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U. S. Nuclear Regulatory Commission
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Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Response to Request for Additional Information
Regarding Post-Power Uprate Startup Testing

Gentlemen:

By application dated December 19, 2000, Entergy Operations, Inc. submitted an "Application for License Amendment to Increase Authorized Power Level." On June 1, 2001, NRC personnel from the Quality Assurance, Vendor Inspection, Maintenance and Allegations Branch requested written responses to five questions regarding the post-outage startup testing portion of the December 19, 2000, application. Attachment 1 to this letter contains the responses to the NRC Staff questions. Attachment 2 lists the regulatory commitments contained in this submittal.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

Dale E. James
Acting Director, Nuclear Safety Assurance

DEJ/dwb
Attachments

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**Response to Request for Additional Information
Regarding Post-Power Uprate Startup Testing**

NRC Question 1

According to WCAP-10263, "A Review Plan for Uprating the Licensed Power of a Pressurized Water Reactor Power Plant," Section 3.3.1.k:

Plant Testing - Numerous qualification and performance tests were completed for the initial startup to assure that all systems/components of the BOP [balance of plant] and NSSS [nuclear steam supply system] are in compliance with the design and licensing bases for the unit. These tests also establish the operating margins of the plant systems. It will be necessary to verify that the performance of any system/component modifications are in compliance with the requirements of the uprating and the licensing bases. The recommended test program for NSSS and interfacing BOP systems would be developed on a plant specific basis, depending upon the magnitude of hardware modifications and the magnitude of the uprating.

Please send us your power uprate testing program (e.g., power ascension test program for Cycle 15 and 16). Section 9.11 of the application does not contain enough testing details for the NRC staff to determine the adequacy of the power uprate testing program. Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," Revision 2, August 1978, provides guidelines for a testing program. However, Regulatory Guide 1.68 is not a requirement.

ANO Response

ANO-2 Technical Specification (TS) 6.9.1.1 requires, in part, that a summary report of plant startup and power escalation be submitted to the NRC following (2) amendment to the license involving a planned increase in power level, (3) installation of fuel that has a different design or has been manufactured by a different fuel supplier, and (4) modifications that may have significantly altered nuclear, thermal, or hydraulic performance of the plant.

During refueling outage 2R14 in the fall of 2000, ANO-2 altered the nuclear, thermal, or hydraulic performance of the unit by installing replacement steam generators. Following refueling outage 2R15 (i.e., the beginning of Cycle 16) scheduled for the spring of 2002, ANO-2 will uprate power by 7.5%. Additionally, beginning in Cycle 16 Erbia will be used as an integral burnable poison. ANO-2 fuel has used Gadolinia as an integral burnable poison since Cycle 13. Prior to Cycle 13, B4C pellets were used as a poison.

Following replacement of the station's steam generators during refueling outage 2R14, a Startup Report was submitted (see letter 2CAN060106 dated June 11, 2001). This report summarizes those tests determined to be required under TS 6.9.1.1(4). Additional testing

was performed during restart and will continue through Cycles 15 and 16. A similar report will be provided following the 2R15 Power Uprate outage. Development of the ANO-2 test program was based upon a review of the ANO-2 Safety Analysis Report (SAR), scope of the modifications performed, scope of testing completed during other steam generator replacements and power uprate projects, and industry experience from startup testing. Based upon these reviews, the following test program was developed.

CYCLE 15 TEST PROGRAM

Pre-Critical Tests

- 2R14 Startup Requirements (sequencing procedure for modifications and testing to support mode changes)
- Unit 2 Containment Structural Integrity Test and Code Pressure Test
- Spillover, Shutdown Cooling Vortexing Test
- Pump Curve Data Collection for 2P-7B (motor driven emergency feedwater pump)
- Service Water/Auxiliary Cooling Water Flow Balancing and Testing
- Nuclear Steam Supply System Heat Loss Test
- Reactor Coolant System Chemistry
- Steam Generator Chemistry
- Reactor Building Ventilation Testing
- Inside Reactor Building Thermal Expansion Measurements/Walkdowns
- Steam Generator Blowdown Testing
- Pressurizer Spray Valve Bypass Valve Setting
- Chemical and Volume Control System Integrated Test
- Pressurizer Spray Effectiveness Test
- Pressurizer Heat Loss Test
- Control Element Drive Mechanism Cooling Performance Test
- Vibration and Loose Parts Monitoring System Test
- Steam Dump and Bypass Control System Post Modification Testing
- Hot Functional Steady State RCS Flow Determination

Power Range Tests

- Unit Load Transients and LTC (Long Term Cooling) Validation
- Replacement Steam Generator Moisture Carryover Test
- Vibration/Temperature Data Collection and Walkdowns Inside Containment
- Vibration/Thermal Expansion Measurements and Walkdowns Outside Containment
- Secondary Performance Testing
- Isophase Cooling Testing
- Steam Dump and Bypass Control System Valve Capacity Testing
- Steam Dump and Bypass Control System Testing (System Level)
- Biological Shield Surveys

- Feedwater Control System/Reactor Regulating System Power Ascension Testing for the Replacement Steam Generators
- Cycle 15 Replacement Steam Generator Performance Testing
- Reactor Coolant System Flowrate Determination

CYCLE 16 TEST PROGRAM

Pre-Critical Tests

- Replacement Steam Generator Thermal Expansion Test
- Control Room Inleakage Tracer Gas Test
- Hot Functional Steady State Reactor Coolant System Flow Determination
- Control Element Drive Mechanism Performance
- Reactor Coolant System Chemistry
- Steam Generator Chemistry
- Incore Instrumentation Measurements
- Comparison of Plant Protection System, Core Protection Calculators and Process Computer Input

Low Power Physics Tests

- Isothermal Temperature Coefficient
- Control Element Assembly Group Worth
- Boron Worth
- Critical Configuration Boron Concentrations

Power Range Tests

- Power Uprate Data Collection/Design Prediction Test - (Sequencing procedure for testing with power ascension administrative controls)
- Variable T_{avg} (Isothermal Temperature Coefficient and Power Coefficient)
- Steady State Core Performance
- Comparison of Plant Protection System, Core Protection Calculators and Process Computer Inputs
- Verification of Core Protection Calculator Power Distribution Related Constants
- Biological Shield Surveys
- Vibration/Data Collection Inside Containment
- Vibration Testing Outside Containment
- Unit Load Transients and LTC (Long Term Cooling) Validation
- Replacement Steam Generator Moisture Carryover Test
- Cycle 16 Replacement Steam Generator Performance Testing
- Unit 2 Maximum Dependable Capability Test
- Reactor Coolant System Flowrate Determination

NRC Question 2

Will the power increases beyond the previous rating be in increments of 5% (or less)? Will steady-state operating data be taken and evaluated at each increment?

ANO Response

Yes, ANO will increase power in 2.5% increments from 90% to 100% reactor power. Steady-state operating data will be evaluated against design predictions and any discrepancies resolved prior to proceeding with power ascension. The Test Working Group made up of senior ANO plant management and experienced testing personnel will review any significant testing deficiencies or anomalies before recommending power ascension to each of the plateaus. Completion of required testing, review and approval of testing results, resolution of testing deficiencies, and approval to proceed in power ascension will be controlled by a special work plan.

NRC Question 3

Will steady-state data be taken at points from 90% up to the previous rated thermal power so that operating performance parameters can be projected for uprated power before the previous power rating is exceeded?

ANO Response

Yes, ANO will make projections based upon actual plant data from our current 100% power level of 2815 megawatts thermal to the new 100% power level of 3026 MWt. These projections support our power uprate design and form the basis for the acceptance criteria at each power plateau level specified, (90%, 92.5%, 95%, 97.5%, and 100% of rated power).

NRC Question 4

Will the control system tests be made at the previous rated power condition and at each 5% power increment to show acceptable adjustment and operational capability?

ANO Response

Yes, most of the control system design changes that support steam generator replacement and power uprate were completed and tested during Cycle 15. Minor tuning and setpoint design changes are planned for Refueling Outage 2R15. These will require Steady State control system monitoring/testing to be performed at 90%, 92.5%, 95%, 97.5% and 100% of uprated conditions. Unit Transient testing and Long Term Cooling validation will also be performed.

NRC Question 5

Will the same performance criteria be used as in the original power ascension tests for the control systems?

ANO Response

The control system performance criteria that were used for Cycle 15, and will be used for Cycle 16, are similar to the original power ascension tests, but not exactly the same. The high-level performance criteria (e.g., not causing trips or safety system actuations) have remained the same. Several of the system specific performance criteria requirements have changed since the original startup because of physical changes to the plant control systems and operating methods. These changes are summarized in the following statements.

- Since the Reactor Regulating System was disabled, the T_{avg} vs. T_{ref} value was changed from $\pm 0.1^{o}$ F to $\pm 2^{o}$ F at steady state conditions.

- Since the Feedwater Control System was replaced, the control system performance criteria were changed from $\pm$ 1% > 20% full power and $\pm$ 5% $\leq$ 20% full power to $\pm$ 1% for all power levels > 2% steady state conditions.

- The Pressurizer Level control performance criterion was changed from the Programmed Level Value $\pm$ 1% at steady state conditions to the Programmed Level Value $\pm$ 2% above 20% power.

- The Pressurizer Pressure control performance criterion was changed from 2250 $\pm$ 15 psi at steady state conditions to 2200 $\pm$ 10 psi.

Attachment 2

Licensee Identified Commitments for 2CAN080108

COMMITMENT	TYPE	
	One-Time Action	Continuing Compliance
A similar report [Startup Test Report] will be provided following the 2R15 Power Uprate outage.	✓	
Yes, ANO plans to increase power in 2.5% increments from 90% to 100% reactor power. Steady-state operating data will be evaluated against design predictions and any discrepancies resolved prior to proceeding with power ascension. The Test Working Group made up of senior ANO plant management and experienced testing personnel will review any significant testing deficiencies or anomalies before recommending power ascension to each of the plateaus. Completion of required testing, review and approval of testing results, resolution of testing deficiencies, and approval to proceed in power ascension will be controlled by a special work plan.	✓	
Yes, ANO will make projections based upon actual plant data from our current 100% power level of 2815 megawatts thermal to the new 100% power level of 3026 MWt. These projections support our power uprate design and form the basis for the acceptance criteria at each power plateau level specified, (90%, 92.5%, 95%, 97.5%, and 100% of rated power).	✓	
Minor tuning and setpoint design changes are planned for Refueling Outage 2R15. These will require Steady State control system monitoring/testing to be performed at 90%, 92.5%, 95%, 97.5% and 100% of uprated conditions. Unit Transient testing and Long Term Cooling validation will also be performed.	✓	