**Entergy Operations, Inc.**
1448 S.R. 333
Russellville, AR 72802
Tel 479-858-4710

**David B. Bice**
Acting Manager, Licensing
Arkansas Nuclear One

2CAN031005

March 25, 2010

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Licensee Event Report 50-368/2010-001-00
Condition Prohibited by Technical Specifications – Inoperable Core Protection Calculator
Arkansas Nuclear One – Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Pursuant to the requirements of 10CFR 50.73(a)(2)(i)(B), attached is the subject Licensee Event Report concerning a condition prohibited by Technical Specifications due to an inoperable Core Protection Calculator.

There are no new commitments contained in this submittal. Should you have any questions concerning this issue, please contact me.

Sincerely,

DBB/slc

Attachment: Licensee Event Report 50-368/2010-001-00

cc: Mr. Elmo Collins
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, GA 30339-5957
LEREvents@inpo.org

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 8/31/2010

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)



| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Arkansas Nuclear One, Unit 2 | 05000368 | 1 OF 4 |

**4. TITLE** An Incorrect Core Protection Calculator Addressable Constant Induced By Personnel Error Resulted In A Condition Prohibited By Technical Specifications

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 02 | 01 | 2010 | 2010 | 001 | 00 | 03 | 25 | 2010 | FACILITY NAME | DOCKET NUMBER |

**9. OPERATING MODE**

1

**10. POWER LEVEL**

100

**11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:** (Check all that apply)

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER- Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| David B. Bice, Acting Manager, Licensing | 479-858-4710 |

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| A | JC | DCC | C490 | N | | | | | |

**14. SUPPLEMENTAL REPORT EXPECTED**

☐ **YES** (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ **NO**

| 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|
| | | | |

**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On February 1, 2010, during the performance of Channel 'C' Core Protection Calculator (CPC-C) Triannual Channel Functional Test, Operations was required to reload Type 1 addressable constants into CPC-C. During the reload of the Type 1 addressable constants, a numerical value of 1.0207 for computer point (PID) 063 (Azimuthal Tilt Allowance) was obtained from the CPC-C Addressable Constant Log Book. PID 063 was manually set to a value of 1.0207 and CPC-C was then observed to successfully pass the software check sum and cross channel checks. After all CPC-C addressable constants were reloaded, the functional test was completed, and CPC-C was declared OPERABLE at 1606 Central Standard Time (CST) on February 1, 2010. On February 2, 2010, at 0430 CST, following a power reduction to approximately 70 percent for planned maintenance, CPC-C was placed in bypass to perform a linear power calibration. During this calibration, Operations identified that an incorrect value for PID 063 had been previously entered into CPC-C. The value for PID 063 in CPC-C was subsequently changed from 1.0207 to the correct value of 1.03, with no notable changes observed in the CPC-C calculations. CPC-C was removed from bypass and restored to OPERABLE status on February 02, 2010 at 0453 CST. An operability evaluation later determined that the CPC-C was inoperable with the incorrect addressable constant installed.

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Arkansas Nuclear One – Unit 2 | 05000368 | 2010 | - 001 - | 00 | 2 OF 4 |

NARRATIVE

A. Plant Status

At the time the incorrect addressable constant was entered into the 'C' Core Protection Calculator (CPC-C) on February 1, 2010, Arkansas Nuclear One – Unit 2 (ANO-2) was operating near 100 percent power. ANO-2 commenced a power reduction to approximately 70 percent power for planned maintenance at 2159 Central Standard Time (CST) on February 1, 2010. On February 2, 2010, when the incorrect addressable constant was identified, ANO-2 power level was approximately 70 percent. At the start of the subject event, there were no additional inoperable structures, systems, or components that contributed to the event.

B. Event Description

The ANO-2 Combustion Engineering design utilizes four Core Protection Calculators (CPC) [JC][DCC]. The primary safety functions of the CPCs are to provide low Departure from Nucleate Boiling Ratio (DNBR) and high Linear Power Density (LPD) reactor trips that assure that Specified Acceptable Fuel Design Limits are not exceeded during Anticipated Operational Occurrences, and to assist the Engineered Safety Features System [JE] in limiting the consequences of certain postulated accidents. These functions are accomplished when 2 out of the 4 CPC channels reach the LPD or DNBR setpoints. The CPC design incorporates a reactor core Azimuthal Power Tilt Allowance to account for "side to side" asymmetry in the core power distribution, which affects the CPC calculations of LPD and DNBR. Since the CPCs are unable to independently determine core tilt, the Azimuthal Power Tilt Allowance is set to a value that bounds the actual core tilt measured by the Incore Detector System [IG]. The actual core tilt is continuously monitored by the Core Operating Limits Supervisory System (COLSS) [ID]. To ensure conservative CPC tilt allowance is maintained, a "CPC Azimuthal Tilt Exceeded" annunciator is provided to alert operators when actual core tilt monitored by COLSS exceeds a setpoint which is more conservative than the CPC tilt allowance. If the "CPC Azimuthal Tilt Exceeded" annunciator is received, manual operator action is required to change the tilt allowance computer point (PID) 063 in each CPC.

On February 1, 2010, during the performance of the CPC-C Triannual Channel Functional Test, Operations was required to reload Type 1 addressable constants into CPC-C. An ANO-2 Licensed Operator obtained and loaded the addressable constants into CPC-C as directed by a Control Room Supervisor. During the reload of the Type 1 addressable constants, the Licensed Operator obtained a numerical value of 1.0207 for PID 063 (which was the last Azimuthal Power Tilt Allowance used in the previous operating cycle) from the CPC-C Addressable Constant Log Book. CPC-C PID 063 was incorrectly set to 1.0207 instead of a value of 1.03, which was the current applicable value for the present operating cycle. After all CPC-C addressable constants were reloaded, CPC-C was observed to successfully pass the software check sum and cross channel checks. The functional test was completed and CPC-C declared OPERABLE at 1606 CST on February 1, 2010.

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Arkansas Nuclear One – Unit 2 | 05000368 | 2010 | - 001 - | 00 | 3 OF 4 |

Event Description – continued

On February 2, 2010, at 0430 CST, following a power reduction to approximately 70 percent for planned maintenance, CPC-C was placed in bypass to perform a linear power calibration. During this calibration, Operations noted that an incorrect value for PID 063 had been previously entered into CPC-C. PID 063 was subsequently changed from 1.0207 to the correct value of 1.03 in CPC-C, with no notable changes observed in the CPC-C calculations. CPC-C was removed from bypass and restored to OPERABLE status at 0453 CST on February 2, 2010. An operability evaluation later determined that CPC-C was inoperable with the incorrect addressable constant installed. This condition existed for a period of 12.4 hours without CPC-C being set to the trip or bypass condition, and resulted in a condition prohibited by the ANO-2 Technical Specification (TS). The TS states that if the number of operable CPC channels is one less than the total number of channels, operation in the applicable mode may continue provided the inoperable channel is placed in the bypassed or tripped condition within one hour.

C. Apparent Causes

An Apparent Cause Evaluation concluded that the procedure and process for CPC addressable constant changes lacked sufficient barriers to preclude the resultant human performance error. The process did not require an independent verification of the addressable constant change. Human performance errors associated with work practices and document use resulted in the incorrect identification of the addressable constant for CPC-C PID 063 in the Addressable Constant Log Book. The incorrect constant was copied from the Addressable Constant Log Book onto another procedure form, then entered into CPC-C PID 063 without a documented independent verification. Additionally, the Apparent Cause Evaluation documented that the error occurred during a higher than normal workload period as the Operating Crew was making preparations for a planned maintenance power reduction.

D. Corrective Actions

A human performance error review was conducted with the involved individuals. The Apparent Cause Evaluation determined that an evaluation of procedure changes to incorporate independent verification requirements when changing CPC addressable constants would be appropriate. Additionally, the Apparent Cause Evaluation recommended a review of multiple work group processes associated with computer or controller inputs to determine if the proper barriers exist to prevent similar events.

E. Safety Significance

During the 12.4 hours that the CPC-C was determined to be inoperable and not bypassed, the Channel ‘A’ CPC was bypassed for approximately 35 minutes to perform Channel ‘A’ linear power calibration. Following restoration of Channel ‘A’ CPC, Channel ‘B’ CPC was bypassed for approximately 9 minutes to perform Channel ‘B’ linear power calibration.

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Arkansas Nuclear One – Unit 2 | 05000368 | 2010 | - 001 - | 00 | 4 OF 4 |

Safety Significance - continued

The TS one-hour allowed outage time for CPC "number of channels OPERABLE one less than the Minimum Channels OPERABLE" requirement was not exceeded during the linear power calibration of Channels 'A' and 'B'. During the remainder of the subject 12.4-hour time period, three CPC channels were OPERABLE. A review of the Plant Data Server archives indicates the maximum value of actual core tilt during the subject time period was approximately 1.02 percent. CPC-C was available during the subject time period to provide the low DNBR and high LPD reactor trip functions with the applied tilt allowance of 2.07 percent being slightly less conservative than the tilt allowance of 3 percent applied to the other three CPCs, but more conservative than the actual tilt that existed in the core. If actual core tilt had exceeded the "CPC Azimuthal Tilt Exceeded" alarm setpoint of 2.88 percent during the subject time period, an annunciator would have prompted Operator action to evaluate the PID 063 Azimuthal Tilt Allowance in all four CPCs. No safety limits were challenged or exceeded during the event. Systems or components needed to safely shutdown the reactor, maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, and mitigate the consequences of an accident were available.

F. Basis for Reportability

10 CFR 50.73(a)(2)(i)(B) - "Any operation or condition which was prohibited by the plant's Technical Specifications except when:

(1) The Technical Specification is administrative in nature;

(2) The event consisted solely of a case of a late surveillance test where the oversight was corrected, the test was performed, and the equipment was found to be capable of performing its specified safety functions; or

(3) The Technical Specification was revised prior to discovery of the event such that the operation or condition was no longer prohibited at the time of discovery of the event."

G. Additional Information

A review of the Licensee's corrective action program and previous Licensee Event Reports for the previous 3 years was performed and revealed one similar event.

On March 19, 2007, a condition was identified where PID 064 in Channel 'A' CPC was found to be different than the documented PID 064 value in the 'A' CPC change log. The value in the CPC was determined to be correct, and the value in the change log was determined to be a human performance error resulting in 2 digits being transposed in the change log. This event is documented in the Licensee's corrective action program as CR-ANO-2-2007-0483.

Energy Industry Identification System (EIIS) codes and component codes are identified in the text as [XX].