

April 11, 2002

MEMORANDUM TO: Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Jack N. Donohew, Senior Project Manager, Section 2
Project Directorate IV **/RA/**
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: CONFERENCE CALL WITH WOLF CREEK NUCLEAR OPERATING CORPORATION ON THE REACTOR PRESSURE VESSEL HEAD INSPECTION PLAN TO MEET NRC BULLETINS 2001-01 AND 2002-01 FOR THE WOLF CREEK GENERATING STATION (TAC NO. MB4592)

Wolf Creek Generating Station began a refueling outage on Friday, March 22, 2002. On March 26, 2002, the NRC staff and the licensee had a conference call to discuss the licensee's plans for assessing the condition of their reactor pressure vessel head in response to NRC Bulletins 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," and 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity." The plant is a low susceptibility plant for Bulletin 2001-01. Attached is the inspection plan sent by the licensee to the NRC staff by e-mail in support of the call. The inspection plan is Revision 0, dated March 24, 2002. There will be another call with the licensee on the results of the inspection of the head.

During the call, the licensee explained their plan as follows: (1) the examination will include a 100 percent effective visual examination of the carbon steel surfaces of the reactor pressure vessel head including an examination around the entire circumference of the vessel head penetrations (i.e., 360-degree coverage); (2) the 100 percent effective visual examination is as defined in Bulletin 2001-01; (3) the examination of the vessel head penetrations (VHPs) will be capable of detecting and discriminating small amounts of boric acid deposits from VHP leaks, such as were identified at the Oconee Nuclear Station; (4) the examination method and personnel will be qualified; and (5) the method uses a robotic crawler that will go under the insulation on the reactor vessel head. The initial visual examination was scheduled to be completed by April 1, 2002.

At the end of the conference call, the NRC staff observed that the susceptibility ranking developed by the industry to address vessel head penetration cracking (as discussed in NRC Bulletin 2001-01) involved susceptibility to the development of circumferential cracks. Furthermore, the NRC staff indicated that the findings at Davis-Besse (as discussed in NRC Bulletin 2002-01) may be the result of an axial through-wall crack in a nozzle and that information related to the rate of degradation (i.e., formation of the cavity) was still under investigation. The NRC raised these issues to make sure the licensee had considered them in their inspection plans. The licensee stated that they had considered them.

The licensee further stated that the inspection plan sent in the March 25, 2002, e-mail may change after this call based on the outage schedule, and that the licensee has made no commitments to the NRC staff during the conference call.

The sections on purpose, reference documents, definitions, examination method, examination qualification, examination and acceptance criteria, contractor information, responsibilities, and sub-work orders for head examination of the inspection plan are attached to the e-mail dated March 25, 2002. The contingency contact list (i.e., the contractor's name, address, and telephone number), purchase order, and contractor name has been deleted because it is not needed to understand the licensee's inspection plan.

Docket No. 50-482

Attachment: E-mail dated March 25, 2002

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Docket No. 50-482

Attachment: E-mail dated March 25, 2002

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EMAIL DATED MARCH 25, 2002

From: Petersen Kenneth R <kepeter@WCNOC.com>
To: "Jack Donohew" <jnd@nrc.gov>
Date: 3/25/02 4:55PM
Subject: Wolf Creek Head Examination Plan

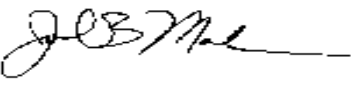
Attached is the examination plan for our bare head examination. All of our Word Perfect experts are unavailable, so I saved it from Microsoft Word in "Word Perfect 5.x for Windows" format. If you can not open this, please let me know and I will send it again.

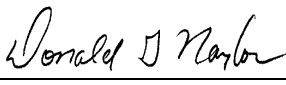
<<HEAD EXAMINATION PLAN.doc>>





REACTOR VESSEL HEAD VISUAL EXAMINATION PLAN

RF-12

Prepared by:  3-24-02
John Makar, Supervisor, Support Engineering

Reviewed by:  3/25/2002
Don Naylor, Senior Engineer, Support Engineering

Approved by:  3-24-02
Fred Hall, WCNOC Level III

Concurred by:  3/25/2002
Ed Peterson, QC Supervisor

Approved by:  3-25-2002
Kevin Scherich, Manager, Support Engineering

Reactor Pressure Vessel Head Visual Examination

Purpose

The purpose of this plan is to prescribe the Effective Visual Examination of the carbon steel surfaces of the Reactor Vessel closure head, as described in NRC Bulletin 2001-01. The examination extent shall be 100% of the vessel head penetrations (VHP) and 100% of the accessible surfaces of the head carbon steel surfaces.

The effective visual examination will provide reasonable assurance that PWSCC degradation of the CRDM nozzles or J-groove welds will be detected prior to posing an undue risk.

The effective visual examination will also determine if there are any areas of wastage on the head attributable to boric acid corrosion.

Work Order (WO) 02-234623-000 has been initiated to perform the effective visual of the closure head. Specific examination requirements, including applicable elements of this plan, are included in that WO. Associated Sub-Work Orders (SWO) are provided in this plan description.

Reference Documents

NRC Bulletin 2001-01: Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles

NRC Bulletin 2002-02: Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity

Draft EPRI Document 1006899, "Update: Visual Examination for Leakage of PWR Reactor Head Penetrations on Top Head"

ASME Section XI, "Inservice Inspection" 1989 Edition, No Addenda

QCP 30-103, "Qualification and Certification of Examination Personnel

STN PE-40D, "BACINS Walkdown for RCS Pressure Boundary Integrity"

Definitions

Effective Visual Examination: An examination of 100% of the vessel head penetration nozzles that is capable of detecting and discriminating small amounts of boric acid deposits from vessel head penetration leaks, such as were identified at ONS2 and ONS3 (Oconee Nuclear Stations 2 & 3). Reference NRC Bulletin 2001-01.

Tightly adherent boron residue: That boron residue which is not easily removable by brushing, blowing, vacuuming, etc. If the boron residue precludes determination of the condition of the base material below the residue, it shall be considered tightly adherent and must be removed to complete the visual exam.

Reactor Pressure Vessel Head Visual Examination

Examination Method

- The effective visual shall be performed utilizing remote and direct visual examination techniques. The examination will be performed as a supplement to the performance of STN PE-40D. This examination method meets or exceeds the visual examination requirements found in ASME Section XI.
- Additional examination requirements delineated in this Inspection Plan are supplemental to the approved procedure (STN PE-40D), and shall be included in WO 02-234623-000.
- The examination results shall be recorded and vaulted with the implementing Work Order.
- The remote visual examinations will be recorded using digital and/or analog recording media. Relevant indications and as found conditions of direct visual exams will be photographed.

Examination Qualification

Prior to examination, remote visual examination systems shall be qualified to demonstrate visual resolution capabilities. The demonstration record shall record the distance at which a 1/32" increment on a Starrett machinist scale is resolved. Equivalent resolution demonstrations are allowable as approved by the WCNOCLIII Visual Examiner.

Direct visual examination shall be performed with sufficient access and illumination to detect relevant indications as defined in this plan and the invoking WO.

Personnel performing the Effective Visual Examination shall be certified to a minimum LII VT-2 in accordance with QCP 30-103. This procedure meets or exceeds the qualification requirements found in ASME Section XI, 1989 Edition.

- Prior to examination, VT-2 personnel shall review the draft EPRI document 1006899.
- The WCNOCLIII will review and approve the results of this examination.

There are no WCNOCLIII certification or qualification requirements for the vendor equipment operators

Examination and Acceptance Criteria

The following relevant indications shall be evaluated:

1. Evidence of boron buildup on the carbon steel surfaces of the RV head
2. Evidence of wastage from boric acid being in contact with the carbon steel
3. Evidence of primary leakage through the CRDM nozzles

The protocol described in AP 16F-001, Boric Acid Corrosion Inspection (BACINS) Program, shall be followed for this examination.

Reactor Pressure Vessel Head Visual Examination

Per section 6.2 of the BACINS procedure:

- The examiner shall initiate a WR for areas with boron residue due to boric acid leakage. Multiple components and leaks may be listed on a single WR. SWO 02-234623-001 has already been initiated for this purpose for this examination; no additional WRs need to be initiated by the examiners. SWO 02-234623-001 will be revised to reflect areas identified with tightly adherent boron residue.
- Maintenance Support will clean the affected areas and components as necessary to remove the tightly adherent boric acid residue using approved methods. The origin of the boron deposits shall be determined to the extent practical.
- IF wastage or other degradation is noted, the maximum depth and extent of the affected area shall be determined by maintenance and/or Quality Control. A picture of the degradation shall be taken. This information shall be provided to the BACINS engineer.
- The BACINS engineer shall initiate a WR to document the degraded condition, and code the WR as a non-conforming condition, if applicable.
- SWO 02-234623-002 has been initiated for the purpose of recording the engineering evaluation and disposition of the identified degradation, in accordance with AP 16F-001.
- If boric acid residue is suspected of originating in the annulus of a CRDM penetration (from a CRDM leak), additional NDE shall be performed as directed by the BACINS engineer and the NDE Level III. A PIR shall be initiated immediately if CRDM leaks are suspected.

Contractor Information

[The Purchase Order (PO)] was issued on March 23 to bring [the contractor] on site to support the remote visual exams. The PO scope includes remote visual examination equipment and the equipment operators. The [contractor] personnel are NOT certified NDE examiners.

Brooks will be providing four personnel to help facilitate this examination. Two Brooks personnel will be on days, and two on nights, to provide 24-hour coverage.

The remote examination crawler is approximately 5" wide x 6½" long x 1¼" tall. The crawler has three cameras on it – one looking forward, one to the right, and one to the left. Currently, there are no additional capabilities for this crawler beyond remote visual examination.

The [contractor] personnel have used this remote visual examination system, referred to as BTRIS (Brooks Top of Reactor Head Inspection System), at seven nuclear plants prior to bringing the system to WCNO.

Reactor Pressure Vessel Head Visual Examination

Responsibilities

Support Engineering is responsible for:

- Developing and maintaining the effective visual examination plan and scope.
- Performing project management functions for implementation of the effective visual examination.
- Providing BACINS engineers to evaluate and disposition areas identified with Boron residue during the effective visual examination.
- Providing vendor oversight and coordination.

Quality Control NDE Group is responsible for:

- Providing certified VT-2 examiners to perform effective visual examination.
- Reviewing and approving the effective visual examination plan and scope for technical adequacy.
- Performing the effective visual examination of the RV Head.

Reactor Pressure Vessel Head Visual Examination

~~SWO #02-234623-000~~

Sub-Work Orders for Head Examination off #02-234623-

| SWO | RESP GROUP | TASK | STATUS | FIELD WORK COMPLETE DATE |
|------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------|
| -000 | QC | Perform Visual Exams | | |
| -001 | Maint. Suppt. | Contingency – remove boric acid deposits as directed by engineering. | | |
| -002 | Sup. Eng. | Contingency – evaluate boric acid accumulation or corrosion identified by the visual exams. | | |
| -003 | Maint. Suppt. | Contingency – remove and reinstall mirror insulation as needed to provide access to RV head. | | |
| -004 | Maint. Suppt. | Contingency – remove and reinstall CRDM shroud as needed to provide access to RV head. | | |
| -005 | Room 210 | Contingency – Develop a modification package to cut access ports in the RV head insulation to support remote visual examination | | |