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ComEd

August 18, 2000

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Startup Report for LaSalle County Station Units 1 and 2 Uprate Power Ascension

References: (1) Letter from R. M. Krich (ComEd) to U.S. NRC, "Request for License Amendment for Power Uprate Operation," dated July 14, 1999.

(2) Letter from D. M. Skay (U.S. NRC) to ComEd, "LaSalle – Issuance of Amendments Regarding Power Uprate (TAC Nos. MA6070 and MA6071)," dated May 9, 2000.

Enclosed, in accordance with Technical Specification 6.6.A.1, "Startup Report," is the LaSalle County Station Units 1 and 2 Uprate Power Ascension Startup Report. The submittal of this report is required within 90 days following completion of the startup program for an amendment to the licenses involving a planned increase in power level.

The power ascension test program performed by Commonwealth Edison (ComEd) Company implements the testing and equipment performance monitoring commitments made by Reference (1).

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The Unit 1 power ascension started May 17, 2000, and was completed on May 21, 2000. Power was increased in one-percent steps until the uprate licensed power level of 3489 megawatts thermal (MWt) was reached. After reaching the new uprate power level a turbine generator power demonstration run and performance warranty test was completed. The uprate power ascension test program was successfully completed with all acceptance criteria being satisfied. All equipment and system performance was in accordance with predictions.

The Unit 2 uprate power ascension test program to installed capacity began on May 23, 2000 and was completed June 8, 2000. The installed capacity was initially determined to be 3434 MWt, with the limiting condition being the Turbine Control Valve (TCV) position. Subsequent to the initial uprate of Unit 2 to installed capacity, degradation of the high pressure feedwater heaters resulted in a reduction in heater performance, thus reducing the steam flow to the main turbine and TCV position. This removed the thermal power limitation based on TCV position and allowed the Unit 2 power ascension test program to be resumed, allowing Unit 2 to achieve the uprate licensed power level of 3489 MWt on July 13, 2000. The uprate power ascension test program to installed capacity was successfully completed with all acceptance criteria being satisfied. All equipment and system performance was in accordance with predictions.

The attached LaSalle County Station Units 1 and 2 Uprate Power Ascension Startup Report summarizes the startup test program and results.

All test data was reviewed in accordance with the applicable test procedures, and exceptions to any results were evaluated to verify compliance with Technical Specification limits and to ensure the acceptability of subsequent test results.

Following the repair of the high pressure heaters and completion of Unit 2 turbine modifications, the Unit 2 power ascension test program outlined in Reference 1 will be completed. A Supplemental Startup Report will be submitted within 90 days of the completion of this testing program.

Should you have any questions concerning this letter, please contact Mr. Frank A. Spangenberg, III, Regulatory Assurance Manager, at (815) 357-6761, extension 2383.

Respectfully,

for

Charles G. Pardee
Site Vice President
LaSalle County Station

Attachment

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – LaSalle County Station

# ATTACHMENT

# LASALLE COUNTY STATION UNITS 1 AND 2

# UPRATE POWER ASCENSION

# STARTUP REPORT

**LaSalle County Station Units 1 and 2**
**Uprate Power Ascension Startup Report**

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## Executive Summary

This Startup Summary Test report is submitted to the Nuclear Regulatory Commission (NRC) in accordance with the requirements of the LaSalle County Station Technical Specification Section 6.0 Administrative Controls, paragraph 6.6.A.1 which requires the submittal of a Startup Report.

The power ascension test program performed by ComEd implements the testing and equipment performance monitoring commitments contained within Licensing Topical Report, "Generic Guidelines for General Electric BWR Generic Power Uprate", NEDC-31897P-A, Class III, May 1992 (LTR-1)," and the letter from R. M. Krich (Commonwealth Edison Company) to the USNRC dated July 14, 1999, "Request for License Amendment for Power Uprate Operation" with Attachment E: General Electric Nuclear Energy, Licensing Topical Report NEDC-32701P, Revision 2, "Power Uprate Safety Analysis Report (SAR) for LaSalle County Station, Units 1 and 2," dated July 1999 (Proprietary).

The LaSalle Power Uprate Project was a zero reactor pressure increase (no increase in the reactor operating pressure) power uprate. As a result, dynamic transient testing associated with pressure increase uprates was not required to be performed at LaSalle.

Power ascension on both units was completed during mid cycle operations. Modifications to Unit 1 were completed during L1R08 in late 1999, thus allowing Unit 1 power ascension to the licensed power level of 3489 MWt. Similar modifications are scheduled for Unit 2 in the L2R08 refueling outage, which is scheduled for November of 2000.

Unit 1 power ascension started May 17, and was completed on May 21, 2000. Power was increased in one-percent steps until the uprate licensed power level of 3489 MWt was reached. After reaching the new uprate power level a Turbine Generator power demonstration run and performance warranty test was completed. The uprate power ascension test program was successfully completed with all acceptance criteria being satisfied. All equipment and system performance was in accordance with predictions.

Unit 2 uprate power ascension test program to installed capacity began on May 23, 2000 and was completed June 8, 2000. The installed capacity was initially determined to be 3434 MWt with the limiting condition being the Turbine Control Valve position.

Subsequent to the uprate of Unit 2 to installed capacity degradation of the 26A/B high pressure heaters resulted in a reduction in heater performance, thus reducing the steam flow to the main turbine and Turbine Control Valve position. With the elimination of this limiting installed capacity condition, the Unit 2 Power Ascension Test Program was revised to allow recovery of MWe. No other Installed Capacity Limiting Condition was reached prior to reaching 3489 MWt on July 13, 2000. After the repair of the 26A/B High

Pressure Heaters and installation of modifications to the main Turbine, the applicable portions of the Unit 2 Power Ascension test will be completed. A revised or Supplemental Startup Report will be submitted within 90 days of the completion of this final phase of testing.

**LaSalle Units 1 and 2 Uprate Power Ascension Startup Report**

## 1.0 Purpose

This Power Uprate Startup Report is submitted to the Nuclear Regulatory Commission pursuant to paragraph 6.6.A.1, Startup Report, which requires:

"A summary report of plant startup and power escalation shall be submitted following ... (2) Amendment to the license involving a planned increase in power level."...
"The report shall in general include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these valves with design predictions and specifications."
"Any corrective actions that where required to obtain satisfactory operation shall also be described."
"Any additional specific details required in license conditions based on other commitments shall be included in this report."
"Startup reports shall be submitted within (1) 90 days following completion of the startup test program ..."

## 2.0 Uprate Power Ascension Program Scope

### 2.1 Program Development

The LaSalle Power Ascension Test Program was developed in accordance with the generic guidelines provided in Licensing Topical Report (LTR) NEDC-31897P-A, Generic Guidelines for General Electric Boiling Water Reactor Power Uprate, the License Amendment Request including the Safety Analysis Report and Power Uprate Project (PUP) Task Report 1005, Startup Recommendations. The power ascension test program also included testing or equipment monitoring recommendations from other PUP Task Reports. According to NEDC-32424P, section 5.11.9, Power Uprate Testing, item (4), "Large transient tests (e.g., isolation) will not be required for uprates less than or equal to 10% of the original licensed thermal power. Initial plant testing and experience during plant operation is considered to be sufficient." Consequently no large transients were included within the LaSalle Uprate Power Ascension Test Program.

The power ascension test program for both units are essentially the same with Unit 2's program being performed in phases. The first phase took Unit 2 to its installed capacity with normal secondary plant configuration. The second phase took it to its licensed capacity with the degraded feedwater heaters. The next phase will take Unit 2 to its licensed power level of 3489 MWt with the normal secondary plant configuration.

The Uprate Power Ascension Test Program verified the following:

- Plant systems and equipment affected by power uprate are operating within design limits.
- Nuclear fuel thermal limits are maintained within expected margins.
- The response of the main steam pressure control system is stable.
- The response of the reactor water level control system is stable.
- The response of the reactor core flow control system is stable and bi-stable core flow is within acceptable limits.
- The feedwater heater drains and level control system is stable.
- Reliable system operation continues, as demonstrated by a 100 hour test run at uprate power level.
- Warranted net gain in electrical output is achieved, as demonstrated by the performance of post and preuprate thermal power testing.
- Radiation levels are acceptable and stable.

## 2.2 Prerequisites to Power Ascension Testing

Prior to the commencement of power ascension testing, the test procedure required the completion of numerous activities, which included:

- The applicable plant operating procedures, administrative procedures, surveillance test procedures, calibration procedures, chemical and radiological procedures and other similar procedures were reviewed and revised as required.
- Computer software programs were reviewed and revised as required to support the power uprate test program.
- The applicable plant instrumentation setpoint changes or recalibrations were completed.
- All plant modifications were reviewed to assure they were completed as required and had no exception which could affect the uprate test program.
- The Out of Service Log, Temporary Modifications log, Operator Work Arounds log, and the Operation Configuration Change log were reviewed to assure there was no effect on uprate testing.
- Baseline data was taken as required by the procedure.
- Commitments which were the result of the Power Uprate Safety Analysis Report (SAR), Power Uprate License Amendment, the NRC Power Uprate Safety Evaluation (SE), and actions resulting from Power Uprate project Task Report review, were verified as either closed, included in the power ascension program or evaluated as not impacting power ascension.

## 2.3 Uprate Power Ascension Testing

Power Ascension was performed in accordance with a LaSalle Special Test Procedure (LST) for each unit. Operator Training and Heightened Level of Awareness (HLA) briefings were completed prior to power ascension for each unit.

Power ascension occurred in 1% power increments for Unit 1 and 0.6% increments for Unit 2, each including a period of data collection and evaluation.

Following each power increase, testing and equipment performance data was collected and evaluated in accordance established acceptance criteria. At each incremental step in power ascension, the following activities were performed:

- Core Thermal Performance data evaluated.
- Reactor pressure control system stability, steam flows limit cycling, and variation in incremental regulation performance data evaluated.
- Turbine-Driven Reactor Feedwater Pump (TDRFP) speed, reactor water level control and the variation in incremental regulation performance data evaluated.
- Electro-Hydraulic Control (EHC) System oil pressure to the Turbine control valve oscillation data evaluated.
- Feedwater heater level control performance data evaluated.
- Bistable reactor recirculation flow data evaluated.
- One Main Turbine Stop Valve (TSV) and Bypass Valve was tested and control system performance data evaluated.
- A complete set of equipment performance data (e.g., control room readings, local readings, process computer and Transient Analysis Data System (TADS) computer data) was collected, evaluated and predictive performance at the next power level determined.
- Radiation surveys performed and evaluated at key points in the power ascension sequence.
- Main Generator stator internal temperatures data collected and evaluated.

After power ascension to 3489 MWt for Unit 1 was completed, a demonstration run was performed followed by two performance tests. One performance test was at 3489 MWt and the other was at 3323 MWt. The difference in electrical generation between these two tests determined the gain in electrical output attributable to uprating the plant.

Due to the fact that modifications had not been performed on Unit 2 balance-of-plant (BOP) systems additional monitoring points and criteria were established for Unit 2 power ascension. Enhanced monitoring of Unit 2 plant equipment, was performed to confirm acceptable operation of plant systems. This monitoring indicated that, with the normal secondary plant configuration, the limiting factor affecting power increases on Unit 2 was the Turbine Control Valve position.

## 2.4 Test Acceptance Criteria (both units)

General Discussion

The development of the power uprate test recommendations and acceptance criteria was based on the review of similar test programs performed at other plants, Chapter 14 of the LaSalle Final Safety Analysis Report (FSAR), the outputs of the NSSS heat balance (PUP Task Report 100) and power flow map (PUP Task Report 201) tasks, the LaSalle Unit 2 Startup Test Program Summary Report, November 1984 and LTR 31987 P-A.

Following each step increase in power level, test data was evaluated against its performance acceptance criteria (i.e., design predictions or limits). If the test data satisfied the acceptance criteria then system and component performance were determined to comply with their design requirements.

Plant parameters during power ascension were evaluated with two levels of acceptance criteria. The criteria associated with plant safety are classified as Level 1. The criteria associated with design expectations are classified as Level 2. The following paragraphs describe the actions required to be taken if an individual criterion is not satisfied.

**Level 1 Acceptance Criteria**

Level 1 acceptance criteria normally relate to the values of process variables assigned in the design of the plant, component systems or associated equipment. If a Level 1 test criterion is not satisfied, the plant must be placed in a hold condition that is judged to be satisfactory and safe, based upon prior testing. Plant operating or test procedures or the Technical Specifications may guide the decision on the direction to be taken. Tests consistent with this hold condition may be continued. Resolution of the problem must be immediately pursued by equipment adjustments or through engineering evaluation as appropriate. Following resolution, the applicable test portion must be repeated to verify that the Level 1 requirement is satisfied. A description of the problem must be included in the report documenting successful completion of the test.

Level 1 acceptance criteria for power ascension included requirements that reactor feedwater flow, reactor water level, reactor pressure and other reactor systems are expected to exhibit stable full power operating

characteristics. This Level 1 acceptance criterion of requiring all plant systems to exhibit normal high power level operating behavior (i.e., stable reactor water level control, feedwater flow and TDRFP speed with acceptable limit cycling if any) is to assure that that this testing stays in a low risk category.

**Level 2 Acceptance Criteria Equipment Performance**

If a Level 2 test criterion is not satisfied, plant operating or test plans would not necessarily be altered. The limits stated in this category are usually associated with expectations of system transient performance whose characteristics can be improved by equipment adjustments. An investigation of the related adjustments, as well as the measurement and analysis methods would be initiated.

If all Level 2 requirements in a test are ultimately met, there is no need to document a temporary failure in the test report; unless there is a lessons learned benefit involved. Following resolution of temporary Level 2 test criterion failures, the applicable test portion must be repeated to verify that the Level 2 requirement is satisfied.

If a certain controller-related Level 2 criterion is not satisfied after a reasonable effort, the control engineers may choose to document that result with a full explanation of their recommendations. This report must discuss alternative actions, as well as concluding recommendations to facilitate evaluation by all related parties.

For the LaSalle Power Uprate, specific Level 2 acceptance criteria were established as detailed in the following paragraphs

EHC/Reactor Pressure Control

Pressure control system deadband, delay, etc., shall be small enough that steady state limit cycles (if any) shall produce steam flow variations no larger than ± 0.5 percent of rated steam flow.
The variation in incremental regulation (ratio of the maximum to minimum value of the quantity, "incremental change in pressure control signal/incremental change in steam flow" for each flow range) should meet the following criteria:

| % of Steam Flow Obtained with Valves Wide Open (VWO) | Variation |
|---|---|
| 0 to 85% | ≤ 4:1 |
| 85% to 97% | < 2:1 |
| 85% to 99% | < 5:1 |

Reactor Water Level and Feedwater (FW) Control

The variation in incremental regulation (ratio of the maximum to the minimum value of the quantity, "incremental change in feedwater flow demand signal/ incremental change in feedwater flow" for each flow range) should not exceed 2:1.

The turbine speed regulation between the feedwater pumps should match within ± 5% of rated speed (the average of their individual speed) over the controllable speed range.

Feedwater control system deadband, delay, etc., shall be small enough that steady state limit cycles (if any) shall not produce narrow range water level variations that exceed ± 1.5 inch.

TDRFP speed during steady state conditions does not exceed 5,050 RPM, (TDRFF electrical high speed stop).

Generator Stator Temperatures

All operable between bus bar RTD's shall be read before exceeding 3323 MWt to establish a current set of baseline temperature data before increasing the load on the generator.

The maximum allowable RTD temperature limit is 77 degrees C. All operable stator cooling outlet thermocouples shall be read before exceeding 3323 MWt to obtain a set of current baseline before increasing generator load. The maximum allowable thermocouple reading is 82 degrees C.

The responsible system engineer shall evaluate the above readings (based upon historical performance data of temperature spread and maximum temperatures) to determine that the maximum allowable temperature will not be exceeded as power level is increased to the next level as required by this procedure.

Bistable Reactor Recirculation Flow

The maximum neutron flux spike associated with bistable flow occurrence shall not exceed 8%.

The maximum recirculation total jet pump flow change associated with bistable flow shall not exceed 3%.

Turbine Stop and Bypass Valve Testing

Peak neutron flux must be at least 7.5% below the scram trip setting. Peak vessel pressure must remain at least 10 psi below the high pressure scram setting. Peak heatflux must remain at least 5.0% below its scram trip point.

Peak steam flow in each line must remain 10% below the high flow isolation trip setting.

The bypass valves should not open during TSV testing

## 2.5 Differences between Unit 1 and Unit 2

### 2.5.1 Differences in Physical Configuration

As previously stated modifications to BOP systems were not performed on Unit 2 prior to power ascension to installed capability. A brief description of modifications which have been installed on Unit 1 during L1R08 and are scheduled for installation on Unit 2 during L2R08 are as follows:

- Modification of the high pressure turbine to increase the steam passing capacity
- Modification of the Turbine Driven Reactor Feed Pumps to eliminate speed restrictions currently in place as a result of GE Technical Information Letter (TIL) 1129
- Modification of the 1(2)4A, Low Pressure Feedwater Heater normal drain valve to the 1(2)3A heater with a valve designed to pass more flow
- Recalibration of Diode Function Generator logic which controls bias to Turbine Control Valves (TCV) to increase the stability of TCV operation at increased steam flow
- Installation of a second Steam Line Resonance Compensator Card to increase the stability of the EHC system at increased power levels.

### 2.5.2 Differences in Test Acceptance Criteria

In order to facilitate power ascension on Unit 2 without the previously listed modifications installed, additional Level 2 acceptance criteria were included in the Unit 2 power ascension test procedure.

1. EHC/Reactor Pressure Control

   In order to ensure stable pressure control, Turbine Control Valve (TCV) position was limited to 56.5% open which equates to 100 millivolts below the Diode Function Generator (DFG) high gain breakpoint during steady state power operation.

2. Level 2 Criteria – Reactor Water Level and Feedwater (FW) Control

   TDRFP speed during steady state conditions was limited to 4,650 RPM due to the fact that modifications to the TDRFP had not been performed.

## 3.0 Unit 1 - Summary of Uprate Testing and Equipment Performance Results

### 3.1 Key Events

**Unit 1 Power Ascension Chronological Sequence of Events**

| No. | Event Description | Date |
|---|---|---|
| 1 | Authorization granted to commence uprate power ascension testing | 05-17-00 |
| 2 | Down power to establish rod pattern for power ascension | 05-17-00 |
| 3 | Start Testing at 3356 MWt | 05-17-00 |
| 4 | Start Testing at 3389 MWt | 05-18-00 |
| 5 | Start Testing at 3423 MWt | 05-19-00 |
| 6 | Start Testing at 3456 MWt | 05-20-00 |
| 7 | Start Testing at 3489 MWt | 05-21-00 |
| 8 | Start 100 Hour Demonstration Run, Test No. 3 | 05-21-00 |
| 9 | Complete Continuous 100 Hour Run, and Test No.3 | 05-25-00 |
| 10 | Start TG Performance Test No. 2 | 06-03-00 |
| 11 | Start TG Performance Test No. 1 | 06-03-00 |
| 12 | TG Performance Test Report Issued | 06-28-00 |

### 3.2 Unit 1 - Testing and Equipment Performance Results

**Unit 1 - Control Systems Performance Results**

Control Systems most affected by uprate were monitored to assure acceptable performance and compliance with their specific Level 1 and 2 acceptance criteria. The following table summarizes these control systems.

**Unit 1 - Control System Performance Results**

| No. | Control System Description | Level 1 Acceptance Criteria | Level 2 Acceptance Criteria | Tuning Adjustments Required |
|---|---|---|---|---|
| 1 | Reactor Water Level Control System | Satisfied | Satisfied | No |
| 2 | EHC and Reactor Pressure Control System | Satisfied | Satisfied | No |
| 3 | Feedwater Heater Level Control System | Satisfied | Satisfied | Yes |
| 4 | Rx. Recirculation and Bi-Stable Flow | Satisfied | Satisfied | No |

**Unit 1 - Equipment Performance Results**

The following systems and selected equipment within these systems most affected by uprate were closely monitored to assure that equipment performed as predicted and that they operated within their design requirements.

**Unit 1 - Equipment Performance Results**

| No. | System Description | Level 1 Acceptance Criteria | Level 2 Acceptance Criteria | Predictive Performance |
|---|---|---|---|---|
| 1 | Condensate System | Satisfied | Satisfied | Acceptable |
| 2 | Condensate Booster System | Satisfied | Satisfied | Acceptable |
| 3 | Feedwater System | Satisfied | Satisfied | Acceptable |
| 4 | Heater Drain System | Satisfied | Satisfied | Acceptable |
| 5 | Main Generator and Alternator | Satisfied | Satisfied | Acceptable |
| 6 | Nuclear Boiler | Satisfied | Satisfied | Acceptable |
| 7 | Reactor Recirculation System | Satisfied | Satisfied | Acceptable |
| 8 | Main Turbine | Satisfied | Satisfied | Acceptable |
| 10 | Main Transformer | Satisfied | Satisfied | Acceptable |
| 11 | Stator Cooling System | Satisfied | Satisfied | Acceptable |
| 12 | Isophase Bus Cooling | Satisfied | Satisfied | Acceptable |
| 13 | TBCCW System | Satisfied | Satisfied | Acceptable |

**Unit 1 - Reactor and Core Performance Results**

1. Core thermal hydraulic parameters were verified to be within Technical Specification limits.

2. During surveillance testing of the TSVs and bypass valves there was no discernable indication of flux spiking or a reactor pressure transient.

3. Core Bi-Stable flow was intermittent with no discernable difference in the magnitude or frequency of its occurrence from historical operating experience.

4. Reactor operation on a higher rod line was stable with no discernable change in reactor performance from pre uprate full power operating conditions other than reduced jet pump flow and total core flows. The core operated in a manner consistent with predictive expectations.

Unit 1 - Radiation and Chemistry Results

Radiation surveys were performed at 3389 MWt and again at 3489 with no measurable change in plant radiation levels from pre uprate full power operating conditions.

Chemistry monitoring (reactor water, condensate water and off gas) continued throughout the uprate power ascension test program with no discernible change from prior full power operating conditions

Unit 1 - Net Gross Electrical Output Gain From Uprate

The net electrical output increased 57 MWE as a result of increasing reactor thermal power from 3323 to 3489 MWt.

## 3.3 Unit 1 - Exceptions

**Equipment and Test Exceptions**

None. All Level 1 and 2 acceptance criteria were satisfied and equipment and system performance behaved in accordance with predictive expectations.

**Administrative Exception**

There was one administrative procedural exception. The power ascension test procedure required the issuance of the Unit 2 procedures concurrently with the Unit 1 procedures. Due to timing differences between issuance of the Power Uprate SE and a required change to the Minimum Critical Power Ratio (MCPR) safety limit for Unit 2, an administrative decision was made to hold distribution of the Unit 2 procedures. The Unit 2 procedures were issued on May 22, 2000 with no impact or delay to either the Unit 1 power ascension test program or the Unit 2 power ascension test program.

## 4.0 Unit 2 - Summary of Uprate Testing and Equipment Performance Results

### 4.1 Key Events

**Unit 2 Power Ascension Chronological Sequence of Events**

| No. | Event Description | Date |
|---|---|---|
| 1 | Authorization granted to commence uprate power ascension testing | 05-23-00 |
| 2 | Down power to establish rod pattern for power ascension | 05-23-00 |
| 3 | Start testing at 3343 MWt | 05-23-00 |
| 4 | Start testing at 3363 MWt | 05-24-00 |
| 5 | Start testing at 3383 MWt | 05-25-00 |
| 6 | Start testing at 3403 MWt | 05-26-00 |
| 7 | Revision 1 of LST-2000-007 Issued | 06-02-00 |
| 10 | Start testing at 3423 MWt | 06-05-00 |
| 11 | Start testing at 3443 MWt | 06-08-00 |
| 12 | Reactor Power Administratively Limited to 3434 MWt to comply with TCV Level 2 Limit | 06-08-00 |
| 13 | Failure of 26A/B heaters resulted in Feedwater temperature reduction and reduced TCV position | 06-25-00 |
| 14 | Authorization granted to raise power to 3489 MWt | 07-10-00 |
| 15 | Start testing at 3454 MWt | 07-11-00 |
| 16 | Start testing at 3474 MWt | 07-12-00 |
| 17 | Start testing at 3489 MWt | 07-13-00 |

### 4.2 Unit 2 - Testing and Equipment Performance Results

**Unit 2 - Control Systems Performance Results**

Control Systems most affected by uprate were monitored to assure acceptable performance and compliance with their specific Level 1 and 2 acceptance criteria. The following table summarizes these control systems.

**Unit 2 - Control System Performance Results**

| No. | Control System Description | Level 1 Acceptance Criteria | Level 2 Acceptance Criteria | Tuning Adjustments Required |
|---|---|---|---|---|
| 1 | Reactor Water Level Control System | Satisfied | Satisfied | No |
| 2 | EHC and Reactor Pressure Control System | Satisfied | Satisfied | No |
| 3 | Feedwater Heater Level Control System | Satisfied | Satisfied | Yes |
| 4 | Rx. Recirculation and Bi-Stable Flow | Satisfied | Satisfied | No |

**Unit 2 - Equipment Performance Results**

The following systems and selected equipment within these systems most affected by uprate were closely monitored to assure that equipment performed as predicted and that they operated within their design requirements.

**Unit 2 - Equipment Performance Results**

| No. | System Description | Level 1 Acceptance Criteria | Level 2 Acceptance Criteria | Predictive Performance |
|---|---|---|---|---|
| 1 | Condensate System | Satisfied | Satisfied | Acceptable |
| 2 | Condensate Booster System | Satisfied | Satisfied | Acceptable |
| 3 | Feedwater System | Satisfied | Satisfied | Acceptable |
| 4 | Heater Drain System | Satisfied | Satisfied | Acceptable |
| 5 | Main Generator and Alternator | Satisfied | Note 1 | Acceptable |
| 6 | Nuclear Boiler | Satisfied | Satisfied | Acceptable |
| 7 | Reactor Recirculation System | Satisfied | Satisfied | Acceptable |
| 8 | Main Turbine | Satisfied | Satisfied | Acceptable |
| 10 | Main Transformer | Satisfied | Satisfied | Acceptable |
| 11 | Stator Cooling System | Satisfied | Satisfied | Acceptable |
| 12 | Isophase Bus Cooling | Satisfied | Satisfied | Acceptable |
| 13 | TBCCW System | Satisfied | Satisfied | Acceptable |

Note 1: Three stator thermocouple (T/C) readings indicate at or near Level 2 criteria. However, these 3 T/C historically read high, were evaluated by Engineering as acceptable prior to commencement of power ascension and are considered to be a preexisting condition. All remaining T/C readings satisfied their acceptance criteria.

**Unit 2 - Reactor and Core Performance Results**

1. Core thermal hydraulic parameters were verified to be within Technical Specification limits.

2. During surveillance testing of the TSVs and bypass valves there was no discernible indication of flux spiking or a reactor pressure transient.

3. Core Bi-Stable flow was intermittent with no discernable difference in the magnitude or frequency of its occurrence from historical operating experience.

4. Reactor operation on a higher Flow Control Line (FCL) was stable with no discernable change in reactor performance from pre uprate full power operating conditions other than reduced jet pump flow and total core flows. The core operated in a manner consistent with predictive expectations.

Unit 2 - Radiation and Chemistry Results

Radiation surveys were performed at 3363 MWt, 3403 MWt and again at 3489 MWt with no measurable change in plant radiation levels from pre uprate full power operating conditions.

Chemistry monitoring (reactor water, condensate water and off gas) continued throughout the uprate power ascension test program with no discernable change from prior full power operating conditions

Unit 2 - Net Gross Electrical Output Gain From Uprate

The net electrical output increased 37 MWE as a result of increasing reactor thermal power from 3323 to the installed capability of 3434 MWt. Subsequent to the completion of the initial phase of power ascension, degradation of the 26A/B Feedwater heaters resulted in a reduction in FW temperature. Unit 2 is currently at the maximum thermal power level of 3489MW. Further increases in electrical output will be performed subsequent to repairs to the 26A/B heaters as well as completion of Power Uprate modifications to the Turbine generator.

## 4.3 Unit 2 - Exceptions

Equipment and Test Exceptions

There were none during phase 1, all Level 1 and 2 acceptance criteria were satisfied and equipment and system performance behaved in accordance with predictive expectations with no anomalies. The three high reading stator T/C are considered a preexisting condition and had been evaluated as acceptable prior to commencement of power ascension and are not considered a power uprate test or equipment performance exception.

Administrative Exceptions

There were none.

## 5.0 Application of the FSAR Initial Startup Test Program to the LaSalle Power Uprate Project

### 5.1 General Discussion

The LaSalle PUP Safety Analysis Report section 10.4, Required Testing requires "This report will include ...brief discussions as to why it was not necessary to repeat specific tests listed in USFAR Section 14, during the power uprate test program." This section of the Uprate Startup Test addresses this requirement with respect to the Power Uprate Project. The FSAR Section 14 addresses the LaSalle initial startup test program. The initial startup test program was divided into three main parts. They are: Construction tests and Equipment Demonstrations, Preoperational tests and System Demonstrations, and Startup Tests and Operational Demonstrations. Each of these programs is discussed in the following paragraphs with respect to the LaSalle Power Uprate Project.

#### 5.1.1 Construction Tests and Equipment Demonstrations

Construction tests (safety related) are those tests, which demonstrate that safety-related equipment meets functional operability requirements. These tests cover a wide variety of checks to assure that components are properly installed and adjusted according to manufacturers instructions, Architect Engineering drawings and specifications, satisfy code requirements, comply with FSAR requirements, etc. They include but are not limited to tests such as: hydrostatic pressure tests, electrical megger tests, load tests, cleanliness inspections, rotational tests, alignment tests, etc.

Equipment demonstrations (non-safety-related) are those tests used to demonstrate that non-safety-related equipment meets functional operability performance requirements.

As applies to the PUP, this category of tests is conducted as part of the modification process. These tests are included within the installation directions and are included in the modification (software) package. Required construction tests for PUP modifications were successfully completed as part of the modification closure process.

#### 5.1.2 Preoperational Tests and Operational Demonstrations

Preoperational test (safety-related) are those tests conducted prior to fuel loading to demonstrate that the plant has been properly designed and constructed, and that the safety-related structures, systems and components meet safety-related performance requirements.

System demonstrations (non-safety-related) consist of those tests conducted to demonstrate that non-safety-related system and components function as required to meet normal plant operating requirements.

This category of tests is conducted as part of the post modification testing process. Power Uprate modifications were successfully completed as part of the modification closure process.

### 5.1.3 Startup Tests and Operational Demonstrations

**FSAR Requirements**

Startup Tests are safety-related tests and consist of such activities as fuel loading, pre-critical tests, critical and low power tests and power ascension tests that ensure fuel loading in a safe manner, confirm the design bases, demonstrates where practical that the plant is capable of withstanding the anticipated transients and postulated accidents, and ensure that the plant is safely brought to rated capacity and sustained power operation.

**LaSalle Power Uprate Startup Program Development**

The following was used in establishing uprate testing requirements, based on Power Uprate Project Task Report 1005.

The development of the power uprate test recommendations and acceptance criteria is based on the review of similar test programs performed at other plants, Chapter 14 of the LaSalle FSAR, the outputs of the NSSS heat balance (PUP Project Task Report 100) and power flow map (PUP Project Task Report 201) tasks, the LaSalle Unit 2 Startup Test Program Summary Report, November 1984 and the PUP LTR1. From the total population of tests identified in the preceding programs, a set of tests were selected for further evaluation and incorporation into the LaSalle uprate test program. The effect of the power uprate at LaSalle on the operational parameters, performance characteristics and acceptance criteria of these tests were examined. If the test was potentially impacted by power uprate, it was then evaluated for applicability and inclusion within the LaSalle Uprate Power Ascension Test Program. This evaluation resulted in a final set of test recommendations to be performed during the initial ascension and operation at full 105% uprated power.

The recommendations are the result of a test selection process that is based upon a review of the original startup test program and changes resulting from the power uprate of the LaSalle plant. The tests and equipment performance monitoring included in these recommendations fall into the following categories:

1. Tests involving control systems with specific performance expectations assumed in the power uprate transient analyses and specific performance expectations for operational considerations,

2. Tests affected by power uprate,

3. Tests required based on engineering judgement, and

4. Performance monitoring of equipment impacted by power uprate.

In general, most of these tests can be satisfied by completion of existing surveillance or functional tests, performance of instrumentation calibration and equipment setup, evaluation of the results of post modification testing, or through steady state data collection as part of normal system monitoring.

**Transient Testing**

As applies to the PUP and allowed by the SAR, system transient and control system dynamic response testing to demonstrate acceptable system performance was performed during the Unit's startup from their last outage as part of post modification testing. Post modification test data was reviewed to assure compliance with the acceptance criteria for power ascension testing for uprate affected equipment. Required post modification power ascension tests for PUP modifications were successfully completed as part of the Unit startup from the last refueling outage. Similar testing for Unit 2 modifications will be performed as part of the startup from L2R08, which is scheduled for Fall of 2000.

**Comparison of Power Uprate Tests to FSAR Power Ascension Tests**

As required by the SAR, the following Table addresses each of the initial power ascension tests and their applicability to the LaSalle Uprate Power Ascension Test Program. Tests identified with a yes were incorporated in the LaSalle Uprate Test program unless credit was taken for another activity (i.e., surveillance test), that satisfies the requirement.

**Results of FSAR Initial Startup Testing Evaluation**
**For Inclusion In**
**The Uprate Power Ascension test Program**

| Test No. | Power Ascension Test Description | Required In Uprate Test Procedure(1) | Acceptance Criteria Same as FSAR |
|---|---|---|---|
| 101 | Chemical and Radiochemical | Yes (2) | Yes |
| 102 | Radiation Measurements | Yes | Yes |
| 103 | Fuel Loading | No | NA |
| 104 | Full Core Shutdown Margin | No | NA |
| 105 | Control Rod Drive System | No | NA |
| 106 | SRM Performance and Control Rod Sequence | No | NA |
| 107 | Water Level Measurements | No | NA |
| 108 | Intermediate Range Monitor Performance | No | NA |
| 109 | Local Power Range Monitor Calibration | No | NA |
| 110 | Average Power Range Monitor Calibration | Yes | Yes |
| 111 | Process Computer | Yes | Yes |
| 112 | Reactor Core Isolation Cooling System | No | NA |
| 113 | Selected Process Temperatures | Yes | Yes |
| 114 | System Expansion | No | NA |
| 115 | Core Power Distribution | Yes | Yes |
| 116 | Core Performance | Yes | Yes |
| 117 | Steam Production | Yes | Yes |
| 118 | Core Power-Void Mode Response | No | NA |
| 119 | Pressure Regulator | Yes (3) | Yes |
| 120 | Feedwater Control System | Yes (3) | Yes |
| 121 | Turbine Valve Surveillance | Yes | Yes |
| 122 | Main Steam Isolation Valves | No | NA |
| 123 | Relief Valves | No | NA |
| 124 | TSV Trips and Generator Load Rejections | No | NA |
| 125 | Shutdown From Outside The Control Room | No | NA |
| 126 | Recirculation Flow Control System | No | NA |
| 127 | Recirculation System | No | NA |
| 128 | Loss Of Turbine Generator and Offsite Power | No | NA |
| 129 | Deleted | NA | NA |
| 130 | Vibration Measurements | No | NA |
| 131 | Deleted | NA | NA |
| 132 | Recirculation System Flow Calibrations | No | NA |
| 133 | Reactor Water Cleanup System | No | NA |
| 134 | Residual Heat Removal System | No | NA |
| 135 | Control Rod Sequence Exchange | No | NA |
| 136 | Drywell Piping Vibrations | No | NA |
| 137 | Off-Gas System | No | NA |

Notes (1) From Task Report 1005, Startup Test Recommendations, Testing Required
(2) Credit Taken for Surveillance Monitoring Program
(3) Credit Taken for post modification testing