Exit Notes

Introductions (name/title) - Pederson, Holmberg, Bilik

Interim Exit Meeting, For the baseline ISI and TI-150 and TI-152 inspections. This inspection began on April 5th and next Wednesday.

- **Purpose/Scope:** - This inspection fulfilled the baseline inspection program requirements for the biennial review of the Unit 1 inservice inspection (ISI) activities (IP 7111108). The intent of this inspection was to confirm the effectiveness of your program for monitoring degradation of the reactor coolant system. To this end, we performed direct observations of your inservice inspection activities such as pzr spray line piping, fw piping weld ultrasonic examinations, and steam generator tube eddy current examinations. Our scope also included a review of your NDE records from past ISI examinations, Code component repair/replacement records and interviews with your NDE staff.

  In addition to the baseline ISI we completed the activities as identified in the NRC Temporary Instruction 152 focused on your lower vessel head examinations. The upper and lower vessel head examinations were prompted by industry experience with cracking of the penetration nozzles and/or corrosion of the upper and lower reactor vessel heads. For our review in this area we performed direct observations of your head inspection activities, review of non-destructive examination records, and interviews with your NDE staff. Our review scope also included review of your susceptibility ranking calculation.

- **Report Documentation-** The results of this inspection will be documented in the second quarter Resident Report of 2004003. In completing TI-150 and TI-152, the level of documentation required in the inspection report differs from the baseline inspection procedures. Specifically, our observations of your head inspection and repair activities will be included in the report and will form the basis to answer a set if questions associated with the quality and scope of your vessel head examination which will be discussed at our final exit meeting next Wednesday.

- **Issues:** As a result of this inspection at this point we have one issues characterized as potential violation of very low safety significance (Green). In addition we have a number of observations related to your vessel head examinations. Lastly we have some general observations and minor issues which will not be documented in our report, but that we intend have shared with your staff and I will cover these during my exit meeting unless you do not wish to hear them.

ISI Inspection Program:

- Inappropriate Reliance on Surface Examinations of Welds in the Risk Based ISI Program.

  The risk based ISI program represents a fundamental shift from the deterministic weld selection methodology in the ASME Code to one that is risk based and focused on identification of degradation modes in your piping systems. It typically results in a substantial reduction in the total number of weld examinations required for a site saving dose and cost. This reduced number of welds increases the importance of selection of appropriate welds and performance of appropriate examinations.

  By letter dated July 3, 2003, NMC requested approval of ISI RR#3 to use a risk informed ISI program iaw EPRI TR-112657 as an alternative to the Code for Class 1 and 2 piping welds for Point Beach. The NRC approved this request under provisions allowed in CFR 50.55a(3)i as an acceptable alternative program which would provide for a comparable level of safety. In EPRI TR-112657, table 4-1, volumetric examinations of welds is identified as the approved examination technique to be performed on welds in your risk based program. Contrary to these requirements on January 14, 2003 surface examinations of two Unit 1 SI system welds, completed in September 2002, were credited as risk based weld examinations. By crediting these exams, your staff potentially reduced the minimum number of volumetric examinations needed under this program. This is considered a violation of 10 CFR 50.55a and of more than minor significance because if this practice had continued it could have resulted in changing the technical basis for your approved risk based ISI program and allowed flawed risk significant piping welds to remain in-service. Because this program was only recently implemented and your staff took actions to not credit these surface examination, this issue did not challenge the integrity of your program monitoring the RCPB and would be of very low safety significance (Green). This characterization is subject to NRC management review.

- We also have the following observations which will not be documented in our report related to your ISI program.

+ Example of good use of industry information (IN-91-05) associated with potential cracking of SI accumulator level line nozzles. ISI program incorporated examinations which identified potential cracking and appropriate repairs were implemented.

+ Observed competent oversight/observation of ISI field exams by PA personnel.

+ Observed well trained appropriately equipped contractors using procedures which met Code requirements for pressurizer spray line UT weld exams.

+ Noted safety focus decisions and appropriate NDE related to identification of wood in containment concrete at a spare electrical containment penetration Q15.

+ Noted appropriate application of 10 CFR 50.55a for investigation of potential boric acid corrosion in inaccessible areas of the containment (1CH-10) liner under the sloped floor area of the sump.

+ SG ET performed in accordance to procedures and program that meet latest industry standards and TS requirements. Appropriate oversight of contractors by NMC competent and knowledgeable NMC staff.

– Noted that radiographs were not available to NDE exam personnel for pressurizer spray line welds to aid in resolving weld indications.

– Noted some minor discrepencies with Code requirements in some visual NDE procedures. Most notably VT-1 procedure (NDE-750) which narrowly focused recordable leakage indications to carbon steel fasteners.

– Identified one example where Code NIS-2 form was not documented for Code piping component replacement at the SI accumulator level lines. Minor Code violation.

– No formal tracking system exists for issuing NRC relief requests and you have accumulated risk significant piping welds such as RC-10-AC-1001-03, AC-10-SI-1001-19, which need Code relief due to exam limitations. I also noted that failure to submit relief for these exams appears contrary to your ISI program document (SEM 7.11.1 Inservice Inspecction Plans and Reports). which indicates that you intend to submit relief requests within six months of identification to the NRC.

Questions?
Proprietary Information?
This concludes part 1 of my exit.

Upper Vessel Head Examination (TI-150):

To evaluate the your efforts in conducting examination of the reactor vessel head and penetration nozzles, we performed a number of direct observations of your contractor staff and reviews of procedures and data. We have previously provided assessments and conclusions to most of the questions and areas required to be reviewed under this TI. I now intend to cover our final conclusions with regard to the questions to be addressed in our report for TI-150.
inch head vent.

c. Findings

Partial Data Acquisition Due To Coupling Slippage.

On September 16, 2003, the licensee contractor identified (Framatome NCR 6028873-Lack of UT Coverage During U1R27 RPV Inspection) that, during the Unit 1 RPV head ultrasonic inspection in September 2002, stalling of the rotating ultrasonic probe head due to coupling slippage resulted in partial data acquisition in 10 of the 16 CRDM nozzles.

This issue was documented in the licensee's corrective action system as CA053202 and CE012362. Corrective actions to prevent recurrence (redesigned coupling, backup analysts) were implemented during the current Unit 2 outage. The licensee also performed an analysis of the coverage limitations and determined that there was sufficient Unit 1 data for the testing results to remain valid. The licensee also planned to conduct an ultrasonic inspection of the CRDM nozzles during the next Unit 1 outage (U1R28). This issue will be a URI pending the inspectors' review of the licensee's analysis and results of the U1R28 nozzle examination (URI 05000266/2003009-01).

Lower Vessel Head Examination (TI-150):

To evaluate the your efforts in conducting examination of the lower reactor vessel head and penetration nozzles, we performed a number of direct observations of your contractor staff and reviews of procedures and data. We have previously provided assessments and conclusions to most of the questions and areas required to be reviewed under this TI. I now intend to cover our final conclusions with regard to the questions to be addressed in our report for TI-150.

.2 Temporary Instruction 2515/152, RPV Lower Head Penetration Nozzles (NRC Bulletin 2003-02)

a. Inspection Scope

On August 21, 2003, the NRC issued Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity." The purpose of this Bulletin was to: (1) Advise PWR licensees that current methods of inspecting the RPV lower heads may need to be supplemented with additional measures (e.g., bare-metal visual inspections) to detect reactor coolant pressure boundary leakage; (2) request PWR addressees to provide the NRC with information related to inspections that have been or will be performed to verify the integrity of the RPV lower head penetrations, and; (3) require PWR addresses to provide a written response to the NRC in accordance with the provisions of Section 50.54(f) of Title 10 of the Code of Federal Regulations (10 CFR 50.54(f)).

The objective of TI 2515/152, "Reactor Pressure Vessel Lower Head Penetration Nozzles," was to support the NRC review of licensees' RPV lower head penetration inspection activities that were implemented in response to Bulletin 2003-02. The licensee had committed to perform a bare metal inspection of the lower vessel head for Unit 1 in response to the NRC Bulletin 2003-02. The inspectors performed a review in accordance with TI 2515/152 Revision 0, of the licensee's procedures, equipment, and personnel used for RPV lower head penetration examinations to confirm that the licensee met commitments associated with Bulletin 2003-02. The results of the inspectors' review included documenting observations and conclusions in response to the questions identified in TI 2515/152.

From April 5, 2004, through April 23, 2004, in an office on the 8 foot level of the technical support building (unless otherwise stated), the inspectors reviewed, of the licensee's activities associated with inspecting the Unit 1 lower vessel head. Specifically, the inspectors:

- performed a direct visual examination of the nozzle-to-head interface for portions of each of the 36 bottom head penetrations inside the Unit 1 containment from a staging platform under the reactor vessel ;
- interviewed nondestructive examination personnel in the head inspection trailer within the site protected area;
- reviewed the lower head visual inspection procedure NDE-757 "Visual Examination For Leakage of Reactor Pressure Vessel Penetrations;"
- reviewed the certification records for the nondestructive examination personnel;
- reviewed the licensee's procedure for certification of visual examination personnel; and
- reviewed visual examination and evaluation of indication records.

b. Observations

Summary

Based upon a bare metal remote visual examination of the lower head, the licensee did not identify evidence of reactor coolant system leakage near the instrument nozzle penetrations. One quadrant of the vessel at the 270 to 360 degrees azimuth had evidence of corrosion stains that were caused by rundown from liquid sources above the bottom of the vessel. The licensee believed that this was from condensed moisture corrosion of the vessel support steel. A few penetrations in this quadrant were contacted by this rust stain, but it did not result in any debris/deposits at the nozzle-to-head interface.

Evaluation of Inspection Requirements

In accordance with requirements of TI 2515/152, the inspectors evaluated and answered the following questions:

a. For each of the examinations methods used during the outage, was the examination:

1. Performed by qualified and knowledgeable personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity.)

Yes. The licensee conducted a direct visual examination of the Unit 1 RPV lower head penetration interface and RPV lower head surface for leakage or boric acid deposits with knowledgeable staff members certified to Level III as VT-2 examiners. One examiner was a licensee staff member certified to licensee procedure NDE-3 "Written Practice For Qualification And Certification For NDE Personnel" and the other was a licensee contractor certified to the contractors procedure 2-NDES-001 "Nondestructive Examination Personnel Qualification and Certification." These qualification and certification procedures met the industry standard ANSI/ANST CP-189 "Standard for Qualification and Certification of Nondestructive Testing Personnel." Additionally, each of the VT-2 examination personnel had reviewed photographs of the boric acid deposits indicative of penetration leakage found at the South Texas Nuclear Power Plant.

2. Performed in accordance with demonstrated procedures?

Yes. The licensee performed a bare metal inspection of the lower head in accordance with procedure NDE-757 "Visual Examination For Leakage of Reactor Pressure Vessel Penetrations." The licensee considered this procedure to be demonstrated because there examination personnel could resolve the lower case alpha numeric characters 0.158 inches in

height at a maximum of 6 feet under existing lighting to meet Code VT-2 inspection criterion.

However, the inspector identified parameters that could impact the quality/effectiveness of the inspection and were not controlled by the procedure. Specifically, the procedure did not provide:

- specific guidance or reference to when and how to samples deposits if any had been identified near the interface of lower head penetrations. Specifically, no guidance for when samples would be taken, how samples would be collected and what analysis would be performed to determine the source of deposits identified. The licensee instead relied on a BMI Inspection Decision Tree to ensure that these activities would have been accomplished.

- specific guidance to identify recordable indications of corrosion or wastage if it had been present on the lower head. Note that no significant corrosion or wastage was present based upon the NRC inspectors inspection of the head.

- provide useful orientation and penetration numbering figure/schematic for the BMI penetrations. Specifically, the procedure used a top down schematic vice a bottom up picture (view that examiners would have) and the BMI numbers marked by examination personnel did not match the designated numbers on vendor drawings. The licensee had physically marked each penetration with numbers (1 through 36) to assist in the lower head examination.

The inspectors performed an independent direct bare metal visual examinations for most of the 36 lower head penetration nozzles. This inspection was conducted a platform under the vessel head and the inspectors determined that each penetration was readily accessible such that the visual examination could be performed within a few inches of each penetration location. Additionally, the inspectors reviewed a sample of licensee photographs taken at each penetration nozzle. Based upon this inspection and interviews with inspection staff, the inspectors did not identify any concerns associated with implementation of the visual inspection procedure for the lower head.

3. Able to identify, disposition, and resolve deficiencies?

Yes. The lower vessel at the 270 to 360 degree (south) quadrant contained corrosion stains in a pattern that suggested a flow of liquid had run down from a source above the lower head. This flow pattern

impacted several lower head penetrations. In most cases this flow pattern did not cover the VHP interface because of a raised metal pad that extended for several inches around the surface of the lower vessel head at each penetration. Based upon the visual examination, the licensee did not identify any penetrations with deposits.

4. Capable of identifying pressure boundary leakage as described in the bulletin and/or RPV lower head corrosion?

Yes. The inspectors performed a direct visual inspection of portions of the 36 lower VHPs. Based on this examination, and interviews with licensee examiners, the inspectors concluded that the visual examination was capable of detecting deposits indicative of pressure boundary leakage as described in the bulletin.

b. Could small boric acid deposits representing reactor coolant system leakage as described in the Bulletin 2003-02, be identified and characterized, if present by the visual examination method used?

Yes. If small boric acid deposits characteristic/indicative of leakage had existed, the licensee's examination would have identified these. However, no boric acid deposits indicative of leakage were identified.

c. How was the visual inspection conducted (e.g., with video camera or direct visual by examination personnel).

Licensee examination personnel conducted a direct visual examination of each of the lower head penetration nozzles. This examination included a bare metal visual examination of the lower head up to the transition to the vertical vessel shell wall. The licensee examiner reported that he was looking for evidence of boric acid deposits or corrosion for this inspection. However, as discussed above there was no specific direction in the procedure for when lower head corrosion/wastage would be recorded.

d. How complete was the coverage (e.g., 360 degrees around the circumference of all the nozzles)?

The examination coverage included a 360 degree unobstructed examination of each of the 36 lower head penetration nozzles at the interface of the vessel head. The entire lower head was accessible for a visual inspection to identify corrosion and wastage.

e. What was the physical condition of the RPV lower head (e.g., debris, insulation, dirt, deposits from any source, physical layout, viewing obstructions)? Did it appear that there are any boric acid deposits at the interface between the vessel and the penetrations?

The Point Beach Unit 1 reactor pressure vessel is installed with mirror-type insulation at the lower dome. The original insulation configuration conformed with the contour of the lower vessel dome with a 3 inch gap between the vessel and insulation. Each BMI penetration had a slight gap that varies in size and is normally covered by metal flashing. The licensee intended to install a revised lower head insulation structure with a tub type configuration (e.g. horizontal insulation floor with vertical walls). This revised insulation design provided for access doors in the vertical and horizontal walls to allow access for future bare metal head inspections. For the Unit 1 inspection, all of the lower insulation had been removed to provide unobstructed access to the BMI penetrations.

The inspectors observed scattered patches of what the licensee staff believed was an corrosion resistant coating applied to the RPV by the head fabricator prior to installation. The remnants of this coating did not interfere with the inspection. The lower vessel at the 270 to 360 degree quadrant contained corrosion and stains in a pattern that suggested a flow of liquid had run down from a source above the lower head.

f. What material deficiencies (i.e., crack, corrosion, etc.) were identified that required repair?

None. No boric acid deposits indicative of leakage were identified and thus no repairs were required.

g. What, if any, impediments to effective examinations, for each of the applied nondestructive examination method, were identified (e.g., insulation, instrumentation, nozzle distortion)?

The direct visual examination required access to the RPV lower head and instrument nozzle penetrations by climbing down a ladder, into the keyway (a sump area under the vessel). This area was a confined space, a high radiation area, and was congested by the instrument tubes and their supports. Scaffold had been installed to support removal of the lower insulation and to allow access for direct inspection of the BMI penetrations. With the insulation removed, each penetration was accessible from this platform for direct visual inspection.

h. Did the licensee perform appropriate follow-on examinations for indications of boric acid leaks from pressure-retaining components above the RPV lower head?

The licensee did not identify indications of boric acid leakage from pressure-retaining components above the lower head.

i. Did the licensee take any chemical samples of the deposits? What type of chemical analysis was performed (e.g. Fourier Transform Infrared(FTIR)), what constituents were looked for(e.g., boron, lithium, specific isotopes), and what were the licensee's criteria for determining any boric acid deposits were not from RCS leakage (e.g., Li-7, ratio of specific isotopes, etc.)?

The licensee did not identify any boric acid deposits on the lower head and thus did not perform any chemical samples.

j. Is the licensee planning to do any cleaning of the head?

The licensee planned to clean the head with deionized water rags and scotch-bright pads.

k. What are the licensee's conclusions regarding the origin of any deposits present and what is the licensee's rationale for the conclusions?

The licensee did not identify any deposits on the Unit 1 lower head during RFO 28. The inspectors questioned the licensee staff as to the source of the corrosion and stains in a pattern that suggested a flow of liquid had run down from a source above the lower head at the 270 to 360 degree quadrant. The licensee staff stated that they believed that this flow pattern was the result of condensed moisture which had run down the side of the vessel from corrosion occurring on the vessel support steel. The licensee had not been able to visually confirm the source of these rust contrails due to the narrow gap between the vessel wall and mirror insulation.

In July of 2003, the licensee had documented in CAP 034123 identification of boric acid deposits at the lower head insulation seams and where the BMI tubes penetrated the insulation. The licensee concluded that the likely leak source for these deposits was the sand box covers or top hat covers in the refueling cavity (e.g. refueling water seal leakage) and that this leakage would not likely contact the vessel. The licensee had chemically tested the boric acid found on the lower head insulation seams and based on the absence of lithium confirmed that source of boric acid deposits was not reactor coolant leakage.