Entergy

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 501 858 5000

2CAN120302

December 8, 2003

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

SUBJECT: 60-Day Report for ANO-2 Reactor Pressure Vessel Head Inspection for Refueling Outage 2R16
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCES:

1. NRC letter dated February 11, 2003, *Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors, EA-03-009* (0CNA020302)
2. NRC letter to Entergy dated October 3, 2003, *Relaxation Request From NRC Order EA-03-009 for the Vessel Head Penetration Vent Line* (CNRI-2003-0013)
3. NRC letter to Entergy dated October 9, 2003, *Relaxation Request From NRC Order EA-03-009 Regarding the Bare Metal Visual Examination* (2CNA100306)
4. NRC letter to Entergy dated October 9, 2003, *Relaxation Request From NRC Order EA-03-009 for the Control Element Drive Mechanism Nozzles* (CNRI-2003-0014)
5. NRC letter to Entergy dated October 9, 2003, *Relaxation Request From NRC Order EA-03-009 for the Incore Instrument Nozzles* (CNRI-2003-0015)

Dear Sir or Madam:

On February 11, 2003, the Nuclear Regulatory Commission (NRC) issued an Order addressing inspection requirements for reactor pressure vessel (RPV) heads at pressurized water reactors (Reference 1). The NRC stated that the actions in the Order are interim measures, necessary to ensure that licensees implement and maintain appropriate measures to inspect and, as necessary, repair RPV heads and associated penetration nozzles. Section

A101

IV.E of the Order requires licensees to submit a report detailing the inspection results within sixty (60) days after returning the plant to operation. Arkansas Nuclear One, Unit 2 (ANO-2) resumed operation on October 13, 2003. The attachment to this letter provides the details of the recent ANO-2 reactor vessel head inspection from refueling outage 2R16. In summary, Entergy did not identify any boric acid leakage or primary water stress corrosion cracking as a result of the ANO-2 RPV head inspections conducted during 2R16.

This letter contains no NRC commitments. If you have any questions or require additional information, please contact Steve Bennett at 479-858-4626.

Sincerely,

Sherrie R. Cotton

Sherrie R. Cotton
Director, Nuclear Safety Assurance

SRC/sab

Attachment:
60-Day Response to Order EA-03-009 on ANO-2 RPV Head Inspection for Refueling Outage 2R16

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

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

U. S. Nuclear Regulatory Commission
Attn: Mr. Thomas W. Alexion MS O-7D1
Washington, DC 20555-0001

Mr. Bernard R. Bevill
Director Division of Radiation
Control and Emergency Management
Arkansas Department of Health
4815 West Markham Street
Little Rock, AR 72205

**Attachment to**

**2CAN120302**

**60-Day Response to Order EA-03-009 on ANO-2 RPV Head Inspection for Refueling Outage 2R16**

## 60-Day RV Head Inspection for ANO-2 Refueling Outage 2R16

Arkansas Nuclear One, Unit 2 (ANO-2) is a CE designed unit with Alloy 600 reactor pressure vessel (RPV) head penetrations which is subject to NRC Order EA-03-009 (Reference 1). Entergy either complied with the Order or sought relaxation in accordance with the Order where necessary. NRC approvals of the 2R16 Order relaxations, including augmented inspection requirements, are documented in References 2 through 5. Entergy performed inspections of the ANO-2 RPV head during refueling outage 2R16 which was conducted in the fall of 2003. In accordance with Section IV.E of the Order, licensees are required to submit a report detailing the inspection results within sixty (60) days after returning the plant to operation. The following provides the results of the 2R16 inspections performed on ANO-2.

| Inspection Area | Inspection Method | Extent of Inspection | 2R16 Findings |
|---|---|---|---|
| Visual Inspection of RPV Head | Visual Inspection Above Cooling Shroud<br>[Ref. 1] | Inspect the CEDM, ICI and vent line penetrations for boric acid from above the cooling shroud. | Inspections of the RPV CEDM, ICI and vent line nozzles above the cooling shroud were performed. Boroscopic inspections between certain nozzles were also conducted to confirm cleanliness of the shroud. No boric acid deposits were identified. |
| | Visual Inspection of RPV Head Flange<br>[Ref. 1] | Inspect the peripheral portion of the head and flange external to the cooling shroud. | A visual inspection of the external surface of the RPV head flange was conducted. No boric acid deposits were identified. |
| | Visual Inspection Inside the Cooling Shroud<br>[Ref. 1 and 3] | Inspect the CEDM nozzles to the extent practical for boric acid deposits above and around the insulation. This inspection was not a BMV inspection. | A visual inspection inside the cooling shroud was conducted including the peripheral CEDM nozzles visible from the shroud access doors. No boric acid deposits were identified. |
| | BMV of ICI Nozzles<br>[Ref. 1 and 3] | Perform a 360° BMV inspection around the ICI nozzles from inside the cooling shroud. | A BMV inspection of the 8 ICI nozzles at the annulus was conducted using visual and boroscopics techniques. No boric acid deposits were identified. |

| | | | |
|---|---|---|---|
| NDE of CEDM Penetrations (81) | UT of Nozzle Wall<br>[Ref. 1 and 4] | Inspect 2" above the J-weld to the blind zone of the CEDM nozzle. | A Westinghouse open housing UT probe was used to perform the examinations. The exams did not reveal any PWSCC indications in the CEDM nozzles. |
| | UT of J-Weld (Triple Point Exam)<br>[Ref. 1 and 3] | Examine extent of J-weld next to nozzle to 0.060" depth. | The open housing UT probe did not reveal any PWSCC indications to be present in the 81 CEDM J-welds. |
| | Manual ECT of Nozzle Blind Zone<br>[Ref. 1 and 4] | Examine blind zone outside diameter on 75 of 81 nozzle ends near the threaded region of the nozzles. | A manual ECT exam was conducted on the exterior surface of the nozzle by various delivery techniques. No indications of PWSCC were identified. |
| | LF ECT of Nozzle Annulus<br>[Ref. 1 and 3] | Examine a minimum of 1.5" below the counter-bore using an acceptance criterion of 0.060" wastage depth. | The LF ECT was conducted on each of the CEDM nozzles using the open housing probe. The exam did not reveal any loss of carbon steel indicative of wastage. |
| | UT of Nozzle Annulus (Leakage Assessment)<br>[Ref. 1] | Interrogate interference fit in the nozzle annulus above the J-weld for leak path assessment. | The open housing probe examination did not reveal any leak path present in the annulus region of the CEDM nozzles. |

| | | | |
|---|---|---|---|
| NDE of ICI Penetrations (8) | UT of Nozzle Wall<br>[Ref. 1 and 5] | Inspect 2" above the J-weld (except for counter-bore liftoff) to the blind zone of the ICI nozzle. | The open housing probe UT examination did not reveal any PWSCC indications in the 8 ICI nozzles. |
| | Manual PT of Nozzle Blind Zone<br>[Ref. 1 and 5] | Inspect lower extent of the blind zone on the 8 ICI nozzles. | Manual PT exams were conducted on the nozzles at the blind zones. Two nozzles had initial indications that required further examination. The indications were subsequently removed by grinding and PT cleared. The indications were determined to be weld inclusions and not PWSCC. |
| | UT of Nozzle Annulus (Leakage Assessment)<br>[Ref. 1] | Interrogate interference fit in nozzle annulus above the J-weld for leakage path. | The open housing probe examination did not reveal any leak path present in the annulus region of the ICI nozzles. |

| | | | |
|---|---|---|---|
| NDE of Vent Line Penetration (1) | ECT of Wetted Surface Area<br><br>[Ref. 1 and 2] | Perform ECT of wetted surface of vent line. | The ECT examination did not reveal any indications of PWSCC on the weld or nozzle. |
| | LF ECT of Nozzle Annulus (Leakage Assessment)<br><br>[Ref. 1] | Examine a minimum of 1.5" below the top of the head to 0.060" depth for wastage. | The LF ECT did not reveal any leak path or loss of carbon steel indicative of wastage. |

Legend:

BMV = Bare Metal Visual

CEDM = Control Element Drive Mechanism

ECT = Eddy Current Examination

ICI = Incore Instrument

LF ECT = Low Frequency Eddy Current Examination

NDE = Non-Destructive Examination

PT = Dye Penetrant Examination

PWSCC = Primary Water Stress Corrosion Cracking

UT = Ultrasonic Examination