9.1

Nominal Reactor Power	50%
Boron Concentration (RCS)	720 ppm
Isothermal Temperature Coefficient	
Measured (w/o center CEA movement)	$-0.377 \times 10^{-4}\ \Delta\rho/{}^{\circ}\mathrm{F}$
(with center CEA movement)	$-0.285 \times 10^{-4}\ \Delta\rho/{}^{\circ}\mathrm{F}$
Predicted (at 720 ppm)	$-0.4284 \times 10^{-4}\ \Delta\rho/{}^{\circ}\mathrm{F}$
Acceptance Criteria	$\pm\ 0.5 \times 10^{-4}\ \Delta\rho/{}^{\circ}\mathrm{F}$
Power Coefficient	
Measured	$-1.031 \times 10^{-4}\ \Delta\rho/\%$ Power
Predicted	$-1.03 \times 10^{-4}\ \Delta\rho/\%$ Power
Acceptance Criteria	$\pm\ 0.2 \times 10^{-4}\ \Delta\rho/\%$ Power

1592 265

6.2.10 UNIT LOAD TRANSIENT TEST

6.2.10.1 Purpose

The purpose of this test was to:

> Demonstrate the following systems operate satisfactorily in the automatic mode to maintain plant parameters within aceptable limits during steady state power operations, 5% per minute power down ramps, 1% per minute power up ramps, and 10% down step changes in plant power:
>
> a. Reactor Regulating System (RRS)
> b. Feedwater Control System (FWCS)
> c. Steam Dump and Bypass Control System (SDBCS)
> d. Megawatt Demand Setter (MDS)
> e. Pressurizer Level Control System (PLCS)
> f. Pressurizer Pressure Control System (PPCS)

6.2.10.2 Test Method

These tests are performed at the 50% power plateau.

A. Automatic Steady State Operation

The reactor is stabilized at 50% power and control systems verified to be in the automatic mode of operation. Strip chart recorders and computer trends are established as required by the test procedure and a 30 minute steady state run is performed.

Following the 30 minute run, the test data is collected, reduced and analyzed to determine the acceptability of the control systems operations. Control System setpoint adjustments are performed as necessary based on the results of the test data analysis. The above described process is performed until no further setpoint changes are required.

B. FWCS Tests

The reactor was stabilized at 50% power and the control systems verified to be in the automatic mode of operation. Steam Generator level transients were initiated by changing the setpoint at the master controller. Master Controller No. 1 controlled level in steam generator A and Master Controller No. 2 controlled level in steam generator B. After each of the transients listed in Table 6.2.10.1, strip chart recorder traces and computer trends were analyzed and the FWCS setpoints adjusted as required. The transient was repeated until no further adjustments were required. The transients listed in Table 6.2.10.1 were completed first on FWCS #1 and then on FWCS #2.

C. RRS Tests

The reactor was stabilized at 50% power with CEA Group 6 between 113" and 135" withdrawn, the CEDMCS in manual sequential, all other control systems in automatic and the automatic withdrawal inhibit feature removed. Using RRS #1 (#2) for temperature control TAVG was decreased 4.5°F less than TREF, the CEDMCS was placed in Automatic Sequential and the resultant transient recorded on strip chart recorders and computer trend groups. The CEDMCS was returned to the manual sequential mode, the results analyzed and the RRS setpoints adjusted as required. Next TAVG was increased 4.5°F greater than TREF, the CEDMCS was placed in Automatic Sequential and the resultant transient recorded. The CEDMCS was returned to the manual sequential mode, the results were analyzed and RRS setpoints adjusted as required. Either or both transients were repeated as necessary until no further adjustments were necessary. Following completion of transients, the automatic withdrawal feature was inhibited.

D. MDS Tests

The reactor is stabilized at 50% power with CEA Group 6 between 113" and 135" withdrawn, the CEDMCS in manual sequential, the MDS in the Ready Mode and all other control systems in automatic. Turbine load is decreased by 20 MWE at 1% per minute. The MDS is placed in the Ready Mode and turbine control is returned to the turbine control panel where load is increased by 20 MWE. The MDS is placed in the Operator Set Mode and the turbine load was decreased 20 MWE at 5% per minute. Both transients are recorded using strip chart recorders and computer trends. The test data is analyzed and the MDS setpoints adjusted as necessary. The transients are repeated until no further setpoint adjustments are necessary.

6.2.10.3 Test Results

A. Steady State Test

This test has not yet been performed at the 50% plateau.

1592 267

B. FWCS Test

Brush pen recorder data and computer trend group data indicate that proper feedwater control was maintained. This data indicated that the level demanded by the FWCS #1 (#2) would be achieved in steam generator A (B) while the level in the remaining steam generator was relatively unaffected. During the transient a slight overshoot of the demanded setpoint was seen, with the level settling out in a fairly short period of time.

C. RRS Test

Analysis of test data revealed that the artifically created power defect was dampened quickly with little overshoot. Proper CEA motion was demanded by each RRS.

D. MDS Test

This test has not yet been performed at the 50% plateau.

6.2.10.4 Conclusions

A. Automatic Steady State Test

This test will be performed upon return to the 50% power plateau.

B. FWCS Test

The FWCS has been shown to operate as expected in the Automatic Control Mode. The ability of FWCS #1 and #2 to achieve demanded setpoints at various rates has been demonstrated. No FWCS setpoint adjustments were necessary.

C. RRS Test

Both RRS #1 and #2 operated satisfactorily to maintain TAVG within the TREF control band as designed. No adjustments of the RRS setpoints were required.

D. MDS Test

This test will be performed upon return to the 50% power plateau.

TABLE 6.2.10.1

	INITIAL STEAM GENERATOR LEVEL	FINAL STEAM GENERATOR LEVEL	RATE OF CHANGE
1)	70%	60%	10% per minute
	60%	70%	10% per minute
2)	70%	60%	1% per second
	60%	70%	10% per minute
3)	70%	80%	10% per minute
	80%	70%	10% per minute
4)	70%	80%	1% per second
	80%	70%	10% per minute

1592 269

6.2.11 SHAPE ANNEALING MATRIX AND BOUNDARY CONDITION MEASUREMENT TESTS

6.2.11.1 Purpose

The objective of this test was to measure the Shape Annealing Matrix (SAM) and to verify the Boundary Point Power Correlation (BPPC) constants for the CPC's. These constants are used in the CPC power distribution synthesis algorithm.

6.2.11.2 Test Method

The SAM coefficients and BPPCs are determined from a least squares analysis of the measured excore detector readings and corresponding axial power distribution determined from the incore detector signals. Since these values must be representative for rodded and unrodded cores throughout life, it is desirable to use as wide a range of core axial shapes as are available to establish their values. This is done by initiating an axial Xenon oscillation. Data is periodically gathered during the oscillations so that it will be representative of as wide a range of axial shapes as possible. Incore, excore and related data are recorded, and incore analysis is perfomed which relates the incore detector signals to power distribution and summarizes the necessary power distribution and excore detector data in a form and format which can be easily input to programs used to perform the least squares fitting. The incore analysis results include:

A. Excore detector fractional responses for each CPC;

B. Core peripheal power fractions for the upper, middle, and lower third of the core;

C. Core average power fractions for the upper, middle, and lower third of the core; and

D. Upper and lower core boundary average power.

The above output is used to determine a "best set" of SAM coefficients and BPPC constants by using least squares analysis. The results of these calculations are then used to adjust the power uncertainty factors (BERR1, BERR3) used by the CPC's in the LPD and DNBR calculations.

6.2.11.3 Test Results

Data was collected for 60 hours during the oscillation. A total of 146 incore detector analysis cases were performed, sixteen of which reflect the core in a rodded condition. In addition, the results

1592 270

of cases #43 and #116 were suspect, due possibly to data link problems. Hence, 118 valid sets of data were obtained (for an unrodded core). From this data a SAM was determined for each CPC channel.

Results of the analyses are presented in Table 6.2.11.1. Included are the calculated SAM and power uncertainty factors for each CPC, the calculated BPPC coefficients, and the predicted BPPC coefficients. The calculated SAM's and power uncertainty factors were loaded in the CPC's.

6.2.11.4 Conclusions

Satisfactory SAM's were calculated for and loaded into all four CPC channels.

1592 271

TABLE 6.2.11.1

SHAPE ANNEALING MATRICES AND POWER UNCERTAINTY FACTORS

	CPC A	CPC B	CPC C	CPC D
S (1,1)	6.88496	6.51368	7.01400	4.85912
S (1,2)	-.99316	-.24121	-1.50201	1.81641
S (1,3)	-2.84804	-3.33609	-2.40177	-4.06836
S (2,1)	-.87821	1.05483	-.59905	.62595
S (2,2)	4.77780	1.76957	4.49607	2.45362
S (2,3)	-.60617	.95069	-.55510	.55951
S (3,1)	-3.00977	1.477723	.00470	-1.27164
S (3,3)	6.45414	5.38007	5.95403	6.50556
BERR1	1.1669	1.1882	1.1586	1.1586
BERR3	1.2350	1.3561	1.2262	1.2262

BPPC COEFFICIENTS

	MEASURED	PREDICTED
α_1	.01317	.016173
α_2	.07031	.12038
α_3	.01294	.010497
α_4	.07662	.03267

6.2.12 TEMPERATURE DECALIBRATION VERIFICATION

6.2.12.1 Purpose

The purpose of this test was to verify the adequacy of the CPC temperature decalibration factors by measuring the actual decalibration experienced by the excore detectors due to variations in reactor coolant temperature.

6.2.12.2 Test Method

Initial conditions for this test were Equilibrium Xenon, ARO (All Rods Out), 50% power and Tcold equal to 549°F. To observe actual temperature decalibration, CPC data was taken as Tcold was changed. Fifteen (15) different temperature plateaus were performed (see Table 6.2.12.1) so that an accurate evaluation of temperature decalibration could be made. Calculations were then done using the collected data to produce Raw Temperature Shadows (RTS) (density effects of "cold" incoming water in the barrel annulus on the core leakage neutrons as seen by the excore detectors). The RTS values were then plotted versus temperature and linear regression analysis was applied. The slope of the ensuing curve fit was taken to be the Measured Temperature Decalibration Factor and the difference between it and the Calculated Temperature Decalibration Factor had to fall within the acceptance criteria of ± 0.0005. If acceptance criteria was not met, adjustments were to be made to uncertainty factors BERR1 and BERR3 on the CPC channel(s) which had unacceptable results.

6.2.12.3 Test Results

Performance of this test went smoothly with power and temperature maintained within specifications. Data analysis yielded acceptable results on CPC channels C & D but CPC channels A & B were unacceptable. As a result, the channel-wise power uncertainty factors for the DNBR and LPD calculations, BERR1 and BERR3 respectively, were modified per procedure to compensate for Channels A & B. Tables 6.2.12.2 and 6.2.12.3 provide a synopsis of test results for temperature decalibration factors and BERR1 and BERR3 adjustments.

6.2.12.4 Conclusions

Upon adjustment of the power uncertainty factors for CPC channels A & B, all CPC channels now adequately compensate for temperature decalibration effects to the excore detectors.

1592 273

TABLE 6.2.12.1

TEMPERATURE PLATEAUS FOR APPENDIX X

1) 549°F
2) 550°F
3) 551°F
4) 552°F
5) 553°F
6) 554°F
7) 552°F
8) 550°F
9) 548°F
10) 546°F
11) 544°F
12) 545°F
13) 546°F
14) 547°F
15) 548°F

TABLE 6.2.12.2

TEMPERATURE DECALIBRATION RESULTS

CPC CHANNEL	MEASURED TEMPERATURE DECALIBRATION	CALCULATED TEMPERATURE DECALIBRATION	DIFFERENCE Δ	MEETS ACCEPTANCE CRITERIA
A	0.0056086/°F	0.00489/°F	.0007186	No
B	0.0054273/°F	0.00489/°F	.0005378	No
C	0.0052399/°F	0.00489/°F	.0003499	Yes
D	0.0052130/°F	0.00489/°F	.0003230	Yes

TABLE 6.2.12.3

BERR1, BERR3 ADJUSTMENTS

BERR1/BERR3	CPC "A"	CPC "B"	CPC "C"	CPC "D"
AS FOUND:				
BERR1	1.1338	1.1338	1.1338	1.1338
BERR3	1.1124	1.1124	1.1124	1.1124
AS LEFT:				
BERR1	1.1419	1.1399	1.1338	1.1338
BERR3	1.1204	1.1184	1.1124	1.1124

1592 275

6.2.13 RADIAL PEAKING FACTOR VERIFICATION

6.2.13.1 Purpose

The purpose of this test was to verify that the radial peaking factors used in the CPC's and COLSS are valid.

6.2.13.2 Test Method

The initial conditions for this test were ARO (All Rods Out), Equilibrium Xenon, 50% power, and Tcold equal to 552°F. The ultimate result of this test, verification of CPC and COLSS radial peaking factors, was determined from comparisons of planar radial peaking factors (F_{xy}), as determined from analysis of incore detector data, to predicted values of F_{xy} for various rodded core configurations. The performance of the test involved establishing the following rodded configurations in the reactor:

All Rods Out

Group 6 at LEL (Lower Electrical Limit)

Group 6 and 5 at LEL

Group 6 and 5 at LEL, Group 4 at 90" WD

Group 6 and 5 at LEL, Group 4 and P at 90"WD

Group 6 and 5 at LEL, Group P at 37.5" WD

Group 6 at LEL, Group P at 37.5" WD

Group P at 37.5" WD

As the various rodded configurations were established, incore detector data was taken. This data was then analyzed and planar radial peaking factors (F_{xy}) determined.

These F_{xy} values could then be compared to the predicted values for CPC and COLSS. Any non-acceptable values would result in the appropriate CPC or COLSS peaking factor(s) being modified.

6.2.13.3 Test Results

The comparison of measured planar radial peaking factors (F_{xy}) to those utilized by the CPC's and COLSS (for the various rodded configurations above) met the acceptance criteria satisfactorily. No modifications to the CPC's or COLSS were necessary. Table 6.2.13.1 presents the F_{xy} comparison results.

6.2.13.4 Conclusions

All acceptance criteria have been met for this test. The radial peaking factors used in the CPC's have been verified as being valid.

TABLE 6.2.13.1

MEASURED CPC/COLSS Fxy COMPARISON RESULTS

CEA GROUP/POSITION	MEASURED Fxy	CPC/COLSS ACCEPTANCE CRITERIA
ARO	1.410	≤ 1.45
6/LEL	1.479	≤ 1.53
6/LEL, 5/LEL	1.649	≤ 1.74
6/LEL, 5/LEL, 4/90"	1.558	≤ 1.65
6/LEL, 5/LEL, 4/90", P/90"	1.566	≤ 1.62
6/LEL, 5/LEL, P/37.5"	1.712	≤ 1.78
6/LEL, P/37.5"	1.456	≤ 1.64
P/37.5"	1.453	≤ 1.52

6.2.14 INCORE DETECTOR SIGNAL VERIFICATION

6.2.14.1 Purpose

To verify the proper conversion of the signal from the incore detectors to voltage as read by the plant computer. This comparison of the signal generated by the incore detector to the voltage seen by the plant computer will also verify the proper operation of the incore amplifier.

6.2.14.2 Test Method

Following determination of the connector number for the core location desired, the amplifier associated with the connector is disconnected and a special test cable is connected between the connector and the amplifier assembly. Using a picoammeter, the current is measured and recorded for the level 1 detector while simultaneously recording the raw incore signal, at the plant computer console. This is repeated for the remaining detector levels for the string under test. Following completion of the string, the test cable is removed and the input connector to the amplifier bin is reconnected.

6.2.14.3 Test Results

A total of 120 detectors were randomly selected and tested. Of these, all except three satisfied the acceptance criteria and these differences are not considered significant. Retesting will be performed at the 80% plateau.

6.2.14.4 Conclusion

The proper conversion of the signal from the incore detectors to voltage, as read by the plant computer, has been verified. Also, this comparison verified the proper operation of the incore amplifiers.

6.2.15 MOVEABLE INCORE DETECTOR CHECKS

6.2.15.1 Purpose

This procedure was performed to provide baseline data for the Moveable Incore Detector system (MICD).

6.2.15.2 Test Method

With reactor power, pressure and temperature stable, and equilibrium Xenon, both moveable incore detectors were operated simultaneously in the automatic mode. Hourly Incore Detector Logs were obtained during the execution of the Moveable Incore Program.

6.2.15.3 Test Results

The Moveable Incore Program was only partially completed when a reactor trip occurred, and a planned outage followed the trip. Hence the procedure was not completed in its entirety.

6.2.15.4 Conclusions

The test will be re-performed upon return of the reactor to 50% power.

6.2.16 TURBINE GENERATOR LOADING

6.2.16.1 Purpose

The purpose of this test was to perform generator loading to 50%, Valve Tightness Test, MSR Safety Test, Auto Synchronization, and Load Transfer. Turbine and generator baseline data was also collected for future reference and to verify the balance shot which was loaded during previous testing.

6.2.16.2 Test Method

The turbine generator was accelerated to 1800 RPM in accordance with the Turbine Startup Operating Procedure (OP 2106.09) then subsequently loaded to 20, 30, 40, and 50%. During loading the following tests were performed:

A. Auto Synchronization,

B. Valve Tightness Test,

C. MSR Safety Test,

D. Load Transfer, and

E. Baseline Data Collection.

6.2.16.3 Test Results

A. During the initial loading, auto synchronization was performed satisfactorily with all breakers closing at the 12 o'clock position.

B. Valve tightness tests were performed and the turbine-generator slowed to less than 1/3 rated speed.

C. The MSR safety valves all lifted at higher than specified pressures during the first test. The valve setpoints were reset and the valves retested yielding satisfactory results.

D. The test of load transfer from the Unit Auxiliary Transformer to Startup Transformer #3 was deferred initially due to damaged bus work. Following bus repairs, the test was performed with satisfactory results.

E. Baseline data was collected and the previously loaded balance shot was verified to have remedied the vibration problem.

6.2.16.4 Conclusion

All required tests at this plateau have been condutcted. Testing to this point is satisfactory with no problems related to this test procedure that would prohibit testing at higher power levels.

6.2.17 MAIN & REHEAT STEAM TEST

6.2.17.1 Purpose

The objectives of this test were as follows:

A. To demonstrate proper operation of the reheat temperature control system;

B. To obtain baseline data for future use in MSR tube leak detection;

C. To obtain baseline data for future analysis of MSR performance; and

D. To obtain baseline data of the main stream system.

6.2.17.2 Test Method

With the reactor at 50% power, a Moisture Separator Reheater Performance Calculation and a Turbine Performance Calculation display printout are obtained from the plant computer. In addition, a set of baseline data is obtained.

6.2.17.3 Test Results

All baseline data as well as both the Moisture Separator Reheater Performance and Turbine Performance Calculations indicated normal performance of the Moisture Separator Reheaters.

6.2.17.4 Conclusion

All required 50% power baseline data was obtained and the system was demonstrated to operate satisfactorily.

6.2.18 CONDENSATE AND FEEDWATER SYSTEM POWER ESCALATION TESTS

6.2.18.1 Purpose

The purpose of this test was to:

A. Obtain base operating data while demonstrating the ability of the Main Feedwater System to supply the steam generators at the required pressures, temperatures, and flows under all anticipated steady state conditions.

B. Verify the proper operation of the FWP recirculation valves.

6.2.18.2 Test Method

With the reactor at approximately 50% power, the Feedwater Control System is placed in Mode 1 (full auto) and flows are allowed to stabilize. Following flow stabilization, main feed pump data and flow valve position data is recorded from local readings and computer data points.

6.2.18.3 Test Results

A. Main feed pump and flow valve position data was not obtained in entirely due to certain system components being out of service.

B. The baseline data obtained at the 50% power level was in agreement with guidelines per the heat balance diagram except for discrepancies with six pressure or flow indications.

6.2.18.4 Conclusions

At the 50% plateau, the condensate and feedwater system was capable of maintaining the required pressures, temperatures, and flow rates. Testing of the condensate and feedwater system remains incomplete and will be completed following return to the 50% plateau. Action has been initiated to correct the six indications noted in 6.2.18.3.B.

6.2.19 MAIN TURBINE ELECTRO-HYDRAULIC CONTROL

6.2.19.1 Purpose

The purpose of this test at the 50% testing plateau was to gather baseline data for the Electro-Hydraulic Control System (EHC). Data was collected first with one main feedwater pump in service, then with both pumps in service.

6.2.19.2 Test Method

The reactor was held stable at approximately 50% and baseline data was collected on the operating EHC pump. Additional data was also collected for Main Turbine throttle pressure, Main Turbine first stage pressure, Main Turbine control valve positions, Main Feed Pump control valve position and pump speed. Turbine generator maximum and minimum loads were noted over a 15 minute interval.

Baseline data was compared to expected values and any discrepancies were issued as deficiencies to the test procedure.

6.2.19.3 Test Results

Hydraulic Fluid Pump 2P-14B discharge pressure and Hydraulic Fluid system pressure were both higher than expected with one feed pump and two feed pumps operating. The data has been reviewed and found acceptable. All remaining baseline data was within expected limits.

6.2.19.4 Conclusions

All required baseline data at 50% has been collected and accepted as satisfactory.

6.2.20 FEEDWATER HEATER VENTS, DRAINS AND WATER INDUCTION TESTS

6.2.20.1 Purpose

The purpose of this test was:

A. To demonstrate the satisfactory operation of the Feedwater Heaters during steady state conditions, and

B. To demonstrate the satisfactory operation of the Feedwater Heater and Heater Drain Tank dump and dump bypass valves to perform their function in the event of high heater shell and drain tank levels.

6.2.20.2 Test Methods

Each individual Feedwater Heater shell and drain was instrumented with appropriate pressure guages to allow test personnel to monitor the performance of the heaters.

Baseline data including process computer performance calculations to determine Feedwater Heater Terminal Temperature Difference and Drain Cooler Approach Temperatures was collected.

6.2.20.3 Test Results

The required baseline data was obtained for this plateau. The dump valves actuated at the proper elevations.

6.2.20.4 Conclusions

The Feedwater Heaters operate satisfactorily at steady state conditions. The FW Heater dump valves operate satisfactorily.

6.2.21 VIBRATION AND LOOSE PARTS MONITOR (V&LPM) TESTS

6.2.21.1 Purpose

The purpose of this test was to provide baseline data for core vibration and loose parts monitoring at 50% of reactor full power.

6.2.21.2 Test Method

At the 50% reactor power level, baseline data was taken on the V&LPM during steady state operation. For each area of the RCS which is monitored by the V&LPM, (see Table 6.2.21.1), data was acquired via tape recordings and frequency/power spectrum plots. In addition, during these data runs, various parameters were trended for ~5 minutes on the plant computer.

6.2.21.3 Test Results

The data described above was obtained during the 50% power plateau at steady state conditions.

6.2.21.4 Conclusions

Baseline data was obtained per procedure and acceptance criteria were satisfactorily met.

TABLE 6.2.21.1

AREAS MONITORED BY THE V&LPM

CHANNEL #	AREA MONITORED
1A, 1B	Lower Vessel (2 locations)
2A, 2B	Upper Vessel (2 locations)
3A, 3B	*Steam Generator A (2 locations)
4A, 4B	*Steam Generator B (2 locations)
5	CPC Channel A "Neutron Noise"
6	CPC Channel B "Neutron Noise"
7	CPC Channel C "Neutron Noise"
8	CPC Channel D "Neutron Noise"
9	Control Channel #1 "Neutron Noise"
10	Control Channle #2 "Neutron NOise"

* Primary Side

6.2.22 HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS PERFORMANCE TESTS

6.2.22.1 Purpose

The purpose of this test procedure was to:

A. Demonstrate the satisfactory performance of plant Heating, Ventilation and Air Conditioning (HVAC) systems under actual operating heat load.

B. Demonstrate that the HVAC system will satisfy the design criteria at plant power levels of 50%.

C. Provide baseline temperature and/or pressure data in selected points of the plant for future reference.

6.2.22.2 Test Method

This test was performed at the 50% power plateau after plant conditions had been stabilized for 24 hours. The HVAC system status was verified to be in the correct operating mode, and data was taken at the selected points in the plant. Temperatures outside of containment were taken using a hand held thermocouple and containment temperatures were read remotely, using installed RTD's.

6.2.22.3 Test Results

Temperatures were taken throughout the plant in accordance with the procedure. Eighteen RTD's did not meet design criteria. This was believed to be due to high auxiliary cooling water temperatures preventing full loading of the main chillers.

6.2.22.4 Conclusions

Although the temperatures did not satisfy acceptance criteria, they did not exceed technical specifications.

The high temperatures are under review for resolution, and upon resolution parts of the test will be reperformed.

1592 289

6.2.23 BIOLOGICAL SHIELD SURVEY TESTS

6.2.23.1 Purpose

The test was conducted to accomplish the following objectives:

A. Determine background radiation levels prior to initial criticality.

B. Evaluate the adequacy of plant radiation shielding.

C. Determine radiation levels throughout the plant at various power levels.

6.2.23.2 Test Method

A comphrehensive series of gamma and neutron dose rate level surveys, known as the intermediate power shield test, were conducted at steady state power levels between 20% and 50% power.

Dose rate surveys were taken at numerous locations which included but were not limited to the following areas:

A. Locations inside the Reactor Building.

B. Areas adjacent to the Reactor Building wall.

C. Selected points in the Turbine and Auxiliary Building.

Radiation dose rate levels at each measurement point were compared to levels measured at previous power levels and extrapolated at 100% power to identify potential problem areas.

6.2.23.3 Test Results

There were several areas where the design radiation levels were exceeded or were expected to be exceeded. These areas are listed in Table 6.2.23.1 along with suggested actions.

6.2.23.4 Conclusion

Three major acceptance criteria were established to judge radiation dose rate levels.

A. Radiation levels should meet the radiation zoning criteria established by the FSAR.

  a. This criteria was not satisfied for the Intermediate Power Shield Test. See Table 6.2.23.1 for exceptions.

B. Radiation levels in unenclosed areas outside the Reactor Building should not be greater than 0.8 mrem/hr.

  a. This criteria was satisfied for the Intermediate Power Shield Test.

C. Radiation resulting from streaming through penetrations, shielding defects, etc., will not cause a significant hazard to personnel.

  a. This criteria was not satisfied for the Intermediate Power Shield Test. See Table 6.2.23.1 for exceptions.

TABLE 6.2.23.1

AREAS OF HIGHER THAN EXPECTED DOSE LEVELS

	AREAS	PROBLEM	SUGGESTED CORRECTIVE ACTION
1.	Reactor Building Elevation 424' East and West of Canal	Dose Rate is expected to exceed 100 mrem/hr. at 100% power.	These areas are not expected to require frequent or prolonged personnel access during power operation and therefore posting of these areas should be sufficient to ensure personnel protection.
2.	Reactor Building Elevation 405' East and West of Canal.	Dose Rate is expected to exceed 100 mrem/hr. at 100% power.	
3.	Reactor Building Elevation 357' Penetration, Sections 1, 5 & 7	Gamma streaming exceeds 100 mrem/hr. at 50% power or is projected to exceed 100 mrem/hr at 100% power	These penetrations are greater than 6' above the floor and thus normally considered inaccessible to personnel. However, special maintenance could require access to these areas. If measurements at higher power levels confirm that a dose rate in excess of 100 mrem/hr is anticipated at 100% power, then an engineering evaluation should be made to determine if a simple fix could be found to shield these penetrations. If a simple fix is not available, the permanent posting of these penetrations should be adequate.
4.	Reactor Building Elevation 335' Penetration, Section 4		
5.	Auxiliary Building Elevation 354', Section B, Wall Pen Designation 16, Pentrations 4 and 11	Possible Gamma Streaming Problem	Both penetrations are greater than 6' above the floor and extremely difficult to get to. This reading will be rechecked at 100% power to determine whether or not the reading was due to activity in the piping.
6.	Auxiliary Building Elevation 335', Section C, Wall Pen Designation 33, Penetration 32.	Possible Gamma Streaming Problem	Penetration approximately 6' above the floor. Reading may be due to activity in the pipes but this could not be verified since radiation levels in pipes and room were approximate background when attempting to recheck. Will be rechecked at higher power levels.